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Prevalence of asthma and allergic diseases in children aged 6-7 in the Kingdom of Bahrain

Reasons for under-reporting of notifiable communicable diseases in the Kingdom of Bahrain: a health-centers based survey

Asthma knowledge, attitude and prescribing behavior of primary health care physicians in the Kingdom of Bahrain

Attitudes of primary care physicians towards insulin initiation in people with type 2 diabetes

Primary colorectal anastomosis, no preparation, no stoma needed

Non-compliance of children with ADHD to outpatient clinic appointments

Identifying employees at high risk of diabetes among the medical staff of Jaber Al-Ahmed Armed Forces Hospital and screening them for diabetes

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Greetings,

When I was elected in April 2014 as President for the Bahrain Medical Society I felt both honored and awed by the task that I was taking on. Well, I find myself now in the hot-seat and sitting down to write my first column – inevitably a time for looking back and forward. It has been a busy past few years with much to learn. What has been absolutely clear tome is the hard-work and dedication that many of my previous colleagues at BMS make to the running of all aspects of our society- the regions and networks, the publications, the meetings, and all the issues concerning medical field in the kingdom. Without this freely given commitment of time and energy we would be a much poorer society and so my thanks go out to all of those who are involved in whatever way. And to those of you who are not yet involved in the BMS’s activity; can I urge you to consider doing so – I am sure that you will find it a rewarding experience and the future of the Society is ultimately in your hands.

Looking to the future, I would like to welcome my new team of board directors: DR Ghada Al Qassim as Vice President, Dr Manaf Al Qahtani ( General secretary) , Dr. Salah Al Ghanem ( Financial Treasurer ) and our three board members ( Dr Aysha Almansoori , Dr Maram Sharbiti and Dr Noora Butti) .

I look forward to seeing many of you and hearing how you think that society should develop, how it is of benefit to you, and how it could support you more. I am always happy to hear from you at the email address below.

drmohdrafie@yahoo.com

Dr.Mohamed Abdulla Mohamed Rafie
President
ORIGINAL ARTICLES
Early outcomes of patients after on-pump coronary artery bypass grafting at Mohammed Bin Khalifa Bin Salman Al Khalifa Cardiac Center, Bahrain Defence Force Hospital in the Kingdom of Bahrain

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**Consultant Cardiothoracic and Vascular Surgeon, Head of Cardiac Surgery at Mohammed Bin Khalifa Al Khalifa Cardiac Centre, Kingdom of Bahrain
***Consultant Cardiothoracic Surgeon at Mohammed Bin Khalifa Al Khalifa Cardiac Centre, Kingdom of Bahrain

Correspondence to: kristoukini@hotmail.com

ABSTRACT

Background: Coronary artery bypass grafting (CABG) is increasingly performed on patients with acute coronary syndrome in Bahrain. Recognition of early outcomes associated with the procedure can provide members of the healthcare team with a better awareness of their occurrence, hence can impact on important decisions with respect to provision of monitoring, diagnosis, and further treatment.

Objective: The objective of this study is to determine the early outcomes of patients who have undergone on-pump CABG at Mohammed Bin Khalifa Bin Salman Al Khalifa Cardiac Center, Bahrain Defence Force Hospital (BDF) in the Kingdom of Bahrain.

Method: This is a retrospective medical record review of patients who have undergone on-pump CABG at BDF Hospital from January 1, 2010 to December 31, 2010. Data extraction was carried out by one investigator and cross checked.

Results: 150 patients were included in this study, 85.3% were between 40 and 59 years of age and 70% were male. 43.3% of patients stayed in the Intensive Care Unit (ICU) for 5 days. One patient had congestive heart failure and another one had stroke. Two patients had acute renal failure. Post-op ejection fraction at 30-40% was seen in 35% of patients. Blood loss in 25% of patients was estimated at 150cc. Post-operative wound complication occurred in 3 patients, and in one this necessitated sternal debridement.

Conclusion: On-pump coronary artery bypass grafting (CABG) is increasingly being undertaken for Bahraini men aged 40-59 years, with ejection fraction lower than normal levels who have multi-vessel disease. The relative safety of CABG was illustrated by the comparatively low mortality rate.

Keywords: Bahrain; coronary artery bypass grafting; cardiac surgery; ejection fraction; post-op complications; cardiopulmonary bypass

INTRODUCTION

The prevalence of ischemic heart disease has been reported at 174.4 per 100,000 and coronary events ranked number five as the leading cause of discharges at Salmaniya Medical Complex in 2005. The second Gulf Registry of Acute Coronary Events covering the seven Middle East countries reported that out of 7,881 patients with acute coronary syndrome, 336 (4.2%) had a history of undergoing coronary artery bypass grafting. In the Kingdom of Bahrain, cardiovascular deaths account for about 19.5% annually.

Coronary artery bypass grafting is well established as a treatment for ischemic heart disease. Traditionally, this is done using cardiopulmonary bypass (on-pump). The operative procedure creates new routes around narrowed and blocked arteries to allow adequate blood flow and the delivery of oxygen and nutrients to the heart muscle. The benefit of CABG in reducing morbidity and mortality has been recognized with excellent outcomes in the short-term and mid-term despite marked change in patient profiles and an increasing number of higher risk patients. Significant improvement has also been noted in survival for most cardiac surgical procedures, despite the increasing complexity of case-mix and an increasing proportion of elderly patients undergoing heart surgery. The importance of recognizing outcomes following cardiac intervention has an impact on the healthcare team’s clinical decision-making in terms of monitoring, diagnosis, and further treatment including long-term follow-up care. Outcomes following CABG can be classified into categories that reflect expected goals, and paramount among these are prolongation of life and improvement in physical functioning.

OBJECTIVES

To determine key factors which might have an impact on the early outcomes of patients who have undergone coronary
artery bypass grafting at Bahrain Defence Force Hospital (BDFH) in 2010. The following variables were considered:

1. Age and gender distribution
2. Ejection fraction
3. Number of grafts
4. Cross-clamp time and bypass time
5. Blood loss, post-operative complications, and mortality
6. Length of stay at the ICU and in the hospital prior to discharge

**LITERATURE REVIEW**

Results from the National Cardiovascular Network in 2000 reported that octogenarians had a significant in-hospital mortality rate when compared to younger patients. The same study noted that the incidence of post-operative stroke and renal failure was double that among the elderly as compared to younger patients. A similar retrospective study in a government hospital in Saudi Arabia concluded that cardiac surgery has a higher risk in the elderly, although the procedure is considered to carry less risk these days. The study also indicated that the mortality rate and duration of stay in the intensive care unit post CABG varied markedly across age groups. The authors concluded that advanced age alone is not a deterrent for the procedure as long as the benefits outweigh the potential risk.

A systematic review of sixty trials with meta-analyses and trial sequential analyses involving participants (mean age 63 years and involving 22% women), reported that the ejection fraction (EF) among 68% of these was <0.30. The same review indicated that in 19 trials, 1,232 patients had three-vessel disease. The American Heart Association in its 2005 Scientific Statement which was based on a study comparing off-pump (OPCAB) and on-pump CABG (standard), reported that fewer grafts tend to be performed with OPCAB. The duration of hospital stay, mortality rate, cardiac outcome and long-term neurological function appeared to be similar in both groups.

Ischemic preconditioning has been recognized to protect the heart during the procedure but there are institutions that do not do this routinely. Such preconditioning may be done by ischemia or the use of adenosine A1 receptor agonist. In a study of 30 patients, which reported the effect of ischemic and pharmacological preconditioning on myocardial necrosis after CABG, the mean bypass time was 91 ±11.6 (SD) min, and the mean ischemic time 33 ±5.5 (SD) min. The study also noted that there was no intergroup difference.

Excessive blood loss and subsequent blood transfusion are important factors to consider after CABG. Reopening sternotomy, with the aim of controlling bleeding after CABG, may be a not infrequent requirement. Bleeding can generally be attributed to platelet dysfunction, impaired coagulation and problems associated with fibrinolysis.

It has been reported that post-operative bleeding can substantially increase morbidity and mortality following cardiac surgery.

Major complications including death may occur after CABG and these can also include myocardial infarction, wound infection, stroke, kidney injury and bleeding which may require transfusion or reopening. A study of in-hospital and 30-day mortality post-CABG among 252 patients at a Veterans Affairs medical center reported that the most frequent primary complications were myocardial infarction (4.8%) and congestive heart failure (4.8%). In addition, patients with prior history of cardiovascular disease and left ventricular ejection fraction (LVEF) ≤40% were independently associated with the occurrence of primary complications.

**METHODS**

This study was a retrospective review of the medical records of 150 consecutive patients with acute coronary syndrome (ACS) who were admitted to the Bahrain Defence Force (BDF) Hospital from January to December 2010. The research investigator and two trained medical students retrieved the medical records of patients who had undergone CABG at BDF Hospital. Cases of ACS were based on the doctors’ diagnosis using clinical history and ancillary procedures. All patients with single to multiple-vessel disease who had undergone on-pump CABG after cardioplegy were included in the study. Excluded were those coronary patients who underwent off-pump CABG. Frequency and percentages were the statistical measures used to report the results of this study.

**RESULTS**

Out of 150 patients who had undergone on-pump CABG, the majority, 128 patients (85%) were in the age range 40-59 years. Thirteen patients (8.7%) were between 60 and 79, and 9 patients (6%) were above 80 years of age.

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Frequency (%)</th>
</tr>
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<tr>
<td>40-59</td>
<td>128 (85.3)</td>
</tr>
<tr>
<td>60-79</td>
<td>13 (8.7)</td>
</tr>
<tr>
<td>80 and above</td>
<td>9 (6)</td>
</tr>
<tr>
<td>Total</td>
<td>150</td>
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Table 1. Age distribution

Males predominated, 105 (70%).

<table>
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<tr>
<th>Gender</th>
<th>Frequency (%)</th>
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<tbody>
<tr>
<td>Male</td>
<td>105 (70)</td>
</tr>
<tr>
<td>Female</td>
<td>45 (30)</td>
</tr>
<tr>
<td>Total</td>
<td>150</td>
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</table>

Table 2. Gender distribution
The preoperative ejection fraction at 31-40% was seen in 52 (35%) patients. The ejection fraction at a range of 20-30% was seen preoperatively in 8 (5%) of the patients who eventually went through CABG. Sixty-eight (45%), less than half of the patients who underwent CABG, had EF 51% and above. The rest were below normal.

**Figure 3. Number of grafts**

Triple-vessel graft was carried out on 68 (45%) and double-vessel graft on 35 (23%) patients. Quadruple-vessel graft was done on 32 (21%) and quintuple-vessel grafting on 14 (9%) of the total number of cases.

**Figure 4. Cross-clamp time**

During CABG, cardiopulmonary bypass is employed and the aorta is clamped off. In this study, cross-clamp time for 56 (37%) patients was between 41 and 50 minutes. The longest cross-clamp time at 81 minutes and above was used in just 3 patients.

**Figure 5. Bypass time**

Total bypass time was 71-80 minutes for 41 (27.3%) patients and 61-70 minutes in 38 (25.3%) patients. Three patients had a total bypass time of 121 minutes and longer.

**Figure 6. Blood loss**

One quarter, 38 patients, had blood loss estimated at 150 cc, which was the least seen in this group of patients. The greatest volume of blood loss at 3 liters was noted in only 2 of the patients. Wound complications were noted in 3 (2%) patients, one of whom required sternal debridement. The 2 other patients had superficial wound infection. Post CABG mortality accounted for 4 patients due to acute renal failure (2) and due to stroke and congestive heart failure, one each. ICU stay was one day for 82 patients (54.7%), and sixty-eight of these stayed in the ICU for an additional two days. Duration of hospitalization was 5 days for 65 (43.3%) of the patients. There were 10 patients (6.67%) who stayed in the hospital for a total of 10 days. The remaining half of patients (75) stayed in the hospital between 6-9 days.

**DISCUSSION**

Most of the patients who underwent on-pump coronary artery bypass grafting in 2010 at BDFH were between 40 and 59 years of age, and 70% of these were males. These demographic data are similar to those reported in a study done in Saudi Arabia at a government hospital in which the mean age was 60.3 ±1.03 years. Bahraini men with a mean age of 57.3 ±13 years had a history of coronary events as reported in a study conducted in 2005. This age and gender distribution corresponds to that found in developed countries in which the prevalence of cardiovascular diseases...
and diabetes continues increasing. Age consistently predicts mortality after CABG. The Practice Guidelines developed by ACC/AHA state that while elderly patients run the risk of the likelihood of morbidity and a particularly high risk of stroke compared with the general population, age in itself should not be considered an exclusion criterion for CABG especially in the absence of prohibitive co-morbidity.

The ejection fraction (EF) expressed in terms of percentage determines how well the heart pumps with each beat. The left ventricular ejection fraction (LVEF) is often referred to as ejection fraction. The normal EF is at 55-70%14. About 45% of the patients who proceeded with the CABG had EF below normal levels. These values indicate that many of these patients were confirmed cases of heart failure. A few of the cases were indeed at risk of life-threatening arrhythmias. In the setting of markedly reduced ejection fraction, selecting patients for CABG is often problematic. CABG in itself carries a risk in this category of patients.

Characteristics of patients included in this study are not too different when compared with the patients reported in the Gulf RACE 2 study in which the patients who underwent CABG had multi-vessel disease and had severe left ventricular dysfunction. A corresponding study done in Saudi Arabia on 61 patients also showed that most had more than 3 grafts done. The ACC/AHA Guidelines also associated poor LV function with early mortality post-CABG.

Because of the emergence of other means to induce ischemic phenomenon, attention to aortic cross-clamp (XCL) times have been diminishing. But patients with impaired contractility evidenced by low LVEF continue to be at increased risk perioperatively because of the higher susceptibility to myocardial ischemia. In this study, the XCL times ranged from a low 20 minutes to high 80 minutes and above. Although certain studies point to XCL being an independent predictor for mortality among patients with EF >40%, XCL patients with <40% EF run the same or higher risk for mortality at XCL times of 1-30 minutes than at 91-120 minutes.16

Total bypass time (or surgery time) in this study ranged from 40 to more than 120 minutes. Although most studies do not indicate acceptable total bypass time as a predictor of better outcomes post-operatively, a review on coronary artery bypass surgery in elderly people reported that long cardio-pulmonary bypass time is intra-operatively a predictor of a poor outcome after CABG.17

According to the statement by the ACC/AHA, on-pump CABG entails lesser blood loss and the need for blood transfusion. Regarding the use of blood or blood products following CABG, it has been illustrated in many studies that the risk of stroke post-operatively is increased. The higher the volume of blood loss intra-operatively, the higher the need for blood transfusion would be. In this study the biggest blood loss was 3 liters seen in 1% of patients. Mikkola, et al. reported that stroke occurred post-operatively in 2.4% of 2,226 patients who underwent CABG. The number of packed red cells transfused was significantly associated with post-operative stroke.18

Abnormalities in the central nervous system after CABG are feared complications. The ACC/AHA reports that incidence of these abnormalities can range from 0.4% to nearly 80%. This may be attributed to emboli, hypoxia, bleeding and metabolic disorders.9 This one-year study carried out among Bahrainis with ACS revealed that there were four deaths; two were due to renal failure, one due to stroke, and one due to congestive heart failure. Infection involving the deep sternum has been noted in certain studies occurring between 1% and 4% after CABG and this carries a mortality rate of about 25%.20 The low number of sternal infections in this study reflect the very effective sterilization methods as well as the effects of prophylactic antibiotics that are taken preoperatively and postoperatively.

**CONCLUSION**

The early outcomes for patients with acute coronary syndrome who have undergone CABG at Bahrain Defence Hospital in 2010 are similar in many aspects to those in the Gulf RACE 2 study and other studies done elsewhere. CABG is increasingly being undertaken and more frequently among men in the 40-59 year age group. Most of these patients had multi-vessel disease and were subjected to on-pump CABG. Less than half of the patients had pre-op EF lower than normal levels.

One of the principal limitations of this study is that the data are solely based on the patients’ medical records.

**Implications for clinical practice**

Events that may trigger the onset of acute renal failure in this particular set of ACS patients need to be carefully monitored. Precipitating factors for stroke and congestive heart failure, e.g. fluid overload following blood transfusion, should also be monitored very cautiously during and after the procedure.

**Implications for research**

Baseline characteristics of patients like existence of co-morbidity, pre-operative ejection fraction, glycemic levels and bleeding parameters may be included in future studies to correlate their possible influence on early outcomes post-CABG. History of prior CABG, use of statins and anti-thrombotic drugs may also be investigated with respect to their influence on outcomes. Correlation studies may be carried out in further studies to evaluate strength of associations.

**REFERENCES**


ABSTRACT

Objective: To estimate the prevalence of asthma, rhinitis and eczema symptoms in school children aged 6-7 years.

Design: A cross-sectional study of randomly selected primary schools for children.

Setting: Government and private primary schools in Bahrain.

Method: A standardized ISAAC-validated Arabic-translated questionnaire was distributed to 3,000 students aged 6-7 years in 18 primary schools which was to be completed by parents or guardians.

Results: 1,951 questionnaires were completed. Participants included 1,094 males (56.1%) and 857 (43.9%) females. The prevalence of asthma was 10.8%, allergic rhinitis, 16.5% and eczema, 9.8%. The prevalence rates for physician-diagnosed asthma were greater in males 13.3% than females 8.7% [CI (1.8-7.4)]. Symptoms of sneezing or blocked nose showed male gender predominance (18.3%) in comparison to females (14.2%) [CI (0.77-7.5)]. Ever diagnosed hay fever also followed the same pattern of a male predominance of 5.4% in comparison to 3.3% in females [CI (0.24-3.9)]. Female predominance was found in prevalence of itchy rash, 12.5% in comparison to males (8.5%) [CI (-6.9 to -1.2)]. 58.6% had symptoms of allergic rhinitis with a significant peak in the winter season [CI (50.9-66.3)], only 11.2%, had symptoms in the summer season [CI (6.48-16.4)].

Conclusion: Prevalence of asthma, rhinitis and eczema symptoms found in this study were all similar to those reported in other Gulf neighboring countries; with a significant male predominance found in asthma and rhinitis, but not in atopic eczema.

INTRODUCTION

Allergic diseases have become a global public health problem. The increased prevalence of allergy is such that currently between 20-30% of the world’s population suffers from some form of allergic disease. It is estimated that more than 80 million people in Europe suffer from some kind of allergic disease, and that by 2015 half of all Europeans will be similarly affected. Nevertheless, asthma and other allergic diseases are still considered under-diagnosed and under-treated, creating a substantial burden on individuals and families with significant impact on quality of life.

Many countries around the world have followed the International Study of Asthma and Allergies in Childhood (ISAAC) protocol, whose main objectives are to continue to measure symptom prevalence and severity of asthma, rhinitis and eczema in children, especially in developing countries where prevalence of the conditions has not been documented.

The ISAAC phase I protocol is structured to identify the symptom prevalence of asthma, rhinitis and eczema. This was done in almost 2 million children in 106 countries all around the world. The ISAAC phase I protocol studied the prevalence of asthma, rhinitis and eczema in school children aged 6-7 years through a standardized questionnaire filled in by parents or guardians with the addition of a self-administered video questionnaire for children aged 13-14 years.

In the last couple of years many Middle Eastern countries and all of the Gulf countries have adopted the ISAAC protocol, including Saudi Arabia, Kuwait, Qatar, UAE and Oman.

The objective of this study is to provide baseline data which can be used for further planning and management of childhood asthma and allergic diseases in Bahrain, based on the ISAAC phase I protocol.

METHODS

This cross-sectional study was carried out from June 2010 to July 2010 on children aged 6-7 years in 18 primary schools in the Kingdom of Bahrain.

A list of all primary schools both government and private was obtained from the Ministry of Education. The lists were serially numbered; schools were selected by systematic random sampling, after which a number were selected by using a table of random numbers. 18 primary schools were selected and a proportionate number of each school’s students aged 6-7 years (grades 1 and 2, of both private and government) were selected to reach a total of 3,000 students. Approval was granted from the Ministry of Education to distribute the questionnaires to be filled in by parents or guardians of the students.

A standardized ISAAC phase I-validated Arabic-translated questionnaire was used after permission was granted from the authors of the Kuwait ISAAC study. A summary of the questionnaire is shown in Table 1:
Asthma

Two questions per module assess symptom prevalence at any time during a child’s lifetime or within past 12 months:

Has your child:

1. Ever had wheezing or whistling in the chest at any time in the past?
2. Had wheezing or whistling in the chest in the last 12 months?

Allergic Rhinitis

In the last 12 months:

1. Has this nose problem been accompanied by itchy-watery eyes?
2. How much did this nose problem interfere with your child’s daily activities?
3. In which of the past 12 months did this nose problem occur?
4. In which months did this nose problem occur?

Eczema

In the last 12 months:

1. Has this itchy rash at any time affected any of the following places: the folds of the elbows, behind the knees, in front of the ankles, under the buttocks, or around the neck, ears or eyes?
2. At what age did this itchy rash first occur?
3. Has this rash cleared completely at any time during the last 12 months?
4. In the last 12 months, how often, on average, has your child been kept awake at night by this itchy rash?

Table 1. A summary of the ISAAC core questionnaire module for asthma, allergic rhinitis and eczema for children aged 6-7 years

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Ever wheezed</th>
<th>Wheeze with exercise in past year</th>
<th>Nocturnal cough</th>
<th>Ever diagnosed asthma</th>
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<tbody>
<tr>
<td>Asthma</td>
<td>204 (1892)</td>
<td>39 (1884)</td>
<td>214 (1894)</td>
<td>216 (1917)</td>
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<tr>
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<td>10.8%</td>
<td>2.1%</td>
<td>11.3%</td>
<td>11.3%</td>
</tr>
<tr>
<td></td>
<td>9.38 – 12.2</td>
<td>1.47 – 2.81</td>
<td>9.87 – 12.7</td>
<td>9.85 – 12.7</td>
</tr>
</tbody>
</table>

Table 2. The prevalence of self-reported symptoms and diagnosis of asthma, rhinitis, and eczema in 6-7 year-old children

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>n (N)</th>
<th>%</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever wheezed</td>
<td>204</td>
<td>10.8</td>
<td>9.38 – 12.2</td>
</tr>
<tr>
<td>Wheeze with exercise in past year</td>
<td>39</td>
<td>2.1</td>
<td>1.47 – 2.81</td>
</tr>
<tr>
<td>Nocturnal cough</td>
<td>214</td>
<td>11.3</td>
<td>9.87 – 12.7</td>
</tr>
<tr>
<td>Ever diagnosed asthma</td>
<td>216</td>
<td>11.3</td>
<td>9.85 – 12.7</td>
</tr>
<tr>
<td>Rhinitis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever had symptoms of rhinitis</td>
<td>304</td>
<td>16.5</td>
<td>14.8 – 18.1</td>
</tr>
<tr>
<td>Ever diagnosed hay fever</td>
<td>83</td>
<td>4.5</td>
<td>3.58 – 5.51</td>
</tr>
<tr>
<td>Eczema</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic rash ever</td>
<td>181</td>
<td>9.8</td>
<td>8.48 – 11.2</td>
</tr>
<tr>
<td>Ever diagnosed eczema</td>
<td>191</td>
<td>10.3</td>
<td>8.91 – 11.7</td>
</tr>
</tbody>
</table>
The overall prevalence rate for sneezing or blocked nose ever was 304 (1,848), or 16.5% [CI (14.8-18.1)]. Symptoms of sneezing or blocked nose also showed male gender predominance, 18.3%, in comparison to females with the same symptoms 14.2% (p value=0.018 and [CI (0.77-7.5)]) (See Table 3). The prevalence rates for itchy rash ever were 181 (1,848), or 9.8% [CI (8.48-11.2)]. Nevertheless, only 191 (1,855), or 10.3% [CI (8.91-11.7)] of the total population of children had a diagnosis of eczema by a physician; with females predominant, 102 (813), or 12.5%, in comparison to males 88 (1,037), or 8.5%, with a p value 0.004 and [CI (-6.9 to -1.2)] (See Tables 2 and 3).

![Table 3. The prevalence of self-reported symptoms and diagnosis of asthma, rhinitis, and eczema in 6-7 year-old children in Bahrain in relation to gender](image)

<table>
<thead>
<tr>
<th>Asthma</th>
<th>n (N)</th>
<th>%</th>
<th>n (N)</th>
<th>%</th>
<th>P-value</th>
<th>Diff in proportions</th>
<th>SE of diff. in proportions</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ever diagnosed asthma</td>
<td>142 (1071)</td>
<td>13.3</td>
<td>7 (841)</td>
<td>3</td>
<td>8.7</td>
<td>0.002</td>
<td>4.6</td>
<td>1.4</td>
</tr>
<tr>
<td>Rhinitis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever diagnosed hay fever</td>
<td>56 (1037)</td>
<td>5.4</td>
<td>2 (814)</td>
<td>7</td>
<td>3.3</td>
<td>0.032</td>
<td>2.1</td>
<td>0.9</td>
</tr>
<tr>
<td>Eczema</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever diagnosed eczema</td>
<td>88 (1037)</td>
<td>8.5</td>
<td>1 (813)</td>
<td>2</td>
<td>12.5</td>
<td>0.004</td>
<td>- 4.1</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Table 3. The prevalence of self-reported symptoms and diagnosis of asthma, rhinitis, and eczema in 6-7 year-old children in Bahrain in relation to gender

It was found that symptoms of allergic rhinitis showed a significant winter seasonal peak of 92/157 (58.6%) [CI (50.9-66.3)], whereas prevalence in the summer season was 18/157 (11.2%) [CI (6.48 – 16.4)] (See Table 4). The results revealed that the overall prevalence rate of diagnosed hay fever was 83/1,856 (4.5%) with predominance in the male population 56/1,037 (5.4%), in respect to female being 27/814 (3.3%) [CI (0.24-3.93)] (See Tables 2 and 3).

<table>
<thead>
<tr>
<th></th>
<th>n (157)</th>
<th>%</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer (May to Oct.)</td>
<td>18</td>
<td>11.5</td>
<td>6.48 – 16.4</td>
</tr>
<tr>
<td>Winter (Nov. to April)</td>
<td>92</td>
<td>58.6</td>
<td>50.9 – 66.3</td>
</tr>
<tr>
<td>All the year</td>
<td>47</td>
<td>30</td>
<td>22.8 – 37.1</td>
</tr>
</tbody>
</table>

Table 4. Seasonal distribution of allergic rhinitis symptoms

DISCUSSION

The asthma prevalence rate reported in this study is within the range found in other studies from neighboring Gulf countries; 11.4% in Saudi Arabia, 10.5% in Oman and 13.6% in UAE. Qatar showed a higher prevalence rate than other Gulf countries of 21.9%. This could be explained by the use of an additional method (video) whereas other countries have used only the self-administered questionnaire. The similarity of the results in other studies across the countries in the Gulf region, may be due to the similarity in factors such as population distribution, cultural, environmental, ethnic, geographical and socio-economic status, the same factors that may cause variations in the results of asthma prevalence studies from other countries.

Despite the relatively low response rate in our study, it was considered that it did not affect the results since it approximated that found in neighboring Gulf countries. It was also considered that even if the non-respondents were added to the results it would not change the results because of the similar characteristics of the respondents in this study. Data shows that the prevalence rates of physician-based diagnosis of asthma were greater in boys than girls, thereby indicating that gender difference is a consistent finding and also similar to findings reported in other countries such as Oman, Iran, Hong Kong, United Kingdom, and New Zealand. It was also noted that the prevalence rate of physician-based diagnosis of asthma is higher than the prevalence rate of those who had wheeze ever. This finding was similar to that found in Oman, however contradicting the findings of the ISAAC study done in Urmia in Northern Iran, which showed under-dagnosis of asthma.

The prevalence of sneezing and blocked nose fall within the range of the neighboring Gulf countries: in Qatar 30.5%, Oman 7.4% and KSA 12.7%. Symptoms of allergic rhinitis peaked during the winter season; this may be attributed to an increase in the incidence of viral upper respiratory tract infections that may initiate or overlap with the symptoms of sneezing and blocked nose or their confusion between common cold symptoms and allergic rhinitis. Bahrain’s climate may have also contributed to the winter peak, since it is categorized into two seasons, summer and winter. The latter includes the spring season (March to April), where pollen allergy may also initiate symptoms of allergic rhinitis. This was supported by a study that concluded that the indigenous trees of Middle Eastern countries, such as date palms, acacia and mesquite, have a specific pollen season (from March to May) that is suggestive of an aero-allergenic origin. Furthermore, our findings were consistent with other studies where results showed a peak prevalence in the winter season, such as Thailand and New Zealand.

Similar to the higher male prevalence found in asthma, a
male predominance was also seen over females in both prevalence of allergic rhinitis and hay fever. This male gender predominance was also found in neighboring countries, such as Oman, Qatar and Iran\textsuperscript{1, 6, 9}. Furthermore, the same high proportion of males was also noticed in Western countries for example Hungary\textsuperscript{18}. Prevalence of hay fever in our study also falls within the range of other Middle Eastern countries, such as Iran 3.6%\textsuperscript{6}, Oman 7.5%\textsuperscript{6} and 14.9% in UAE\textsuperscript{12}.

The prevalence of itchy rash ever and physician diagnosed eczema were very close and almost identical. This can be explained by the knowledge of the general population that itchy rash in certain flexural areas is the main feature to the diagnosis of eczema. Furthermore, this prevalence also was similar to that found in other GCC countries (UAE 11%, Qatar 22.5%, Oman 7.5%, and KSA 13%)\textsuperscript{3, 6, 10, 11}. The study also showed significant difference in prevalence of physician-diagnosed eczema in relation to gender. Unlike the male predominance noted in asthma and allergic rhinitis, female gender predominates in atopic eczema; this finding is in parallel with the findings reported in the region (Qatar, Iran and Oman)\textsuperscript{3, 6, 9}.

Another important unique aspect of this study is the questionnaire-related enquiries received by the asthma trained nurse from the children parents. She received around 30 phone calls during data collection; most of these required further clarification of the term “hay fever” despite having been provided with the definition. Some enquiries sought clarification of the characteristics of the rash. All enquiries were answered and the nurse welcomed any further questions.

**CONCLUSION**

The prevalence of asthma, allergic rhinitis and eczema in children aged 6-7 years was 10.8%, 16.5% and 9.8% respectively. All of which were similar to the prevalence found in neighboring Gulf countries. Furthermore, significant male gender predominance was noted in asthma and allergic rhinitis while a higher percentage of female gender is seen in atopic eczema.

**REFERENCES**


Author contribution: This is to certify that all authors have made (1) a substantial contribution to conception and design, acquisition, analysis and interpretation of data; (2) drafting the article and revising it critically for important intellectual content; and (3) final approval of manuscript version to be published. Yes. Potential conflicts of interest: None. Competing interest: None. Sponsorship: None.

Ethical Approval: Ministry of Education approval was granted to distribute the questionnaire in school children. The research committee of the Family Physician Residency Program has approved the methodology of data collection.
Reasons for under-reporting of notifiable communicable diseases in the Kingdom of Bahrain: a health-centers based survey

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ABSTRACT

Background: Poor compliance by physicians with communicable diseases reporting is a worldwide phenomenon. In Bahrain, there are limited data regarding thoroughness and completeness of the current communicable diseases reporting system.

Objective: To identify reasons for noncompliance with reporting of notifiable communicable diseases by primary health care physicians practicing in the Ministry of Health (MoH) primary health care centers.

Methods: This is a cross-sectional study. Two hundred and forty-one self-administered questionnaires were distributed to all primary health care physicians practicing in all primary care health centers of the Ministry of Health. The questionnaires included items regarding socio-demographic and practice-related characteristics, self-reported practice related to communicable diseases reporting and reasons for noncompliance with reporting requirements.

Results: The response rate was 93%; the mean age of the respondents was 43 ±8.36 years. The period of experience in clinical practice ranged from 1 to 35 years with a mean of 12.84 ± 7.86 years. Lack of feedback on notified cases, forgot to notify, and not sure of diagnosis were cited by more than half of the physicians as reasons for noncompliance with communicable diseases reporting.

Conclusion: The findings suggest that there are several reasons for noncompliance with reporting requirements. Revising the current notification procedure to resolve some of the reasons is vital to enhance communicable diseases reporting in Bahrain.

Keywords: Bahrain; communicable diseases; notification; reporting; reasons

INTRODUCTION

Epidemiological surveillance has been defined as “the ongoing and systematic collection, analysis and interpretation of health data in the process of describing and monitoring a health event”. The important role of surveillance in reporting, monitoring, and responding to infectious diseases has been stressed by the World Health Organization (WHO).

Surveillance data are useful in many ways, including assurance of provision of appropriate medical therapy, detection of common source outbreaks, and providing the basis for planning and implementing prevention and control programs. Policy makers need such data in order to determine public health priorities for public health programs and to evaluate the success or failure of prevention and control programs.

The literature suggests that the occurrence of notifiable infectious diseases is seriously underestimated due to under-reporting. This negatively impacts on the effectiveness of the notification process as a real-time surveillance tool and an early warning system for outbreaks. In many countries, under-reporting is a common problem of the communicable diseases notification systems. Arab countries are not an exception. Therefore, researchers in different parts of the world have investigated reasons for noncompliance with communicable diseases notification (CDN).

The factors that contribute to under-reporting are diverse. Hence, some authors have pointed to lack of awareness regarding notifiable diseases, or physicians’ attitude towards the notification system as responsible factors. However, it is not only knowledge and attitude that are directly translated into practice, other external factors also influence this process such as lack of time, concern about patient confidentiality, complexity of the reporting procedures, poor accessibility to notification materials, lack of motivation secondary to lack of feedback, and an assumption that somebody else will report. e.g., lab technicians and other specialists.

The system of communicable diseases reporting in Bahrain was established in 1955 and the surveillance system was strengthened in 1971, whereby registers for selected communicable diseases are maintained. Public health officials rely on health providers, laboratories and other public health personnel to notify of the occurrence of infectious diseases to the Communicable Diseases Unit (CDU) of the Ministry of Health. According to the current notification regulation in MoH health centers all practicing primary health care physicians are required to notify of relevant communicable diseases via stamping patients’ prescriptions with the communicable diseases stamp, subsequently sending the patient to nursing staff who should fill in the form, to be returned within a week via hand, post or fax. For some diseases an immediate
telephone notification is mandated, followed by written notification within 24 hours.

In Bahrain, there are limited data regarding thoroughness and completeness of the current communicable diseases notification system. However, observations by public health officials in the MoH strongly suggest that a problem does exist in Bahrain. The number of notified cases by physicians was perceived not to reflect the actual occurrence of infectious diseases when compared to that reported by the Public Health Laboratory. Thus, a need exists to explore the reasons for under-reporting.

The aim of this study is to identify reasons for noncompliance with optimal notification requirements by primary health care physicians practicing in MoH primary health care centers in Bahrain.

METHODOLOGY

This study is a cross-sectional, descriptive study involving all physicians practicing in Ministry of Health primary health care centers (PHCC) in Bahrain including both family physicians and general practitioners. At the time of conducting the study there were 271 primary health care physicians (PHCP) practicing in twenty-two PHCC that are distributed throughout Bahrain. Primary health care physicians who were involved in administrative work only and have no access to clinical practice were excluded. The sample size was 261 physicians as ten physicians were involved in administrative work only and were not running regular clinics in the health centers.

The study instrument was a self-administered, structured questionnaire which was partially developed and modified by the researchers based on a literature review of studies conducted to investigate reasons for under-reporting of notifiable diseases. The questionnaire included the following items: socio-demographic and practice-related characteristics (age, gender, specialization, years of experience), physicians’ self-reported practice (the number of cases that the participants diagnosed within the past three months and the number of cases which were notified from the diagnosed cases), and reasons for noncompliance with reporting requirements which were identified by using a predetermined checklist. The checklist contained 12 items, the participants were asked to mark either “Yes” or “No” for each item (Table 3).

The questionnaire was piloted in order to check the clarity of the questions and reliability of the questionnaire using a sample of 20 PHCPs. Accordingly, minor changes were made based on feedback from the participants. The participants in the pilot study were not included in the main study. Content validity has been assessed by public health specialists and the academic committee to evaluate the items’ readability, suitability, and to evaluate the relationship of each item to the whole scale. The internal consistency reliability of the questionnaire has been assessed using Cronbach’s alpha which was 0.74. The participation in the study was voluntary and confidentiality was assured through number coding of questionnaires to protect privacy.

The self-administered questionnaires were distributed to all physicians practicing in government health centers at the time of conducting the study along with a covering letter addressed to the participants briefing them on the purpose of the study and assuring confidentiality. The questionnaires were collected from the health centers heads of council within two weeks.

The data were analyzed using SPSS version 15 and relevant descriptive analyses were performed for all items. Variables were presented either as frequencies for categorical variables or means with standard deviation for quantitative variables. The Pearson’s Chi-square test was used to compare proportions. Statistical significance was set at P-value <0.05.

RESULTS

A total of two hundred and forty-one questionnaires were distributed to all eligible primary health care physicians practicing in MoH health centers in Bahrain (20 physicians who were involved in the pilot study were excluded). 225 questionnaires were returned yielding an overall response rate of 93%. The mean age of the respondents was 43.00 ± 8.36 years with a median age of 43 years. The period of experience in clinical practice ranged from 1 to 35 years with a mean of 12.84 ± 7.86 years and a median of 12.0 years. Female physicians constituted more than half of the sample (58.5%). About two-thirds of the sample had family medicine qualifications (67.7%). (See Table 1)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Level</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤35</td>
<td>39</td>
<td>(19.3)</td>
</tr>
<tr>
<td>36-49</td>
<td>95</td>
<td>(47.0)</td>
</tr>
<tr>
<td>≥50</td>
<td>68</td>
<td>(33.7)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>202</td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>93</td>
<td>(41.5)</td>
</tr>
<tr>
<td>Female</td>
<td>131</td>
<td>(58.5)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>224</td>
<td></td>
</tr>
<tr>
<td><strong>Specialization</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family physician</td>
<td>151</td>
<td>(67.7)</td>
</tr>
<tr>
<td>General practitioner</td>
<td>58</td>
<td>(26.0)</td>
</tr>
<tr>
<td>Other¹</td>
<td>14</td>
<td>(6.3)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>223</td>
<td></td>
</tr>
<tr>
<td><strong>Years of experience</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10</td>
<td>79</td>
<td>(35.1)</td>
</tr>
<tr>
<td>10-19</td>
<td>96</td>
<td>(42.7)</td>
</tr>
<tr>
<td>≥20</td>
<td>50</td>
<td>(22.2)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>225</td>
<td>(100%)</td>
</tr>
</tbody>
</table>

Table 1. Participants’ socio-demographic and practice-related characteristics

With regards to physicians’ reported CDN practice, 198 (88%) physicians stated that they have diagnosed notifiable communicable diseases within the last three months. One hundred and eighty physicians (90%) stated that they had ever reported a notifiable communicable disease, whereas 18 (10%) stated that they had never reported any notifiable communicable disease within the last three months even when diagnosed. Assuming the average number of cases, the total number of diagnosed notifiable conditions was found to be 1,403, and the total number of notified cases was 1,134. This indicates that 80% of the diagnosed
Communicable conditions were notified while 20% were not (see Table 2).

<table>
<thead>
<tr>
<th>Question</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosed notifiable communicable diseases (N=225)</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>26 (11.5)</td>
</tr>
<tr>
<td>1-5</td>
<td>106 (47.1)</td>
</tr>
<tr>
<td>6-10</td>
<td>47 (20.9)</td>
</tr>
<tr>
<td>11-15</td>
<td>15 (6.7)</td>
</tr>
<tr>
<td>&gt;15</td>
<td>31 (13.8)</td>
</tr>
<tr>
<td>Reported notifiable communicable diseases (Among those who have ever diagnosed N=198)</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>18 (9.1)</td>
</tr>
<tr>
<td>1-5</td>
<td>111 (56.1)</td>
</tr>
<tr>
<td>6-10</td>
<td>36 (18.1)</td>
</tr>
<tr>
<td>11-15</td>
<td>12 (6.1)</td>
</tr>
<tr>
<td>&gt;15</td>
<td>21 (10.6)</td>
</tr>
</tbody>
</table>

Table 2. Diagnosis and reporting experience of notifiable communicable diseases among the primary health care physicians within the last three months

As is shown in Table 3, lack of feedback from the Public Health Directorate was the most commonly cited reason for noncompliance with communicable diseases notification followed by physicians’ forgetfulness to notify. Furthermore, over half of the PHCPs cited uncertainty of diagnosis as a reason for under-reporting (58.6%). Unfamiliarity with the CDU telephone number and unavailability of the notification forms were considered as reasons by 45.2% and 42.7% respectively. More than one-third of the physicians (38.4%) cited “do not know how to notify a notifiable communicable disease” as a reason for not reporting.

Ranking of reasons for under-reporting of communicable diseases didn’t vary much when the analysis was repeated according to age, gender, specialty and years of clinical practice. In all categories lack of feedback from the Public Health Directorate, forgot to notify and not sure of the diagnosis were in the top of the list for all mentioned categories.

<table>
<thead>
<tr>
<th>Reasons</th>
<th>% Yes responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of feedback from the concerned authority</td>
<td>74.0</td>
</tr>
<tr>
<td>Forgot to notify</td>
<td>68.0</td>
</tr>
<tr>
<td>Not sure of the diagnosis</td>
<td>58.6</td>
</tr>
<tr>
<td>Do not know telephone number</td>
<td>45.2</td>
</tr>
<tr>
<td>No notification forms are available</td>
<td>42.7</td>
</tr>
<tr>
<td>No time to notify</td>
<td>38.4</td>
</tr>
<tr>
<td>Current procedure of notification is impractical</td>
<td>35.5</td>
</tr>
<tr>
<td>Cases will be reported by lab technician or specialist</td>
<td>34.9</td>
</tr>
<tr>
<td>Concerns about patients confidentiality</td>
<td>24.9</td>
</tr>
<tr>
<td>The disease does not worth notification</td>
<td>23.7</td>
</tr>
<tr>
<td>Do not know how to report a notifiable communicable disease</td>
<td>20.0</td>
</tr>
<tr>
<td>No notification stamp in the consultation rooms</td>
<td>13.5</td>
</tr>
</tbody>
</table>

Table 3. Percentage of primary care physicians marking “Yes” on reasons for noncompliance with communicable diseases notification requirements (N=225)

The possible relationship between the socio-demographic characteristics of the participants and their responses to the questionnaire was investigated. It was found that the female physicians were more likely to consider forgetfulness to notify (79.1%), lack of time (45.3%) and uncertainty of diagnosis (64.4%) as reasons for noncompliance compared to male physicians, 53.3%, 28.6% and 50.0% respectively. The differences in the proportions were statistically significant (Table 4).

Likewise, physicians who were less than 35 years old were more likely to consider these factors as reasons for not reporting communicable diseases.

<table>
<thead>
<tr>
<th>Reasons</th>
<th>≤35</th>
<th>35-49</th>
<th>≥50</th>
<th>Male</th>
<th>Female</th>
<th>FP</th>
<th>GP</th>
<th>Others</th>
<th>&lt;10</th>
<th>10-19</th>
<th>≥20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of feed back</td>
<td>76.9</td>
<td>77.9</td>
<td>64.6</td>
<td>73.6</td>
<td>74.4</td>
<td>73.8</td>
<td>76.8</td>
<td>64.3</td>
<td>79.7</td>
<td>69.5</td>
<td>74.5</td>
</tr>
<tr>
<td>Forgot to notify</td>
<td>87.2</td>
<td>77.4</td>
<td>44.8***</td>
<td>53.3</td>
<td>79.1***</td>
<td>75.7</td>
<td>53.6</td>
<td>50.0**</td>
<td>75.3</td>
<td>73.4</td>
<td>46***</td>
</tr>
<tr>
<td>Unsure of diagnosis</td>
<td>76.9</td>
<td>60</td>
<td>49.2*</td>
<td>50.0</td>
<td>64.4*</td>
<td>63.6</td>
<td>50.0</td>
<td>42.9</td>
<td>68.4</td>
<td>51.6</td>
<td>55.1</td>
</tr>
<tr>
<td>Do not know telephone number</td>
<td>59</td>
<td>41.9</td>
<td>47</td>
<td>45.5</td>
<td>45.0</td>
<td>47</td>
<td>43.7</td>
<td>35.7</td>
<td>54.4</td>
<td>36.6</td>
<td>47.9</td>
</tr>
<tr>
<td>Unavailability of forms</td>
<td>41</td>
<td>48.9</td>
<td>39.4</td>
<td>45.6</td>
<td>40.6</td>
<td>45.6</td>
<td>21.4</td>
<td>43.6</td>
<td>44.9</td>
<td>38.7</td>
<td>47.9</td>
</tr>
<tr>
<td>Current CDN procedure is impractical</td>
<td>34.2</td>
<td>39.4</td>
<td>29.2*</td>
<td>30</td>
<td>39.1</td>
<td>34.5</td>
<td>41.8</td>
<td>21.4</td>
<td>32.9</td>
<td>33.7</td>
<td>41.7</td>
</tr>
<tr>
<td>Lack of time</td>
<td>64.1</td>
<td>35.9</td>
<td>26.9*</td>
<td>28.6</td>
<td>45.3*</td>
<td>43.9</td>
<td>25.0</td>
<td>35.7*</td>
<td>47.4</td>
<td>31.2</td>
<td>36.7</td>
</tr>
<tr>
<td>Lab technician or specialist will report</td>
<td>28.2</td>
<td>30.4</td>
<td>44.8</td>
<td>32.2</td>
<td>36.4</td>
<td>29.7</td>
<td>47.3</td>
<td>7.1*</td>
<td>29.9</td>
<td>39.4</td>
<td>35.4</td>
</tr>
</tbody>
</table>

Table 4. Reasons for noncompliance with communicable diseases notification requirements by primary care physicians’ socio-demographic characteristics (N=225) (P value based on chi-square)
that uncertainty of diagnosis was a major reason for not notifying. This finding implies that lack of knowledge regarding notification requirements is a contributing factor for under-reporting. Cases reported by laboratory technicians or a specialist were cited as a reason by 34.9% of PHCPs. This finding is in agreement with results of other studies in other parts of the world including USA, Portugal, and Malta. Obviously, this finding reveals the reliance of the primary care physicians on hospital physicians and/or laboratory technicians to notify their suspected cases. Although laboratories can provide an important source of communicable diseases surveillance, it is not a substitute for physician notification, since there are a number of notifiable diseases, such as meningococcal infections, for which timelines of notification is an important factor, and waiting for a test result is not practical. Therefore, the duty to notify of communicable diseases regardless of hospital referral or laboratory confirmation is one area where clarification of notification requirements by the public health officials is needed.

Unavailability of CDN notification forms was cited as a reason for noncompliance with CDN by more than 40% of the participants in the present study. This reason has been pointed out by some researchers as a major barrier to CDN suggesting that not only human factors are responsible for non-compliance with CDN, the notification system itself could be a main obstacle to CDN. Given the fact that the nurse is the responsible staff for filling the notification forms in the health centers, the responses of the physicians in the present study uncover the lack of knowledge concerning the current CDN requirement in primary health care centers.

In the present study, more than one-third of the physicians (35.5%) cited the impracticality of the current CDN procedure regulations as a cause for not notifying communicable diseases. This figure is comparable to that of Tan et al. and Abdool Karim and Dilraj, and it implies that the current CDN procedure in the MoH primary health care centers should be evaluated and revised in order to guarantee the utmost compliance with communicable diseases notification requirements in the Kingdom of Bahrain.

CONCLUSION

The study results identified that there are several reasons for noncompliance with communicable diseases notification requirements. With the emergence of new communicable disease pandemics, it is crucial that the Public Health Directorate at the MoH discuss these reasons with the frontline health workers, and involve them in devising solutions in order to improve their compliance.

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Asthma knowledge, attitude and prescribing behavior of primary health care physicians in the Kingdom of Bahrain

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ABSTRACT

Background: Asthma is a serious public health problem, affecting people of all ages. When uncontrolled it can cause significant morbidity and mortality. Poor implementation of the guidelines is considered one of several barriers for achieving asthma control.

Objectives: To determine the asthma knowledge, attitude and prescribing behavior of primary health care physicians in the Kingdom of Bahrain.

Methods: A cross-sectional survey was carried out from March 2012 to March 2013 among primary health care physicians (PHC) attending asthma workshops as part of a continuing medical education program. During the study period 5 workshops were conducted which were attended by PHC physicians. A self-administered questionnaire was designed to achieve the research objective. The questionnaire was based primarily on a previous study carried out by the Chicago Asthma Surveillance Initiative (CASI) in the USA; a similar questionnaire was used in a study conducted in 2004, and permission was taken from the investigators to use it in our study. Questionnaires were distributed to the study groups at the beginning of each workshop and 192 of the 240 attending doctors completed the questionnaire, an 80% response rate.

Results: The responders were mainly family physicians (66.7%), of whom 73.4% were following asthma guidelines. The study showed that slightly more than half of PHC physicians (56.8%) were able to assess the level of asthma control appropriately and the majority of them reported scheduling regular follow-ups for their patients. However, only 39.1% of PHC physicians were aware of the appropriate medication recommended for step 1 and only 37.3% of them reported that they provided written plans for their patients.

Conclusion: Various aspects of GINA guidelines appear to have been integrated into clinical practice by primary care physicians in the Kingdom of Bahrain, whereas other recommendations do not seem to have been readily implemented.

Keywords: primary health care physicians; bronchial asthma; PHC; Kingdom of Bahrain

INTRODUCTION

Asthma is a common inflammatory disorder of the lungs, characterized by reversible airflow limitation and an increased airway hyper-responsiveness to a variety of stimuli, leading to recurring episodes of characteristic signs and symptoms.1

According to the World Health Organization (WHO), almost 300 million people suffer from asthma worldwide and with the rising trends it is expected to increase to 400 million by 2025, and nearly 255,000 people die annually from asthma.2 The prevalence is continuously increasing and is expected to rise by a further 100 million by the year 2025.1 A study in the United Kingdom showed an increase in the prevalence by more than 5.5-12%.4 In the Gulf and the region there is a paucity of data about the distribution...
of asthma, some studies have been carried out but they involved relatively small samples of patients. In Saudi Arabia, the prevalence of asthma has been investigated in several studies and it has been found to have increased from 8% in 1986 to 23% in 1995.\textsuperscript{5,6} Increasing air pollution, rapid modernization, and widespread construction work are some of the reasons suggested for the increasing asthma problem, in addition to poor access to medical services, the high cost of effective drugs and poor health education among the affected population.\textsuperscript{7}

Studies have shown that the majority of patients in developed and developing counties do not obtain optimal care, and therefore, are not well controlled.\textsuperscript{8} Poorly controlled asthma may cause significant morbidity and mortality whereas early treatment, proper administration of medication and monitoring of the disease can decrease the frequency of exacerbation, hospitalization and the mortality rate.\textsuperscript{9}

In order to improve the quality of asthma care, several approaches have been attempted. These include establishment of clinical guidelines for the diagnosis and management of asthma, such as GINA (Global Initiative for Asthma)\textsuperscript{10} and NAEPPEP (National Asthma Education and Prevention Program),\textsuperscript{11} as well as improvement of the knowledge and attitude of asthmatic patients and general practitioners by educational programs. Several guidelines have emphasized the perception of asthma as chronic inflammation of airways with stepwise use of anti-inflammatory medications.\textsuperscript{10-14} Despite this, previous studies suggest the existence of a gap between actual asthma care and guideline recommendations.\textsuperscript{15-18}

The Ministry of Health in the Kingdom of Bahrain adopted the GINA guidelines in 2004 and some primary health care physicians have been trained to apply them in their practice. The authors are not aware of any previous local published studies on assessment of asthma management among GPs. Therefore, this study’s objective was to assess bronchial asthma knowledge, attitude, and the prescribing behavior of primary health care physicians in the Kingdom of Bahrain since the introduction of the guidelines.

METHODS

A self-administered questionnaire was designed to achieve the research objective. The questionnaire was based primarily on a previous study carried out by the Chicago Asthma Surveillance Initiative (CASI) in the USA.\textsuperscript{19} A similar questionnaire was used by Abdulrahman Abudahish and Hassan Bella\textsuperscript{16} in their study which was conducted on 2004 and permission was taken from them to use it in our study. A slight modification of the questionnaire was made in order to comply with the new recommendations of GINA guidelines. The original questionnaire contained 7 case scenarios which were used in this study with minimal modification. We examined the assessment of level of asthma control instead of assessment of asthma severity for the first three cases and step 1 treatment as an alternative for treatment of intermittent asthma in adults and children for cases number four and five. All cases had a single correct response.

The questionnaire (see Appendix) contained 25 questions, most of which were multiple choice, aiming at assessment of three important aspects from the participating physicians; the physicians’ knowledge, practice and attitude. It covered mainly the following items:

1. Demographic information about the respondents such as age, gender, time in practice.
2. Clinical monitoring of asthma patients.
3. Pharmacological and non-pharmacological treatment of asthma.
4. Opinions and beliefs about treatment options and reasons for referrals.
5. Use of asthma practice guidelines.
6. Follow-up of patients.
7. Education of asthma patients.

The survey was carried out during the period from March 2012 to March 2013 among primary care physicians attending asthma workshops as part of a continuing medical education program (CME). During the study period 5 workshops were conducted and about 250 physicians attended. Questionnaires were distributed to the study groups before the beginning of each workshop and 192 of the 240 attending doctors completed it, a response rate of 80%. Scoring of case scenarios on asthma was used to determine the physicians’ knowledge.

The questionnaire was pilot tested on primary care physicians working in one primary care health centre. No significant alterations were required to the questionnaire following the pilot study so that the same questionnaire was used in the actual study.

Responses were coded and data were entered and analyzed using SPSS software (version 20). The mean ± standard deviation was calculated for numerical variables. Percentage was calculated for categorical variables.

RESULTS

The survey was completed by 192 of the 240 PHC physicians, a response rate of 80%.

- General Characteristics of Physicians

The responders were mainly female (67.7%) and 74.5% were Bahraini. Most of the physicians were family physicians (66.7%) and aged ≥34 years (70.8%). About 66% of the responders had been in practice for 10 years or more.

- Clinical Monitoring

The physicians were questioned on aspects of asthma monitoring and assessment of level of control. Table 1
illustrates that slightly more than half of PHC physicians (56.8%) were able to assess the level of asthma control appropriately.

<table>
<thead>
<tr>
<th>Case Scenarios</th>
<th>Score</th>
<th>n=192 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Item 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of asthma control (see questionnaire Q 9, 10, 11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>5 (2.6)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>23 (12.0)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>55 (28.6)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>109 (56.8)</td>
<td></td>
</tr>
<tr>
<td><strong>Item 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriate</td>
<td>0</td>
<td>94 (49.0)</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>23 (12.0)</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>75 (39.1)</td>
</tr>
<tr>
<td><strong>Item 3</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriate follow-up of controlled case (see questionnaire Q23)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>52 (27.1)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>140 (72.9)</td>
<td></td>
</tr>
<tr>
<td><strong>Item 4</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Referral of a child with severe persistent asthma (see questionnaire Q13)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>57 (29.7)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>35 (70.3)</td>
<td></td>
</tr>
<tr>
<td><strong>Total Score (out of 7)</strong></td>
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<tr>
<td>0</td>
<td>1 (0.5)</td>
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<td>10 (5.2)</td>
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<td>2</td>
<td>21 (10.9)</td>
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<td>3</td>
<td>49 (25.5)</td>
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<td>4</td>
<td>42 (21.9)</td>
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<td>5</td>
<td>39 (20.3)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>30 (15.6)</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Scoring achieved by PHC physicians for case scenarios of asthma patients

The physicians reported that during routine office visits, they most often monitored the following: day-time symptoms (92%), frequency of disturbed sleep (93.2%), activity level (91.7%), work/school days lost due to asthma (84.9%) and B2 agonist use (90%). Direct observation of inhaler techniques was reported by 72.4% of physicians and routine use of peak flow measurements was reported by 67.7%.

Physicians were also asked about their opinion regarding the usefulness of home peak flow monitoring for patients 5 years and over with moderate to severe persistent asthma. 51.6% of physicians described routine home peak flow monitoring as “often useful” and 41.1% reported it to be “somewhat useful.” Only 7.3% of physicians described home peak flow monitoring as not useful. However, 16.1% of PHC physicians regularly checked peak expiratory flow during exacerbation (Table 2).

<table>
<thead>
<tr>
<th>Frequency</th>
<th>%</th>
<th>Valid %</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>35</td>
<td>18.2</td>
<td>18.2</td>
</tr>
<tr>
<td>Rarely</td>
<td>51</td>
<td>26.6</td>
<td>44.8</td>
</tr>
<tr>
<td>Sometimes</td>
<td>75</td>
<td>39.1</td>
<td>83.9</td>
</tr>
<tr>
<td>Often</td>
<td>31</td>
<td>16.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>192</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 2. How often do you use peak expiratory flow in acute symptomatic patients?

The survey also included questions on aspects of emergency care. As reported in Table 3, 75.5% of PHC physicians used inhaled salbutamol via nebulizer while half of them (50%) used the inhaled salbutamol via spacer. Additional treatment reported by PHC physicians during acute exacerbation of asthma included IV hydrocortisone (79.2%), oral steroid (72.9%) and atrovent (66.1%), whereas only 6.3% used oral salbutamol during exacerbation (Table 3).

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Yes</th>
<th>No</th>
</tr>
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<tbody>
<tr>
<td>Inhaled short-acting B2 agonist with spacer</td>
<td>96</td>
<td>96</td>
</tr>
<tr>
<td>Nebulized short-acting B2 agonist</td>
<td>45</td>
<td>47</td>
</tr>
<tr>
<td>Oral short-acting B2 agonist</td>
<td>12</td>
<td>180</td>
</tr>
<tr>
<td>IV hydrocortisone</td>
<td>52</td>
<td>40</td>
</tr>
<tr>
<td>Atrovent</td>
<td>127</td>
<td>65</td>
</tr>
<tr>
<td>IV theophylline</td>
<td>4</td>
<td>148</td>
</tr>
<tr>
<td>Oral steroids</td>
<td>40</td>
<td>52</td>
</tr>
</tbody>
</table>

Table 3. PHC physicians prescribing habits for patients with moderate to severe asthma attack

- Medication Used in Treating Patients With Asthma

The survey investigated physicians’ awareness of the medication recommended for step 1 for adults and children, and revealed that only 39.1% of them were aware of appropriate medicine (Table1).

In their practice 72.4% of physicians never or rarely prescribed oral short-acting B2 agonists. However, 17.2% still prescribed oral short-acting B2 agonist very often and about 10.4% prescribed it sometimes. 71.9% of physicians reported that they had never or rarely prescribed long-acting B2 agonist without inhaled steroid (Table 4). The majority of the respondents (85.4%) reported that they had prescribed inhaled steroids for persistent or uncontrolled asthma (Table 4).
Table 4. Prescribing behavior of PHC physicians on management of asthma

The survey also enquired about the participants’ opinions on the safety of inhaled corticosteroids at standard agreed doses. This we have reported in Table 5 which shows that 88.5% of the PHC physicians perceived inhaled corticosteroids as safe medicine, whereas only 5.7% considered it as unsafe medicine.

- Other Aspects of Asthma Management

Awareness of the guidelines was high in that 73.4% of the physicians were following asthma guidelines. GINA guidelines were the most used (68.2%) and the majority (94.3%) of respondents believed that following asthma guidelines would improve their clinical practice.

Table 5. PHC Physicians’ opinion regarding safety of inhaled steroids

When asked about their approach for the follow-up of patients with moderate, persistent asthma under control, the majority of physicians (72.9%) reported scheduling regular follow-up visits. However, 27.1% of the physicians reported seeing patients only when they were symptomatic.

Referral to specialists was most often for patients with a history of life-threatening episodes (95.8%). Other reasons for referral include multiple medication with continuous symptoms (89.1%), the presence of atypical signs and symptoms (82.3%), uncontrolled patients on step four (80.2%) and the presence of unacceptable side effects of medication (59.4%). Less common reasons for referral included: history of previous hospitalization (30.7%) and all patients with uncontrolled asthma (38%) as shown in Table 6.

Table 6. PHC physicians’ opinion about indications of referral for secondary care

The survey also evaluated the incorporation of patients’ health education into clinical practice. The majority of the physicians reported the following: discussion with the patient’s regarding mistaken beliefs (84.9%), the effect of smoking (95.8%), house dust mites (95.8%), animal allergens (93.8%) and the effect of cockroaches (67.2%).

When physicians were asked about the use of a written asthma action plans (WAAP) for their patients as a part of patient care, only 37.3% of them reported that they had used them.

DISCUSSION

The majority of respondents were aware of the availability of asthma guidelines; however, the survey did not ask whether the respondents have ever read the guidelines.

The results suggest that there are several key aspects in the delivery of asthma care by PHC physicians that are consistent with the guidelines’ recommendations. For example, the survey inquired into several aspects of peak flow use. Most of the responding physicians reported routine PEFR monitoring during routine office visits and half of them routinely use it for acute symptomatic patients. The study also tested the criteria for referral to specialists and it showed that most physicians would refer patients with life-threatening episodes and on multiple medications with continuous symptoms. Most of the PHC physicians reported scheduling regular follow-up for their patients which is consistent with the guidelines. However, the survey also identified several other aspects of asthma care that are less consistently observed in accordance with the guidelines’ recommendations. For example, the study showed that only
37% of physicians give their patients written instructions. The use of written asthma action plans is a key aspect of patient education, and their use has been associated with decreased morbidity. Tan et al. demonstrated in their study that GPs rarely used a written asthma action plan (WAAP) despite their perceived usefulness. This may be attributed to a lack of time related to patient loads in GP clinics and GPs lack of training and practice.

In addition, the study showed that 28.1% of PHC physicians are still prescribing a long-acting B2 agonist without steroid. Its use as mono-therapy should be avoided as this may increase the risk of serious side effects in patients with unstable asthma. It has also been shown that 27.6% of PHC physicians prescribed an oral short-acting B2 agonist (SABA). Oral administration of SABA was not recommended because it has not been shown to be more effective than inhaled SABA and has been associated with an increased frequency of side effects.

The study also disclosed that only about 44% of PHC physicians were unable to assess the level of control correctly and this may represent a major obstacle in managing asthma cases not only because of the lack of proper assessment but also because of inappropriate controller selection. Different studies have shown that continuous medical education can increase the knowledge of physicians after graduation especially in younger physicians. Unfortunately, our study did not investigate the proportion of PHC physicians who have ever participated in an asthma educational program.

CONCLUSIONS

Various aspects of the GINA guidelines appear to have been integrated into clinical practice by primary care physicians, whereas other recommendations do not appear to have been readily adopted. This information suggests areas for intervention such as improvement of physicians’ knowledge regarding proper assessment of the level of control and provision of appropriate management accordingly. This study also recommends further studies or audits to assess physicians’ adherence to the guidelines and to look for possible causes behind decreased compliance with the guidelines’ recommendations.

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practices associated with reduced risk of pediatric asthma hospitalization and emergency department visits. Pediatrics. 1997 Sep;100(3 Pt 1):334-41.


ACKNOWLEDGEMENTS

We are very grateful to Dr Abudahish who emailed the questionnaire to enable its use in this study. We would also like to thank to Dr Tawfeeq Naseeb who reviewed our manuscript.

APPENDIX

1- Age: ____________ years

2- Sex: 1- Male □ 2- female □

3- Nationality: 1- Bahraini □ 2- Non-Bahraini □

4- Qualification:
   4.1- General practitioner □
   4.2- Family physician □
   4.3- Other board □
   Please, specify the specialty ____________

5- Duration in primary health care service in Bahrain ____________ years

6- Do you follow a specific asthma guideline in your management?
   1- Yes □ 2- No □ If No go to question No 8

7- If yes, please mention the name of this guideline_________________

8- Do you think Adherence to specific asthma guideline will improve the outcome of patient management?
   1- Yes □ 2- No □ 3- Uncertain □ 4- Other □ specify ____________

The next three questions ask you to classify patients according to level of asthma control (Please choose ONE response only)

9- 38 years old, nonsmoker, with Peak Expiratory Flow (PEF) of 60% of predicted, uses B2 agonist daily for his daily symptoms, and has 3-4 nocturnal symptoms per a week. This patient would be classified as having:
   1- Controlled asthma □
   2- Partly controlled asthma □
   3- Uncontrolled asthma □
   5- Don’t Know □

10- A 46 years old female non-smoker, with a PEF of 80% of predicted, has symptoms twice a week which require B2 – agonist and sometimes require her to stop her activities, and has no nocturnal symptoms. This patient would be classified as having:
   1- Controlled asthma □
   2- Partly controlled asthma □
   3- Uncontrolled asthma □
   5- Don’t Know □

11- A 20 years old female non-smoker, with a PEF of 80% of predicted, has symptoms less than twice a week which require B2 – agonist of same frequency. She has no limitation of daily activities, and no nocturnal symptoms. This patient would be classified as having:
   1- Controlled asthma □
   2- Partly controlled asthma □
   3- Uncontrolled asthma □
   5- Don’t Know □

12- What medications are most likely to prescribe for a patient with MILD INTERMITTENT symptoms or controlled asthma on step 1 treatment with no triggers? (Please respond “yes” or “No” for EACH treatment listed).

   Adult children

12.1 - Theophylline   YES No YES No
12.2- Inhaled short acting B2 agonist □1 □ 2 □ 1 □ 2
12.3- Oral short acting B2 agonist □1 □ 2 □ 1 □ 2
12.4- Inhaled Steroid □1 □ 2 □ 1 □ 2
12.5- Inhaled long acting B2 agonist □1 □ 2 □ 1 □ 2

13- For child (5 years and older) on step 3 treatment with daily symptoms that respond to t.i.d short acting inhaled beta 2-agonist and waking up more than three times a week with symptoms, what would you do next? (Please choose ONE response )
   1. No change □
   2. Increase B2 agonist □
   3. Add theophylline □
   4. Add inhaled steroids □
   5. Add oral steroids □
   6. Add Sodium Cromoglycate □
   7. Add long acting beta- agonist □
   8. Refer him to the specialist □

14- How often do you do the following for your asthmatic patients:

14.1- Prescribe oral short acting B2 agonist (tablet or syrup):
   1- Never □ 2- Rarely □ 3-Sometimes □
   4- Often □

14.2-Prescribe steroid inhaler for persistent asthma (mild, moderate or severe) or uncontrolled asthma:
   1- Never □ 2- Rarely □ 3- Sometimes □
   4- Often □

14.3-Prescribe long –acting B2 agonist without inhaled steroid
   1- Never □ 2- Rarely □ 3- Sometimes □
   4- Often □
15. In your experience, how safe are inhaled corticosteroids (at approved doses) for long-term use in chronic asthma? (Please choose ONE response only).

1- Very safe □ 2-safe □ 3-Uncertain □ 4- Unsafe□ 5-Very unsafe □

The question below will assess your knowledge in the management of acute exacerbation of bronchial asthma.

16. Which of the following agents should be considered for treatment of moderate to severe acute exacerbation of asthma in an adult in conjunction with a short acting B sub 2 agonist? ( please respond “YES” or “NO” for EACH item)

YES  NO
16.1- Inhaled short acting B sub 2 agonist given by spacer □1 □2
16.2-Nebulized short acting B sub 2 agonist □1 □2  
16.3- Oral short acting B sub 2 agonist □1 □2
16.4- IV hydrocortisone □1 □2
16.5- Inhaled atrovent □1 □2
16.6- Oral theophylline □1 □2
16.7- IV theophylline □1 □2
16.8- Oral steroid □1 □2

17. Which of the following factors routinely do you discuss with your asthmatic patients as a part of health education? (Please respond “YES” or “NO” for EACH factor listed).

YES  NO
17.1- Wrong beliefs □1 □2
17.2- Effect of smoking □1 □2
17.3-House dust mites □1 □2
17.4-Animal allergens □1 □2
17.5-Cockroach allergens □1 □2

18. Which of the following outcomes do you ROUTINELY monitor during office visits for your patient with asthma? ( Please respond “YES” or “NO” for EACH item)

YES  NO
18.1- Frequency of wheeze/ cough □1 □2
18.2-Frequency of disturbed sleep due to asthma symptoms □1 □2
18.3-Activity levels □1 □2
18.4-Loss of work/ school days due to asthma □1 □2
18.5-Specific frequency of use of beta 2 agonist □1 □2
18.6- Peak flow diary review (for patients 5 years and older) □1 □2
18.7- Direct observation of inhaler technique (for patients 5 years and older) □1 □2

19. Which of the following events would lead you to ROUTINELY refer to hospital? (please respond “YES” or “NO” for EACH item)

19.1- Previous hospitalization □1 □2
19.2- Unaccepted side effects of medication □1 □2
19.3- On multiple medications with continued symptoms □1 □2
19.4- A life- threatening episode □1 □2
19.5- All patients with uncontrolled asthma □1 □2
19.6- Signs or symptoms are atypical □1 □2

20. In your experience, how often is routine peak flow monitoring for patients (5 years and older) with asthma

20.1 – At home:
1- Often useful □ 2- Sometimes useful □ 3- not useful □
20.2- At office:
1- Often useful □ 2- Sometimes useful □ 3- not useful □

21. How Often do you use peak expiratory flow in acute symptomatic patient

1- Never □ 2- Rarely □ 3- Sometimes □ 4- Often □

22. Are you satisfied with your skill in demonstrating proper use of peak flow meter?
1- Yes □ 2- No □ 3- Other □ specify________

23. Which of following, if any, best describes your approach for following up asthmatic under good control? ( Please choose ONE response only)
1- Office visits when patient is symptomatic, no scheduled visits □
2- Scheduled visits every 3 months □
3- Other, specify__________ □

24. Is your center supplied with the following:

24.1- Peak flow meter 1- yes □ 2-No □
24.2- Steroid inhaler 1-yes □ 2-No □
24.3- Short acting Beta sub 2 agonist inhaler 1-yes □ 2-No □
24.4- Short acting Beta sub 2 agonist nebulizer 1-yes □ 2-No □
24.5- Long- acting Beta sub 2 agonist □1 □2
24.6- Theophylline tablet 1-yes □ 2-No □

25. Do you ROUTINELY provide (Written Asthma Action Plan) written instructions for your asthmatic patient in the clinic?
1- Yes □ 2- No □
Attitudes of primary care physicians towards insulin initiation in people with type 2 diabetes in Bahrain

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ABSTRACT

Objective: The aim of this study is to explore the beliefs and attitudes of primary care physicians (PCP) regarding insulin initiation in people with type 2 diabetes.

Methods: A structured, adapted questionnaire was distributed to all primary care physicians. The questionnaire consisted of 2 parts: the first part collected information on physicians’ demographic characteristics; the second part contained 30 items measuring the beliefs and attitudes of physicians regarding insulin initiation.

Results: A total of 171 physicians out of 245 completed the questionnaire with a response rate of 70%. Most of the physicians were between 30 and 59 years of age. The majority were females (79.4%), had been in practice for >10 years and were certified family physicians seeing more than 25 diabetic patients a week. About 75% of the physicians found initiation of insulin as one of the most difficult aspects of managing patients with type 2 diabetes. The main obstacles reported by physicians were: route of administration by injection, the risk of hypoglycemia, and the patients’ level of education. However, they agreed that the benefits of insulin outweighed the risks of hypoglycemia and weight gain. Only 45% of them agreed that patients will eventually need to go on insulin regardless of how well they adhere to treatment. Moreover, 31.8% of physicians stated that increased levels of plasma insulin will increase the risk of cardiovascular events.

Conclusion: Physicians’ concerns and lack of knowledge regarding insulin use may act as barriers to insulin initiation. This may increase the risk for a higher rate of uncontrolled diabetes and its subsequent complications.

Keywords: insulin; family physician; Bahrain

INTRODUCTION:

Diabetes is a common chronic non-communicable disease that is highly prevalent worldwide. It is estimated that the total number of affected people in 2013 was 382 million and it is expected that this number will rise to 592 million by 2035. Type 2 accounts for 85-95% of all diabetesSystematic review of the literature has shown that type 2 diabetes is a growing epidemic, with the number of new cases increasing every year. It is estimated that by 2050, 35.2% of the world’s population will have type 2 diabetes. This increase in prevalence is due to factors such as increased life expectancy, changes in lifestyle, and genetic factors. The type 2 diabetes epidemic is a global health problem, and its management is crucial for the prevention of complications and the improvement of quality of life.

Type 2 diabetes is characterized by insulin resistance and relative insulin deficiency. Insulin resistance occurs in the insulin-sensitive tissues such as muscle, fat, and liver. This results in an increase in hepatic glucose production and a decrease in glucose utilization, leading to hyperglycemia. Insulin resistance is often accompanied by β-cell dysfunction, which reduces the capacity of the pancreas to produce insulin in response to elevated blood glucose levels.

Glycemic control is important in managing type 2 diabetes to prevent microvascular and macrovascular complications. The target HbA1c level for people with type 2 diabetes is <7% (53 mmol/mol). However, recent studies have shown that even lower HbA1c levels may have beneficial effects on reducing the risk of diabetes-related complications.

Hepatic and peripheral (muscle and fatty tissues) insulin resistance followed by β-cell dysfunction in susceptible individuals are the two major pathophysiologic defects that lead to type 2 diabetes. However, there are many other defects involving many different organs. Glycemic control is important to prevent and/or reduce the occurrence of micro- and macrovascular complications. It has been shown that reducing glycated hemoglobin (A1C) to ≤53 mmol/mol (7%) resulted in significant reduction of microvascular complications. While intensive control has not been found to result in significant reduction of macrovascular complications (and can be hazardous to some patients) as shown in recent trials in newly diagnosed patients with type 2 diabetes.
patients and those with short diabetes duration, a significant short and long term beneficial effect is evident. Type 2 diabetes is a progressive disease. It has been shown that with time, there is a need for more than one agent to control hyperglycemia. For example, maximum doses of sulphonylurea failed to maintain normal fasting blood sugar (< 6mmol/l) in 53% of patients within 6 years of treatment and required the addition of insulin. In addition, it was found that while oral hypoglycemic agents (OHA) were preferred over insulin, most patients eventually need insulin.

Disappointingly, a substantial proportion of patients are still above their target A1C despite the introduction of many new and costly medications. This has been attributed to many factors, including physicians' inertia. Recent studies found significant delay in titration of OHA and/or initiation and titration of insulin in uncontrolled patients.

Primary care physicians (PCP) play an important role in the management of diabetes. Studies have found that people with diabetes are mostly seen by family doctors and general practitioners. Unfortunately, it has also been found that misconceptions, wrong beliefs, inadequate knowledge about insulin therapy are common among PCP.

The aim of this study is to explore the beliefs and attitudes of PCPs regarding insulin initiation in people with type 2 diabetes.

MATERIALS AND METHODS

An updated list of primary care physicians working in the Ministry of Health was obtained from the Directorate of Primary Health Care in the ministry. The questionnaire was sent to all physicians through the head of council of each health center. The study was conducted during the period from August to October 2013.

In order to explore the beliefs of the PCP regarding insulin initiation in patients with type 2 diabetes, a structured questionnaire, adapted from a previous study, was used. Permission was given by the authors of that study to use the questionnaire. The original questionnaire consisted of 2 parts:

The first part collected information on physicians’ demographic characteristics which included: age, gender, years of experience, and specialty. In addition, these two questions were included: (1) The number of patients with type 2 diabetes seen by the physicians in a week; and (2) A question exploring the physicians’ knowledge regarding the glycemic goal for patients in three age categories.

The second part of the questionnaire contained 30 items measuring the beliefs of physicians. The physicians’ responses were assessed on a five-point Likert scale: strongly agree, agree, don’t know, disagree, and strongly disagree.

Data was analyzed using the Statistical Package for the Social Sciences (SPSS) software, versions 20. Frequencies were used to describe these categorical variables: age groups, gender, years of experience, specialty, number of patients seen per week, and treatment goal in different age groups. In addition, frequencies were calculated for the responses to the 30 belief items. One-way analysis of variance (ANOVA) was used to test the association between each of the belief-item responses and the physicians’ characteristics. P-value less than 0.05 was considered statistically significant. The study was approved by National Research Committee for Primary Health Care.

RESULTS

A total of 171 physicians out of 245 responded and completed the questionnaire with a response rate of 70%. One hundred and fifty (88.3%) of them were between 30 and 59 years of age. One hundred and thirty-one (79.4%) were females and one hundred and three (60%) had been in practice for >10 years. According to specialty, one hundred and twenty-five (73%) were certified family physicians. One hundred and twelve physicians (83%) were seeing more than 25 diabetic patients a week. Regarding glycemic control, one hundred and fifty (89%) agreed that HbA1c should be ≤53 mmol/mol (7%) for patients with type 2 diabetes younger than 50 years of age, one hundred and twenty-seven (76%) agreed with the same goal for those between 50 and 70 years of age, but only eighty-five (50%) agreed for those patients over 70 years of age.

Figure 1. Gender distribution of physicians

Figure 2. Physicians’ specialty

The responses to the research questions exploring beliefs about insulin initiation for type 2 diabetic patients were analyzed so that if 50% or more of responses fell into the ‘agree’ or ‘strongly agree’ category they were grouped...
together. Similarly, if <50% of responses fell into the
‘disagree to strongly disagree’ category, they were grouped
together.

<table>
<thead>
<tr>
<th>Items</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Agree to strongly agree (%)</td>
</tr>
<tr>
<td>1. Patients would initiate insulin therapy if it was not by injection</td>
<td>75.3</td>
</tr>
<tr>
<td>2. Education is the key to the initiation of insulin</td>
<td>92.3</td>
</tr>
<tr>
<td>3. The injection route of administration is the greatest barrier to</td>
<td>86.5</td>
</tr>
<tr>
<td>acceptance of insulin</td>
<td></td>
</tr>
<tr>
<td>4. Benefits of therapy outweigh the risks of hypoglycemia</td>
<td>71.8</td>
</tr>
<tr>
<td>5. Benefits of insulin therapy outweigh the risks of weight gain</td>
<td>78.7</td>
</tr>
<tr>
<td>6. Physicians might prescribe insulin more frequently if the route</td>
<td>71.6</td>
</tr>
<tr>
<td>did not involve injections</td>
<td></td>
</tr>
<tr>
<td>8. Patients on oral diabetes therapy are afraid of insulin</td>
<td>93.5</td>
</tr>
<tr>
<td>9. Patients using insulin feel much better physically</td>
<td>74.6</td>
</tr>
<tr>
<td>10. Patients would benefit from receiving insulin prior to the</td>
<td>85.9</td>
</tr>
<tr>
<td>development of complications</td>
<td></td>
</tr>
<tr>
<td>11. Patients on oral diabetes therapy would be reluctant to accept</td>
<td>84.6</td>
</tr>
<tr>
<td>insulin</td>
<td></td>
</tr>
<tr>
<td>12. Patients find the demands of insulin therapy to be less than</td>
<td>54.1</td>
</tr>
<tr>
<td>they expected</td>
<td></td>
</tr>
<tr>
<td>13. Initiation of insulin is one of the most difficult aspects of</td>
<td>75.7</td>
</tr>
<tr>
<td>managing patients with type 2 diabetes</td>
<td></td>
</tr>
<tr>
<td>14. Patients using insulin take their insulin as prescribed</td>
<td>69.4</td>
</tr>
<tr>
<td>17. Training in administration of insulin is complicated for most</td>
<td>28.8</td>
</tr>
<tr>
<td>patients</td>
<td></td>
</tr>
<tr>
<td>19. The risk of weight gain with insulin makes me reluctant to</td>
<td>5.8</td>
</tr>
<tr>
<td>prescribe for patients with BMI &gt; 35</td>
<td></td>
</tr>
<tr>
<td>20. The fear of side effects is the greatest barrier to their</td>
<td>30.6</td>
</tr>
<tr>
<td>acceptance of insulin</td>
<td></td>
</tr>
<tr>
<td>21. Risk of hypoglycemia from insulin makes me reluctant to prescribe</td>
<td>76.4</td>
</tr>
<tr>
<td>it for patients ≥85 years</td>
<td></td>
</tr>
<tr>
<td>22. Patients using insulin self-monitor their blood glucose</td>
<td>49.7</td>
</tr>
<tr>
<td>26. Insulin has a beneficial effect on insulin resistance</td>
<td>52.4</td>
</tr>
</tbody>
</table>

Table 1. Frequency distributions for items in which 50% or more primary care physicians (n=171) ‘agreed’ or ‘disagree’ with the listed question

Generally physicians agreed that the barriers to insulin therapy are route of administration being given by injection (items 1, 3, 6), and patients’ level of education (item 2). They also agreed that the benefits of insulin outweighed the risks of hypoglycemia (item 4) and weight gain (item 5). There is agreement that most of the patients on oral diabetes therapy are afraid of insulin therapy (item 8) and would be reluctant to accept a prescription for insulin (item 11). Many physicians (74.6%) also agreed that patients using insulin feel much better physically once they become accustomed to it (item 9), benefit from receiving insulin prior to the development of complications (item 10), and find the demands of insulin therapy to be less than they expected (item 12). About 75% of physicians found the initiation of insulin as one of the most difficult aspects of managing patients with type 2 diabetes (item 13). Many physicians (69.4%) agreed that most of their patients are using their insulin as prescribed (item 14). More than three quarters of physicians (76.3%) think that the risk of hypoglycemia from insulin therapy makes them reluctant to prescribe it for most of their patients ≥85 years of age (item 21). Regarding blood glucose monitoring, 49.7% of them find that their patients are self-monitoring their blood glucose with sufficient frequency (item 22). Only 52% of physicians agreed that insulin therapy has a beneficial
effect on insulin resistance (item 26). Some physicians (61.2%) disagreed that training in the proper administration of insulin is complicated for the patients (item 17). They also disagreed (78%) that the risk of weight gain associated with insulin therapy will make them reluctant to prescribe it for patients with BMI >35 (item 19) or that the fear of side effects is a barrier to the acceptance of insulin therapy (item 20).

The table below shows areas of disagreement between physicians.

<table>
<thead>
<tr>
<th>Items</th>
<th>Agreement (%)</th>
<th>Neutral (%)</th>
<th>Disagreement (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Patients using insulin are able to manage the demands of insulin therapy</td>
<td>33.5</td>
<td>21.2</td>
<td>45.3</td>
</tr>
<tr>
<td>15. Patients on oral therapy would regard the initiation of insulin as a personal failure</td>
<td>45.3</td>
<td>25.3</td>
<td>29.4</td>
</tr>
<tr>
<td>16. Patients using insulin are satisfied with their therapy</td>
<td>45.3</td>
<td>26.5</td>
<td>28.2</td>
</tr>
<tr>
<td>18. Follow-up needed for patients on insulin is too resource-intensive</td>
<td>39.1</td>
<td>26.6</td>
<td>34.3</td>
</tr>
<tr>
<td>23. Training of patients in the proper administration of insulin is too time-consuming</td>
<td>36.4</td>
<td>16.0</td>
<td>47.5</td>
</tr>
<tr>
<td>24. Most patients would not need to go on insulin if they would follow physicians’ recommendations</td>
<td>47.6</td>
<td>11.8</td>
<td>40.6</td>
</tr>
<tr>
<td>25. Patients will eventually need to go on insulin regardless of how well they adhere to treatment</td>
<td>44.7</td>
<td>8.8</td>
<td>46.5</td>
</tr>
<tr>
<td>27. Increased levels of plasma insulin will increase the risk of a cardiovascular event</td>
<td>31.8</td>
<td>39.4</td>
<td>28.8</td>
</tr>
</tbody>
</table>

On bivariate analysis, there was a significant association between the gender of the physicians and the following items: (1) patients would initiate insulin therapy if it was not by injection (p=0.01), (3) the injection route of administration is the greatest barrier to acceptance of insulin (p=0.005), (6) physicians might prescribe insulin more frequently if the route did not involve injections (p=0.006), (12) patients find the demands of insulin therapy to be less than they expected (p=0.01), and (15) patients on oral therapy would regard the initiation of insulin as a personal failure (p=0.014). Moreover, there was a significant association between the specialty of the physicians and the following items: 3 (p=0.004), 13 (p=0.005), 18 (p=0.003), and 19 (p=0.004). On further analysis using one-way ANOVA procedure, a significant association between the years of experience of the physician and items 2 (p <0.001) and 13 (p=0.04) was shown. However, one-way ANOVA procedure did not show a significant association between the number of diabetic patients seen per week and any of the items.

**DISCUSSION**

There is a decline in ß-cell mass and function within 10-15 years after diagnosis of diabetes. Insulin is recommended if oral hypoglycemic agents failed to achieve good glycemic control in these patients\(^{12,13,24}\).

A meta-analysis study concluded that “early and intensive antidiabetes treatment was recommended in patients with T2DM, particularly those with a shorter duration of disease and without a history of CVD” in order to prevent long-term complications of the disease\(^{25}\).

Basically, most of these patients are managed by primary care physicians in the health centers. A Canadian study proved that PCPs could guide patients to implement bedtime basal insulin therapy as successfully as diabetes experts could and achieved glycemic control in their
patients as effectively as experts did. The study suggested that PCPs should be given a practical protocol for initiating insulin\(^\text{26}\).

However, there are many factors delaying or preventing prompt insulin initiation. A study showed that insulin is underused in patients with type 2 diabetes despite the physicians’ knowledge of glycemic targets and this has been referred to as “clinical inertia”. The study found that PCPs added insulin late in the course of disease and waited an average of 9.2 years before initiating insulin. Furthermore, after more than 3 years of insulin therapy, 20% of patients still had poor glycemic control\(^\text{27}\).

So, in this study, barriers facing primary care physicians when prescribing insulin were explored. The response rate was satisfactory as 70% of the physicians responded and completed the questionnaire. Most of the physicians were between 30 and 59 years of age. The majority were females (79.4%), had been in practice for more than 10 years and were certified family physicians seeing more than 25 diabetic patients a week. Most of the physicians agreed that the goal for HbA1c should be ≤7% for patients with type 2 diabetes younger than 70 years of age, but only half of them agreed for those patients more than 70 years old. About 75% of physicians found the initiation of insulin as one of the most difficult aspects of managing patients with type 2 diabetes. There was a strong association of this belief with the physicians’ specialty and years of experience. The main obstacles reported by physicians in this study were: route of administration being given by injection, the risk of hypoglycemia, and patient’s level of education. The reporting of these obstacles was strongly associated with the physicians’ gender and specialty. These are shared factors and were reported by different similar studies\(^\text{22, 28}\). In another study physicians reported that they “have concerns about the use of insulin therapy in elderly patients and that “It is difficult to provide guidance and education on insulin injection to patients”\(^\text{29}\).

There is agreement among physicians that most of the patients on oral diabetes therapy are afraid of insulin therapy. This was also reported by other studies which found out that fear of difficulties with using insulin was the main obstacle facing these patients\(^\text{22, 29}\).

On the other hand, physicians agreed that the benefits of insulin outweighed risks of hypoglycemia and weight gain. Many physicians (75%) also agreed that patients using insulin feel much better physically and benefit from using insulin prior to the development of complications (86%). These beneficial effects were reported by the patients themselves in a study which examined patients’ attitudes toward insulin injections and found that positive attitudes towards insulin are: “its efficacy and efficiency, the avoidance of complications, and feeling better and more energetic”\(^\text{30}\).

Although only 29% of physicians thought that training in administration of insulin is complicated for patients, 69% of them reported that patients take their insulin as prescribed. Several negative attitudes explained by patients for non-adherence were: anxiety about the pain, proper techniques, and hypoglycemic symptoms\(^\text{30}\). Another study showed that 94% of their patients adhered to their insulin regimen although they reported that the cost and weight gain were the main factors contributing to non-adherence. Moreover hypoglycemia was experienced by 56% of the participants. Some patients were uncomfortable with the use of insulin and others felt that taking insulin interfered with their routine activities\(^\text{31}\).

Physicians disagreed (78%) that the risk of weight gain associated with insulin or the fear of side effects will make them reluctant to prescribe it, but these side effects are of concern to many patients as reported by other studies\(^\text{27, 28, 31}\).

The results showed that PCPs may lack the knowledge about the progressive nature of diabetes mellitus as only 45% of them agreed that patients will eventually need to go on insulin regardless of how well they adhere to treatment. Moreover, 31.8% of physicians stated that increased levels of plasma insulin will increase the risk of cardiovascular events and 39.4% were neutral about that statement. These effects were not evident from previous research\(^\text{32}\).

**CONCLUSION**

Physicians’ concerns and lack of knowledge regarding insulin use may act as barriers to insulin initiation. This will delay achieving glycemic control and exposing patients to complications. Further studies are needed to look at factors that make patients reluctant to accept insulin therapy. Also factors related to health care system which facilitate the prescription of insulin should be explored. These include medical education of physicians, health education of patients and provision of medical supplies.

**REFERENCES**


DISCLOSURE

Author contribution: This is to certify that all authors have made a substantial contribution to: (1) the concept and design; acquisition and analysis and interpretation of data; (2) drafting the article and revising it critically for intellectual content and conformity to style guidelines; and (3) final approval of the manuscript version to be published.

Potential conflicts of interest: none

Competing interest: none

Sponsorship: none

Ethical approval: Ministry of Health Research Committee.
Primary colorectal anastomosis, no preparation, no stoma needed

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**Consultant General Surgeon, Head of Surgical Department, Al Bashir Teaching Hospital, Ministry of Health, Amman, Jordan
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ABSTRACT

Background: Mechanical bowel preparation was regarded for a long time as a vital prerequisite for successful colorectal surgery; this is now being questioned. The distressful effect of bowel preparation, alongside the safety of primary colorectal anastomosis in emergency cases, has led to a considerable change in the surgical protocol, making primary repair and anastomosis after colon resection safer without bowel preparation, and the role of colostomy has changed from mandatory to optional.

Aim: To assess whether colorectal surgery can be performed safely without mechanical bowel preparation or colostomy.

Method: A series of 130 patients, who underwent elective and emergency colorectal surgery, were followed prospectively over a three-year period in Al Bashir Teaching Hospital, Amman, Jordan. The patients were randomized into two groups. In one group (preparation group) 66 elective patients were selected from the outpatient department; the bowel was prepared using Fortran’s solution. In the second group (non-preparation group), 64 patients were selected from the emergency and outpatient departments, no bowel preparation was used. Colostomy was omitted in both groups. The main outcomes regarding operative time, hospital stay, rate of postoperative wound infection, anastomotic leak and intra-abdominal abscess were compared between the two groups.

Results: Malignancy was the most prevalent pathology in both the preparation and non-preparation groups, 75.7% and 62.5% respectively, while benign diseases were present in up to 24.2% of the preparation group and in 1.5% of the non-preparation group. Anastomosis was ileo-colic in 33.3% and 37.5%, colo-colic or colo-rectal in 66.6% and 62.5% of the preparation and non-preparation groups respectively. There was no significant statistical difference in the overall...
postoperative complication rates between the two groups, 16.6% in the preparation group and 14% in the non-preparation group. Postoperative wound infection, wound dehiscence, intra-abdominal abscess and anastomotic leak occurred in 9.09%, 1.5%, 1.5% and 4.5% in the preparation group, as compared to 7.8%, 3.1%, 0% and 3.1% in the non-preparation group respectively. The mortality rate was nil in both groups.

Conclusion: Resection of colorectal pathology followed by primary anastomosis, without stoma, can be performed safely with the omission of preoperative mechanical bowel preparation.

Keywords: colorectal surgery; primary anastomosis; mechanical bowel preparation; anastomotic leak; stoma

INTRODUCTION

In the past, the mortality rate following colorectal surgery approached 20%, which was usually as a result of anastomotic leak and sepsis. It was generally believed that colon fecal load had an adverse effect on healing of the suture line. This hampered primary colon anastomosis unless preoperative mechanical bowel preparation and antibiotic prophylaxis has been undertaken in the presence of healthy bowel, sufficient blood supply, tension-free and water-tight suture placement. Nichols and Condon in 1971 demonstrated that mechanical removal of fecal load in patients undergoing colorectal surgery dramatically decreases postoperative morbidity and mortality rates.

The concept of mechanical bowel preparation would appear to have many advantages: it decreases contamination of the peritoneum and wound by reducing the intraluminal bacterial load, which in turn decreases the incidence of anastomotic dehiscence and makes bowel handling during surgery easier. This current practice of mechanical bowel preparation before colorectal surgery is now being questioned. Its benefit has never been unequivocally proven in previous studies, and, on the contrary, some studies have shown that mechanical bowel preparation increases the incidence of wound infections and anastomotic leaks.

The distressful and unpleasant effects of mechanical bowel preparation, with enhanced bacterial translocation and adverse effects on anastomotic healing, has resulted in a change of the paradigm in respect to the need for bowel cleansing before colorectal surgery.

Until recently emergency surgery for colon obstruction and injuries was managed by a staged procedure, the damaged colon either exteriorized, or repaired with protective colostomy. Primary anastomosis was contraindicated in such circumstances for fear of sepsis and suture line leaks. The psychological and physical impact of stoma on patients, with the added expense of stoma care and a second surgery for closure, beside a paucity of published studies confirming the efficacy of diverting colostomy in preventing anastomotic leak, questions the surgical principles in managing emergency colon surgery. This had led to a considerable change in surgical protocols around the world, and recent published studies have shown that primary repair and anastomosis after colon resection is safe, and the role of colostomy, instead of being mandatory, has become optional.

METHOD

A series of 130 patients were studied prospectively in Al Bashir Teaching Hospital, Amman, Jordan, over a 3-year period (2009-2012). All had undergone colorectal resection, or repair, with primary anastomosis for different pathologies. Patients were randomized into two groups and managed by two surgical teams. In one group (preparation group), 66 elective patients with presentations suggestive of colorectal pathology were selected from the outpatient department. Radiologic, endoscopic and biopsy studies confirmed colorectal disease mandating operative intervention. All patients were admitted on the day before surgery and received mechanical bowel preparation with four sachets of Fortran’s solution 12 hours before surgery, a soft diet was allowed until evening time. Resection of colorectal pathology was followed by primary anastomosis without stoma. In the second group (non-preparation group) 64 patients were selected from the emergency and outpatient departments with clinical diagnosis of intestinal obstruction, abdominal trauma, or signs and symptoms of colon pathology. Emergency and planned colorectal resections with primary anastomosis were undertaken, neither colostomy nor mechanical bowel preparation was used. Intravenous antibiotics were given to all patients in both groups at induction of anesthesia and continued for three doses postoperatively. Prolonged courses of intravenous antibiotics were given for any post-operative infections.

Laparotomies were carried out through midline approach; colorectal pathologies were dealt with accordingly by suture repair, or divided between non-crushing clamps. Bowel ends were cleaned with saline impregnated gauze, anastomosis was completed by a hand sewn single, mucosal-inverting, layer of 3/0 vicryl suture, or staplers. Integrity of anastomosis was checked by increasing intraluminal pressure manually, looking for any gas or fecal leak. Drains or stoma were not used.

Data relative to patients’ demographics, diagnosis and operative procedure were recorded. The main outcomes regarding operative time, hospital stay, rate of post-operative wound infection, anastomotic leak and intra-abdominal abscess were compared between the two groups.

Wound infection was defined as discharge of pus, wound erythema or a positive culture. Anastomotic leak was defined as a fecal discharge from the abdominal wound, vagina, intraperitoneal abscess or peritonitis.

STATISTICAL ANALYSIS

Data from two groups were compared using chi square test, with a P-value of 0.05% considered to be statistically significant.
RESULTS

<table>
<thead>
<tr>
<th>Variable</th>
<th>Prep. group (66)</th>
<th>Non-prep. group (64)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (years)</td>
<td>60</td>
<td>55</td>
<td>N/A</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>36</td>
<td>38</td>
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</tr>
<tr>
<td>Female</td>
<td>30</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>Diagnosis</td>
<td></td>
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<tr>
<td>Colorectal carcinoma</td>
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<td>Colon injury</td>
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<td>Sigmoid volvulus</td>
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<td>0</td>
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<tr>
<td>Procedure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right hemicolectomy</td>
<td>15</td>
<td>16</td>
<td>N/A</td>
</tr>
<tr>
<td>Extended Rt hemicolectomy</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Lt hemicolectomy</td>
<td>22</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Extended Lt hemicolectomy</td>
<td>5</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Subtotal colectomy</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Sigmoidectomy</td>
<td>12</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>High anterior rectal resection</td>
<td>5</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Hospital stay (days)</td>
<td>5</td>
<td>5.6</td>
<td>&gt;0.05%</td>
</tr>
<tr>
<td>Operative time (min.)</td>
<td>95</td>
<td>110</td>
<td>&gt;0.05%</td>
</tr>
<tr>
<td>Length of antibiotic use (days)</td>
<td>2.3</td>
<td>1.9</td>
<td>&gt;0.05%</td>
</tr>
</tbody>
</table>

Table I. Demographic and clinical data

There were more male than female patients in both preparation (54.5% versus 45.4%) and non-preparation (59.3% versus 40.6%) groups respectively. The average hospital stay was similar for patients in the two groups. Histopathology of the resected specimens showed malignancy as the most prevalent pathology in both preparation and non-preparation groups, 75.7% and 62.5% respectively, while benign diseases were present in up to 24.2% of the preparation group and in 1.5% of the non-preparation group (see Table I). Surgery for colon injuries constituted about 35.9% of cases of the non-preparation group, with stab wounds comprising the major indication for laparotomy in 56.5% of them. All associated injuries were evaluated and treated accordingly, the liver being the organ injured most commonly (see Table II). All procedures were undertaken by consultant surgeons, with colo-colic or colo-rectal anastomosis representing about 66.6% and 62.5% of the preparation and non-preparation cases respectively, the majority being performed by hand-suturing technique. The anastomosis was ileo-colic in 33.3% and 37.5% of preparation and non-preparation groups respectively.

| Variable               | Number | P value | |
|------------------------|--------|---------| |
| Mechanism of trauma    |        |         | |
| Blunt trauma           | 7      | N/A     | |
| Stab wound             | 13     |         | |
| Gun shot               | 3      |         | |
| Associated injury      |        |         | |
| Small bowel            | 2      | N/A     | |
| Liver                  | 9      |         | |
| Spleen                 | 1      |         | |

Table II. Mechanism of trauma and clinical data

Solid stool in the colon was the predominant finding in the non-preparation group, 51.5%, while liquid stool was present in up to 56% in the colon of the preparation group. Intraoperative spillage of fecal content was significantly higher in the preparation group, 22.7%, than the non-preparation group, 4.6%, P value <0.05% (see Table III).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Preparation group (66)</th>
<th>Non-preparation group (64)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid stool</td>
<td>6</td>
<td>33</td>
<td>&gt;0.05%</td>
</tr>
<tr>
<td>Liquid stool</td>
<td>37</td>
<td>11</td>
<td>&gt;.05%</td>
</tr>
<tr>
<td>Clean bowel</td>
<td>23</td>
<td>19</td>
<td>&gt;.05%</td>
</tr>
<tr>
<td>Fecal spillage</td>
<td>15</td>
<td>3</td>
<td>&lt;.05%</td>
</tr>
</tbody>
</table>

Table III. Intraoperative assessment of bowel content and fecal spillage

There was no significant statistical difference in the overall postoperative complication rates between the two groups, 16.6% in the preparation group and 14% in the non-preparation group. Postoperative wound infection was slightly higher in patients of the preparation group, 9.09%, as compared to patients in the non-preparation group, 7.8%. The incidence of anastomotic leak and wound dehiscence in the preparation group was 4.5% and 1.5%, while patients of the non-preparation group showed an incidence of 3.1% and 3.1% respectively. One patient in the non-preparation group required reoperation for closure of a dehiscent wound (see Table IV). An intra-abdominal abscess occurred in only one patient in the preparation group, proving to be a minor anastomotic leak which closed spontaneously. The mortality rate was nil in both groups.

<table>
<thead>
<tr>
<th>Complication</th>
<th>Preparation group (66)</th>
<th>Non-preparation group (64)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anastomotic leak</td>
<td>3</td>
<td>2</td>
<td>&gt;0.05%</td>
</tr>
<tr>
<td>Superficial wound infection</td>
<td>6</td>
<td>5</td>
<td>&gt;0.05%</td>
</tr>
<tr>
<td>Wound dehiscence</td>
<td>1</td>
<td>2</td>
<td>&gt;0.05%</td>
</tr>
<tr>
<td>Intra-abdominal abscess</td>
<td>1</td>
<td>0</td>
<td>&gt;0.05%</td>
</tr>
<tr>
<td>Postoperative ileus</td>
<td>4.7 days</td>
<td>2.3 days</td>
<td>&gt;0.05%</td>
</tr>
</tbody>
</table>

Table IV. Postoperative complications

DISCUSSION

The use of mechanical bowel preparation before colorectal surgery has been surgical dogma for some considerable time, because it was considered to reduce the rate of infectious complications.21 But a number of prospective randomized
studies have failed to show any significant difference in the rate of anastomotic leak and wound infection in patients with or without bowel preparation.\textsuperscript{24, 25} Burke et al. in 1994 published a study on 186 patients undergoing left colorectal resection, some received bowel preparation, others did not. These investigators failed to find a significant difference in the percentage of anastomotic leak and wound infection between the two groups, 3.7\% and 4.9\% for the preparation group, versus 4.6\% and 3.4\% in the non-preparation group respectively.\textsuperscript{26} Other studies have shown a significant increase in the incidence of anastomotic leak and wound infection in patients receiving mechanical bowel preparation (10\% and 24\% respectively) as compared to patients without preparation (5\% and 12\% respectively).\textsuperscript{27} In our study the rate of anastomotic leak and wound infection was lower in patients not receiving mechanical bowel preparation (3.1\% and 7.8\% respectively) as compared to patients receiving bowel preparation (4.5\% and 9\% respectively), but the difference was not statistically significant. Changing the physical characteristics of feces from solid to liquid, induced by cathartics during bowel preparation, makes it less controllable with more spillage of fecal material from the fresh anastomotic line.\textsuperscript{28, 29} Liquid stools were found in 56\% of patients of the preparation group in our study, and control of intraoperative fecal spillage was significantly difficult in 22.7\% of cases of the preparation group as compared to 4.6\% of cases of the non-preparation group, P value <0.05\%. This may explain the higher incidence of wound infection in patients in the preparation group (see Table IV).

Mechanical bowel preparation is not without its disadvantages; it causes fluid and electrolyte disturbance, abdominal pain and bloating. Furthermore bowel preparation may deplete colonic fatty acid and disturb the colon mucosal barrier thereby enhancing bacterial translocation, leading to an increased incidence of anastomotic leak, wound infection and other perioperative complications.\textsuperscript{30, 31}

The safe results of primary anastomosis in the management of an unprepared colon in emergency surgery, obstruction or trauma, questions the necessity of mechanical bowel preparation.\textsuperscript{32, 33} In the current series of 23 patients with various kinds of abdominal trauma, all were managed soon after hospital admission by primary repair or anastomosis without stoma. Two cases of gunshot injuries were managed by resection and primary anastomosis of the left colon and small bowel, one of them developing low output fecal fistula, treated conservatively, and the other one developing abdominal dehiscence that required reoperation for wound closure. However, 12 cases of colon obstruction treated with urgent resection and primary anastomosis without stoma underwent a smooth postoperative period except for one case that developed deep wound infection, which proved to be a minor anastomotic leak.

Frequently, when surgeons decide to create a defunctioning stoma this is based on a belief that a difficult anastomosis might leak. When the real indications of colostomy are not present, i.e. feculent peritonitis, low rectal excision, shock, poor nutritional status and neoadjuvant radiochemotherapy, stoma should be avoided, as it has not been shown to prevent anastomotic leak.\textsuperscript{35, 36} However, animal studies have shown that colostomy might impair anastomotic healing. Omission of stoma in our study showed no increase in the incidence of anastomotic leak and wound infection when compared with other studies where a stoma is created to protect an anastomosis.\textsuperscript{37–39}

Current data from randomized controlled studies showed no benefit of routine drainage after uncomplicated colorectal surgery, and on the contrary it might increase the incidence of anastomotic leak and wound infection.\textsuperscript{40, 41}

Whether a handsewn or a stapler device is used for secure anastomosis, many controlled trials have shown no significant difference in terms of postoperative complication rate.\textsuperscript{42, 43}

**CONCLUSION**

We report that resection of colorectal pathology followed by primary anastomosis, without stoma, can be performed safely with the omission of preoperative mechanical bowel preparation. Stoma should be strongly recommended when the patient has: shock, gross fecal peritonitis, low rectal anastomosis, multiple injuries and associated co-morbidities. Antibiotic prophylaxis is recommended at induction of anesthesia and for two doses postoperatively, prolonged courses may be required in cases of infectious complications. Handsewn or stapled anastomosis produce the same results with respect to anastomotic leak.

**REFERENCES**

Non-compliance of children with ADHD to outpatient clinic appointments at the Psychiatric Hospital, Kingdom of Bahrain

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ABSTRACT

Introduction and Objectives: Non-adherence to clinic appointments by children with ADHD is considered a major obstacle to treatment. The aims of the study were to determine the rate of non-compliance to treatment and to identify the reasons for non attendance, as well as the characteristics of children who did not comply with clinic appointments.

Method: A retrospective cross-sectional survey was undertaken of all children aged 18 years and under who attended the Child Psychiatric Unit, Psychiatric Hospital, Bahrain, from June 2010 until September 2011 and who were subsequently diagnosed with ADHD according to DSM-IV and Conners’ Parent and Teacher checklist (n=53).

Results: More than 60% of the cases did not keep their clinic appointments. Their families were characterized by a higher level of education and social status compared to other parents attending the same clinic. Non-compliant children were characterized by the presence of comorbidity (53%), and were in the older age group.

Discussion and Conclusion: The degree of compliance to outpatient clinic appointments of children with ADHD should be monitored regularly in team meetings. Problems should be analyzed and solved quickly to ensure better compliance. Education of parents and children should be an integral part of the management plan and presented to families as soon as diagnosis is reached.

Keywords: Non–compliance; children; ADHD; Reasons; Bahrain

INTRODUCTION

DSM-IV cites Attention Deficit Hyperactivity Disorder (ADHD) as one of the most commonly diagnosed childhood disorders and it is estimated to affect 3-5% of school-aged children.1 Worldwide, the rate of compliance of these children is low (ranging from 20-60%), hence identifying reasons and subsequently managing these cause will have a great impact on both the child and his family.2,3

There have been many theories advanced and much research done which has reported the reasons and characteristics of noncompliance of these children and their families. Swanson reported that social attitude as well as pressure and worries surrounding medication and the inconvenience of multiple daily doses as the main reasons for treatment non-compliance.4

Stein found that non-adherence to treatment resulted from complex interactions between drug response, psychosocial variables and individual and family dynamics. To minimize the rate of non-adherence clinicians must be prepared to deal actively with psychosocial sources of non-compliance such as the parents’ or child’s difficulty in accepting the diagnosis, fear of medication and media misinformation about medication.5

Characteristics of these children were also studied. Faraone

عدم التزام الأطفال ذوي نقص الانتباه وفرط الحركة بمواعيد العيادات الخارجية

د. أحمد مال الله الأنصاري، د. ميساء الخنيزي

ملخص البحث

عدم الالتزام بالمواعيد لدى أطفال نقص الانتباه وفرط الحركة يعتبر عائقاً كبيراً للعلاج، يهدف البحث معرفة مدى انتشار عدم الالتزام بالعلاج ومعرفة الأسباب وخصائص الأطفال غير الملتزمين بمواعيد العيادة الطبية - استخدام طريقة منهج الرجعية المقطعية لكل الأطفال أقل من 18 عامًا الذين حضروا إلى العيادة النفسية للأطفال والناسة بمستشفي الطب النفسي / مملكة البحرين خلال الفترة بين يوليو 2010 وديسمبر 2011 وخصوصاً حسب الفهرس الرابع المراجع للأمراض النفسية وقياس كونرز للذويين والمدرسين (عدد = 53) للأطفال – أكثر من 60% من الأطفال لم يلتزموا بالمواعيد المعطاة لهم

استنادًا عناصر هواء الأطفال بارتفاع درجة التعليم والوضع الاجتماعي للمقارنة مع الأطفال الآخرين – الأطفال غير الملتزمين بالمواعيد كما أن من ضمن الأطفال الأكبر سنًا والذين لديهم اضطرابات مضاحية أخرى (53%) الملقاة والتوصيات: يجب الاهتمام بمواجهة ومعالجة ترد الأطفال على العيادة ومن خلال اللقاء الأسبوعي لفريق العمل وذلك للتدخل السريع وإصلاح الخلل التي يمكن

كما يجب أن يكون التعليم والتعرف بالمرض من ضمن خطة العمل العلاجية للطفل واسرته بعد الانتهاء من عملية التشخيص مباشرة.
reported that the mean adherence rate was 75% in children receiving pharmacological treatment and that the older the patient the fewer the ADHD symptoms. This study also found that minority ethnic status was associated with lower adherence to medication. Other studies have reported that the presence of oppositional behavior, in addition to ADHD, difficulty in emotional acceptance of diagnosis and fear of medication as factors among boys who had low adherence. The issue of non-compliance to treatment has never been studied in the region and so this study was undertaken to assess the prevalence of non-compliance, and reasons and factors associated with it.

METHODS
Design: This study is a retrospective cross-sectional survey.
Sample: The sample included all patients aged 18 years and under who attended the Child and Adolescent Psychiatric Unit (CAPU) outpatient clinic from June 2010 until September 2011 and were subsequently diagnosed with ADHD according to DSM-IV criteria, supported by Conners’ Parent and Teacher checklist. Those who had the diagnosis of mental retardation in addition to ADHD were excluded. Non-compliance to appointments in the sample population was defined as “missing 3 subsequent or 6 scattered appointments in one year.”
Procedures: Files were reviewed and those participants who met the criteria were identified (n=53). Data were unavailable for 10 cases because the parents could not be located or refused to consent to the study. A questionnaire was developed to obtain basic bio-demographic data, compliance, type of intervention and the reasons for missing appointments. Social class was constructed following a modified Hollingshead and Redlich 5-point scale. Ethical approval was obtained from appropriate sources. Families were contacted by telephone to obtain their consent and were interviewed by one of the authors.

ANALYSIS
All data were entered in the SPSS program, Chi square test of significance was used to assess difference wherever applicable.

RESULTS
Table 1 shows sample descriptions in terms of bio-demographic characteristics, comorbidity and type of intervention. The majority of cases were male (67%), under 9 years of age (63%) attending junior school (93%) belonging to intact families and from a middle-class background (88.5%, 76.7%). The non-compliance rate was 62.8%. Fathers and mothers were college graduates (33%, 42% respectively). Fathers were mostly employed (91%) while half of the mothers were housewives (53.5%).

<table>
<thead>
<tr>
<th>Factor</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>29</td>
<td>67</td>
</tr>
<tr>
<td>Female</td>
<td>14</td>
<td>33</td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 years and under</td>
<td>27</td>
<td>62.8</td>
</tr>
</tbody>
</table>

Table 2 illustrates the parents’ reasons for non-adherence to clinic visits. Difficulty accepting treatment plans and difficulty accepting medication and safe transportation stood out as the main reasons. Factors such as difficulty accepting diagnosis, medication side effects and lack of social support were ranked low among the listed factors.

<table>
<thead>
<tr>
<th>Reasons</th>
<th>N</th>
<th>%</th>
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<tbody>
<tr>
<td>Difficulty accepting diagnosis</td>
<td>1</td>
<td>3.7</td>
</tr>
<tr>
<td>Difficulty accepting treatment plan</td>
<td>4</td>
<td>14.8</td>
</tr>
<tr>
<td>Difficulty accepting medication</td>
<td>4</td>
<td>14.8</td>
</tr>
</tbody>
</table>

Table 1. Sample bio-demographic characteristics, comorbidity and type of intervention

Comorbidity was high (53.5%) while one-third of the cases had one year below the expected educational level (35%). Nearly two-thirds of the cases (60.5%) received medication only, (9.4%), behavioral therapy (18.6%), or a combination of therapies and no treatment (11.6%).
DISCUSSION AND CONCLUSION

Sample characteristics were similar to those reported in other studies involving ADHD children from the same clinic. These characteristics include: more male gender, younger age group, intact family structure and middle-class socioeconomic status. The high level of employed mothers probably reflects the higher education attained. The rate of non-compliance to appointments was high and similar to other reports. The high rate was expected due to the fact that the rate of comorbidity, especially learning difficulties and conduct problems, was also high among the sample. These factors would definitely make management of these cases more difficult, and accordingly vigorous efforts to keep them in treatment were needed.

As to reasons for non-compliance to appointments, issues related to the diagnosis and management of the disorder stand out as major obstacles to continued treatment. This was the case in other studies from different regions.

It is not convincing for many parents to accept treatment of a learning and behavioral disorder by using medication rather than psychosocial intervention. Psychosocial intervention is time consuming, needs trained personnel and is not available in all schools. This makes prescribing medication the most widely used and the most practical method of intervention. However, this explanation needs further support as children who receive psychosocial intervention alone present a challenge to therapists in adhering to treatment plans. Non-adherence to treatment was found to be a major issue in the treatment of adults with ADHD. This finding would make one think that adults with ADHD symptoms as future parents would have difficulties in organizing activities and in being consistent in following long-term commitments.

Among the reasons listed, safe transportation was mentioned several times by parents. Data collection was done in 2011 where there were road closures in some areas due to the civil unrest which made moving around the city difficult for some families.

Study limitations:
The study suffered from some limitations such as the retrospective nature of the design, which carries with it known limitations. Among other limitations was losing contact with 20% of the study sample for different reason such as relocation, declined to participate and inability to contact by telephone.

Summary:
In a group of children with ADHD examined for reasons of non-attendance to their appointments in an outpatient clinic, the main prevalent reason was lack of safe transportation followed by difficulty in accepting treatment plans and medication. Reasons such as lack of social support, difficulty accepting diagnoses and medication side effects were of low importance.

In order to increase the rate of compliance parents need to be educated about the nature of the disorder, its outcome and prognosis. A system of reminding families about appointments should be adopted in outpatient clinics.

REFERENCES

Authors declare that there is no conflict of interest and no financial support from any source.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication side effects</td>
<td>1</td>
<td>3.7</td>
</tr>
<tr>
<td>No transport</td>
<td>2</td>
<td>7.4</td>
</tr>
<tr>
<td>Safe transportation</td>
<td>5</td>
<td>18.5</td>
</tr>
<tr>
<td>Missed appointment card</td>
<td>2</td>
<td>7.4</td>
</tr>
<tr>
<td>Child refusal to attend</td>
<td>3</td>
<td>11.1</td>
</tr>
<tr>
<td>Travelling outside the country</td>
<td>3</td>
<td>11.1</td>
</tr>
<tr>
<td>Lack of social support</td>
<td>1</td>
<td>3.7</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>11.1</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 2. Cases by parents’ reasons for non-compliance
Identifying employees at high risk of diabetes among the medical staff of Jaber Al-Ahmed Armed Forces Hospital in Kuwait and screening them for diabetes

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ABSTRACT

Background: Diabetes mellitus is one of the top diseases leading to morbidity and mortality in Kuwait. There is often a delay in diagnosing patients with type 2 diabetes due to the long asymptomatic pre-clinical stage and complications are commonly present at diagnosis. Screening can identify diabetics and treatment can be initiated earlier to prevent complications. Screening can detect pre-diabetics who may benefit from interventions to prevent or delay progression to diabetes.

Objectives: The aim of this study is to estimate the prevalence of risk factors for diabetes in healthy employees and screen those with high risk for diabetes.

Method: A cross-sectional study conducted in Jaber Al-Ahmed Hospital from October to November 2012. The Finnish questionnaire for diabetes risk assessment was used to categorize participants into different risk categories for diabetes. Participants considered to be at high risk were screened for diabetes using HbA1c.

Results: 647 employees participated in the study. 70.6% of the participants were overweight or obese; more than half had a high waist circumference and 23% were smokers. Kuwaiti employees tended to have more risk compared to non-Kuwaitis (P<0.001) with 27.6% of Kuwaitis belonging to the low risk group compared to 42.4% of the non-Kuwaitis. HbA1c testing showed that out of the 51 participants with high/very high risk, 6 (11.8%) were diabetics and 26 (51.0%) were pre-diabetics.

Conclusion: Screening and a diabetic risk assessment for those at high risk should be part of the routine occupational health check program in the hospital.

Keywords: diabetes; occupation; health; screening; Kuwait; risk
INTRODUCTION

Diabetes mellitus is one of the leading non-communicable diseases accounting for significant morbidity and mortality in Kuwait and globally. According to the World Health Organization (WHO), it is one of the top ten causes of death in the world.1 Moreover, diabetic retinopathy is a leading cause of new onset blindness in many industrialized countries and is an increasingly frequent cause of blindness elsewhere.2 According to the Canadian Diabetes Association, about one-third of people who have had diabetes for more than 15 years will develop kidney disease.3

There are two main types of diabetes: Type 1 diabetes which usually develops in childhood and adolescence and Type 2 diabetes which occurs in adulthood and is related to obesity, lack of physical activity, and unhealthy diet. Type 2 is more common representing 90% of diabetic cases worldwide.4

According to the International Diabetes Federation (IDF), a rising trend of incidence and prevalence of diabetes is seen in every country around the world. 1 in 9 adults in the Middle East and North Africa has diabetes and more than half of the people with diabetes in this region are unaware that they have it.5 Three of the top 10 countries with the highest prevalence of diabetes in 2013 (in adults aged 20 to 79 years) were in the Middle East, i.e. Saudi Arabia (24.0%), Kuwait (23.1%) and Qatar (22.9%).5 In 2013, Kuwait also had the highest prevalence of impaired glucose tolerance worldwide (17.9%).6 In developed countries most people with diabetes are above the age of retirement, whilst in the Arab region nearly three quarters (73.4%) of diabetics are under 60 years of age.7 The mean onset age for type II diabetes in Kuwait is 48.6±12.12 years.8

Type 2 diabetes has a long asymptomatic pre-clinical phase which frequently goes undetected. Complications are commonly present at the time of diagnosis although the reported rates vary between studies.9 Screening can identify individuals with diabetes and treatment can be initiated earlier in the course of the disease to prevent cardiovascular disease (CVD) and other complications. Screening can also detect pre-diabetics who may benefit from interventions to prevent or delay progression to diabetes.

The main objective of this study was to identify staff members who are at high risk of developing diabetes and to screen them for diabetes. The screening project might also help in raising awareness of the risk factors for diabetes and the importance of periodic checking of staff members.

METHOD

This cross-sectional study was carried out among all staff working at the Jaber Al-Ahmed Armed Forces Hospital in the period from 14th October to 18th November, 2012.

Exclusion criteria were established diabetes and pregnancy at the time of the project. Written informed consent was obtained from each participant.

In developed countries

In 2013, the

The mean onset age for

obtained from each participant.

Exclusion criteria were diabetes and pregnancy at the time of the project. Written informed consent was obtained from each participant.

STATA (Version 12). Categorical variables were compared using chi-squared tests and a p-value of less than 0.05 was considered statistically significant.

RESULTS

The total number of staff registered in Jaber Al-Ahmed Armed Forces Hospital was 1,031 and of those 851 were accessible. Out of these, 50 were diabetics, 15 were pregnant, 169 were on leave, 11 were commissioned and 21 refused to participate in the study.

Among the 647 staff members who participated in the study, 308 (48%) were Kuwaiti. 513 (79.3%) of the participants were under 45 years of age and the male to female ratio was 1:1.2. The vast majority of Kuwaiti participants (90.9%) were under 45 years of age compared to 68.7% of the non-Kuwaiti (p<0.001). 23% of the participants were smokers. Only 28.6% of the participants had normal weight and 70.6% were either overweight or obese. More than half the participants had a high waist circumference (Table 1).

Risk assessment showed that 228 participants (35.3%) had a low risk, 274 (42.3%) had a slightly elevated risk, 93 (14.4%) had a moderate risk and 52 (8%) had a high to very high risk.

The prevalence of smoking was higher among Kuwaiti participants (27.6%) compared to non-Kuwaiti (18.9%) (p-value=0.01). 27.6% of Kuwaiti participants had low risk compared to 42.2% of non-Kuwaiti and 9.7% of Kuwaitis belonged to the high risk category compared to 6.5% of non-Kuwaitis (p-value=0.001).

Out of the 52 participants in the high and very high risk categories, one staff member refused blood collection for HbA1c testing. HbA1c testing showed that out of the 51

The Finnish questionnaire which is the recommended tool for diabetes risk assessment by IDF, WHO and American Diabetic Association (ADA) was used in the study to assess the risk for diabetes. It has eight scored questions with the total test score providing a measure of the probability of developing Type 2 diabetes over the following 10 years.9 Information regarding risk factors and socio-demographic variables was collected in face-to-face interviews conducted by a team of 2 doctors and 4 nurses who received special training in order to collect uniform information from the participants. Weight was measured with light clothing and without shoes. Height was measured without shoes, with the participants standing fully erect on a flat surface and looking straight ahead. Body mass index (BMI) was calculated and evaluated as defined by WHO.10 Participants were divided into low, slightly elevated, moderate, high or very high risk categories. Staff members belonging to the high or very high risk categories were screened for diabetes using HbA1c as recommended in the updated IDF Guidelines.16 Based on IDF categorization, participants with an HbA1c of more than 6.5 were considered diabetics and those with HbA1c between 5.7 and 6.5 were considered pre-diabetics.11 Analysis of data was performed using STATA (Version 12). Categorical variables were compared using chi-squared tests and a p-value of less than 0.05 was considered statistically significant.

The prevalence of pre-diabetics who may benefit from interventions to prevent or delay progression to diabetes.

The mean onset age for type II diabetes in Kuwait is 48.6±12.12 years.8

Type 2 diabetes has a long asymptomatic pre-clinical phase which frequently goes undetected. Complications are commonly present at the time of diagnosis although the reported rates vary between studies.9 Screening can identify individuals with diabetes and treatment can be initiated earlier in the course of the disease to prevent cardiovascular disease (CVD) and other complications. Screening can also detect pre-diabetics who may benefit from interventions to prevent or delay progression to diabetes.

The main objective of this study was to identify staff members who are at high risk of developing diabetes and to screen them for diabetes. The screening project might also help in raising awareness of the risk factors for diabetes and the importance of periodic checking of staff members.
participants with high or very high risk 6 (11.8%) were diabetics, 26 (51.0%) were pre-diabetics and 19 (37.2%) were normal.

DISCUSSION

The prevalence of diabetes is rapidly increasing globally at an alarming rate. Diabetes has changed from being a mild disorder of the elderly to one of the major causes of morbidity and mortality affecting youth and middle age people. Type 2 diabetes has a long asymptomatic pre-clinical phase which frequently goes undetected and complications frequently present at the time of diagnosis. Chronic hyperglycemia is associated with long-term complications in various organs, especially the eyes, kidneys, nerves, heart, and blood vessels. Individuals with undiagnosed Type 2 diabetes are also at significantly higher risk for stroke, coronary heart disease, and peripheral vascular disease than non-diabetics. Early detection of pre-diabetes and diabetes would be appropriate because the duration of hyperglycemia is a predictor of adverse outcomes, and there are effective interventions to prevent disease progression and to reduce complications. The IDF recommends that each health service should decide whether to have a program to detect people with undiagnosed diabetes based on the prevalence of undiagnosed diabetes. The decision to conduct such a program should also take into consideration the availability of resources to run the program and to provide the necessary treatment for newly diagnosed patients. The IDF also recommends that detection programs start with identifying high-risk individuals using a risk assessment questionnaire to be followed by checking fasting blood glucose or HbA1c in high-risk individuals.

Our study showed that risk factors for diabetes e.g. overweight and obesity, high waist circumference and smoking, are common among staff members in Jaber Al-Ahmed Armed Forces Hospital.

Although Kuwaiti employees were younger than non-

<table>
<thead>
<tr>
<th>Gender</th>
<th>Kuwaiti (%) n=308</th>
<th>Non-Kuwaiti (%) n=339</th>
<th>p-value*</th>
<th>Total (%) n=647</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>156 (50.6)</td>
<td>138 (40.7)</td>
<td>0.01</td>
<td>294 (45.4)</td>
</tr>
<tr>
<td>Female</td>
<td>152 (49.4)</td>
<td>201 (59.3)</td>
<td></td>
<td>353 (54.6)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>&lt; 45</td>
<td>&lt; 45</td>
<td>&lt;0.001</td>
<td>513 (79.3)</td>
</tr>
<tr>
<td></td>
<td>280 (90.9)</td>
<td>233 (68.7)</td>
<td></td>
<td>109 (16.8)</td>
</tr>
<tr>
<td></td>
<td>26 (8.4)</td>
<td>83 (24.5)</td>
<td></td>
<td>25 (3.9)</td>
</tr>
<tr>
<td>≥55</td>
<td>2 (0.7)</td>
<td>23 (6.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoke</td>
<td>Smokers</td>
<td>85 (27.6)</td>
<td>0.01</td>
<td>149 (23.0)</td>
</tr>
<tr>
<td></td>
<td>223 (72.4)</td>
<td>275 (81.1)</td>
<td></td>
<td>498 (77.0)</td>
</tr>
<tr>
<td>BMI categories (Kg/m²)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under weight (BMI&lt;18.5)</td>
<td>3 (1.0)</td>
<td>2 (0.6)</td>
<td>0.15</td>
<td>5 (0.8)</td>
</tr>
<tr>
<td>Normal (BMI 18.5-24.9)</td>
<td>84 (27.3)</td>
<td>101 (29.8)</td>
<td></td>
<td>185 (28.6)</td>
</tr>
<tr>
<td>Overweight (BMI 25-29.9)</td>
<td>112 (36.4)</td>
<td>149 (44.0)</td>
<td></td>
<td>261 (40.3)</td>
</tr>
<tr>
<td>Obesity I (BMI 30-34.9)</td>
<td>78 (25.3)</td>
<td>63 (18.6)</td>
<td></td>
<td>141 (21.8)</td>
</tr>
<tr>
<td>Obesity II (BMI 35-39.9)</td>
<td>21 (6.8)</td>
<td>17 (5.0)</td>
<td></td>
<td>38 (5.9)</td>
</tr>
<tr>
<td>Morbid (BMI ≥40)</td>
<td>10 (3.2)</td>
<td>7 (2.0)</td>
<td></td>
<td>17 (2.6)</td>
</tr>
<tr>
<td>Waist</td>
<td>&lt;80 in females</td>
<td>143 (46.4)</td>
<td>0.11</td>
<td>275 (42.5)</td>
</tr>
<tr>
<td></td>
<td>&lt;94 in males</td>
<td>132 (38.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>80-88 in females</td>
<td>79 (25.7)</td>
<td></td>
<td>187 (28.9)</td>
</tr>
<tr>
<td></td>
<td>94-102 in males</td>
<td>108 (31.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;88 in females</td>
<td>86 (27.9)</td>
<td></td>
<td>185 (28.6)</td>
</tr>
<tr>
<td></td>
<td>&gt;102 in males</td>
<td>99 (29.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk</td>
<td>Low</td>
<td>85 (27.6)</td>
<td>&lt;0.001</td>
<td>228 (35.2)</td>
</tr>
<tr>
<td></td>
<td>Mild-moderate</td>
<td>193 (62.7)</td>
<td></td>
<td>367 (56.8)</td>
</tr>
<tr>
<td></td>
<td>High-very high</td>
<td>30 (9.7)</td>
<td></td>
<td>52 (8.0)</td>
</tr>
</tbody>
</table>

Table 1. Distribution of risk factors among Kuwaiti and non-Kuwaiti employees. *chi-squared test
Kuwaiti, they tended to have a higher risk \( (p<0.001) \). This is expected with the high prevalence of diabetes among Kuwaitis but can also reflect the fact that immigrant workers especially those working in demanding, non-administrative jobs such as nursing, which is the case in our hospital, are healthier and pass through pre-employment checkup to assess their fitness.

**CONCLUSION**

Due to the high prevalence of risk factors in our employees and the high prevalence of undiagnosed diabetes and pre-diabetes among those in the high and very high risk categories, we recommend that assessment of these risk factors and screening for diabetes and pre-diabetes should be employed as part of the routine occupational health check-up program in Jaber Al-Ahmed Armed Forces Hospital. This should be followed by planning an intervention program to address these risk factors and help prevent or delay the onset of diabetes among staff members at high risk of diabetes.

**ACKNOWLEDGEMENT**

Special thanks go to nurses who assisted in data collection and entry: Abdulla Yaqoob Abdulla, Mohamed Jawad Abu Taleb, Alanoud M Alobaidly, Mariam Sadiq Hasan and Jawaher Mohamed Alsabte.

**REFERENCES**

CASE REPORTS

The eye - the window to the soul of the diagnosis: CHARGE Syndrome, a case report

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ABSTRACT

The modality of inheritance in CHARGE syndrome is autosomal dominant, classically triggered by mutations in the chromo-domain helicase DNA binding protein-7 (CHD7) gene. CHARGE syndrome is characterized by the variable occurrence of coloboma, heart defects, atresia of the choanae, retarded growth and development, genital hypoplasia, ear anomalies and deafness. In this report, we describe an infant with a typical phenotype characterized by severe psychomotor retardation, facial asymmetry, coloboma, cortical blindness, unilateral choanal atresia, congenital heart anomalies, genital hypoplasia, cranial nerve IX/X dysfunction and global developmental delay that was diagnosed clinically.

Following clinical diagnosis a complete sequencing of the CHD7 gene was carried out at the Institute for Medical Diagnostics GmbH in Ingelheim, Germany. Genomic DNA was screened for mutations in the CD7 gene (OMIM 608892) on chromosome 8q12.1 The codon exon 2-38 and the respective exon-intron boundaries were amplified by polymerase chain reaction and analysed by direct sequencing. Resulting sequence data were compared with the reference sequence NM_017880.3 No mutation in CHD7 gene was detected as a genetic cause for the clinical phenotype of the patient. The MPLA multiplex ligation-dependent probe amplification analysis showed no copy number variation in the CHD7 gene.

This case report underscores the importance of a detailed family history and physical examination in the diagnosis of CHARGE syndrome. Additionally, it provides valuable insight into the pathogenesis and clinical presentation of the syndrome as well as highlighting the benefits of a multidisciplinary approach. With supportive nurturing care, children with CHARGE syndrome can overcome the associated disabilities and develop necessary motor skills and a life-style enhancing level of fitness.

Keywords: CHARGE syndrome; CHARGE association; Hall-Hittner syndrome; CHD7 gene; empty sella

INTRODUCTION

The acronym CHARGE is used to designate the physical and health issues that are concomitant with the syndrome. CHARGE is a phenotypically heterogeneous syndrome which has been defined as a bundling of clinical features including Coloboma, Heart malformation, Atresia of choanae, Retardation of growth and development, Genital hypoplasia, and Ear anomalies or deafness1. In addition, temporal bone and olfactory nerve anomalies are now considered extremely sensitive for a diagnosis of CHARGE syndrome2.

CHARGE syndrome’s modality of inheritance is autosomal dominant, classically triggered by mutations in the CHD7 gene in roughly two thirds of cases reported3. CHD7 descends from a large family of evolutionarily conserved proteins that are alleged to play a part in chromatin organization. CHD7 is a regulatory element that potentially affects a large sum of developmental pathways, explaining the pleiotropic nature of its phenotypic continuum.

A clinical diagnosis of CHARGE syndrome necessitates the presence of four or more major features or three major features plus three or more minor features4. As a consequence, persons with CHARGE syndrome often require multiple and protracted hospitalizations which in turn can cause developmental delays because of the lack of socialization and physical activity during hospitalizations.

See Tables 1 & 2 Post-neonatal death is not a rare event in patients with CHARGE syndrome and it often occurs unexpectedly. Gastro-oesophageal reflux and poor coordination of swallowing and breathing due to cranial nerve dysfunction seem to be the major risk factors5.
Table 1. Major diagnostic characteristics of CHARGE syndrome

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Manifestations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocular coloboma</td>
<td>Coloboma of the iris, retina, choroid, disc</td>
</tr>
<tr>
<td>Choanal atresia or stenosis</td>
<td>Unilateral/bilateral: bony or membranous atresia/stenosis</td>
</tr>
<tr>
<td>Cranial nerve dysfunction or anomaly</td>
<td>I: hyposmia or anosmia</td>
</tr>
<tr>
<td></td>
<td>VII: facial palsy (unilateral or bilateral)</td>
</tr>
<tr>
<td></td>
<td>VIII: hypoplasia of the auditory nerve</td>
</tr>
<tr>
<td></td>
<td>IX/X: swallowing problems with aspiration</td>
</tr>
</tbody>
</table>

Table 2. Minor diagnostic characteristics of CHARGE syndrome

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Manifestations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genital hypoplasia</td>
<td>Males: micropenis, cryptorchidism</td>
</tr>
<tr>
<td></td>
<td>Females: hypoplastic labia</td>
</tr>
<tr>
<td>Developmental delay</td>
<td>Delayed milestones, hypotonia</td>
</tr>
<tr>
<td>Cardiovascular malformation</td>
<td>Including conotruncal defects (e.g. tetralogy of Fallot), AV canal defects, and aortic arch anomalies</td>
</tr>
<tr>
<td>Growth deficiency</td>
<td>Short stature, usually postnatal with or without growth hormone deficiency</td>
</tr>
<tr>
<td>Orofacial cleft</td>
<td>Cleft lip and/or palate</td>
</tr>
<tr>
<td>Tracheoesophageal fistula</td>
<td>All types</td>
</tr>
<tr>
<td>Distinctive facial features</td>
<td>Square face with broad prominent forehead, prominent nasal bridge and columella, flat midface</td>
</tr>
</tbody>
</table>

CASE REPORT

A Bahraini male IUGR infant aged 18 months, the 1st pregnancy to non-consanguineous phenotypically normal parents. The mother was 19 and the father was 30 years of age at the time of birth of the child. The mother’s 1st and 2nd trimester histories showed that she had anemia and calcium deficiency for which she was on supplemental iron and calcium. She was also being treated for hypothyroidism. Ultrasound identified oligohydramnios and bilateral dilated ventricles and features of an echogenic bowel. The pregnancy was completed at 36 weeks by induced vaginal delivery for IUGR. Apgar scores were 9* and 9† with a birth weight of 1.65 kg. The neonate was admitted immediately to the NICU with transient tachypnoea of the newborn (TTN) and required mechanical ventilation for two days. His low birth weight necessitated a further twelve week NICU admission.

The pedigree study revealed that the mother had no previous unviable pregnancies and both parents were in good health. One first degree relative was found to have trisomy 21.

The window to establishing the diagnosis was the coloboma and dysmorphism noted for the first time by the admitting paediatric resident at the age of 17 weeks. He was tracheostomised and placed on home oxygen at the age of six months due to swallowing problems and in order to avoid accumulation of copious secretion that may obstruct the upper airway. He is currently on home pump nasogastric tube feeding. The mother was instructed by the speech and language therapist on how to do oral stimulation to maintain the infants sucking reflex.

The four major diagnostic characteristics of CHARGE manifested in this specific patient were:

- **Ocular colobomas**: Bilateral coloboma affecting the iris and posterior segment of the eye. Multidirectional nystagmus. Cortical blindness.
- **Choanal atresia**: NCCT brain showed moderate dilatation of the lateral and third ventricle with the V H Q of 55% consistent with moderate hydrocephalus. The fourth ventricle is normal in size. Narrowing of the left choanal region consistent with choanal atresia.
- **Cranial nerve dysfunction**: Cranial nerve IX/X palsy and neonatal brainstem dysfunction, causing feeding difficulty and swallowing difficulty with recurrent aspiration pneumonia.
- **CHARGE syndrome ear**: small, low set ears; protruding helix in the form of a tag was noted. Lack of response to calls but not to sounds.

The five minor diagnostic characteristics of CHARGE manifested in this specific patient were:

- **Genital hypoplasia**: Genital examination showed a micropenis, hypospadas and cryptorchidism. FISH study showed one signal for both chromosome X and Y in 140 cells (XY). Scrotal and renal ultrasound: Testes could not be located in the ectopic sites.
- **Developmental milestones**: Gross motor: Axial and appendicular hypotonia with no neck support. Able to flex limb, symmetrical posture, marked head lag on pulling up but does not raise head to 45°, does not sit, crawl or walk around furniture. He has severe psychomotor delay.
- **Vision and fine motor**: He is unable to reach out for toys, does not transfer, does not have pincer grasp. Hearing, speech and language: Startles to loud noises. Does not respond to calls but responds to sound. He does not turn to soft sounds and does not vocalize alone or say mama and dada. A tympanogram showed mild asymmetry of hearing loss bilaterally.

Social, emotional and behavioural development: He smiles socially, but does not put food in the mouth, does not wave bye-bye or play peek-a-boo. His need for multiple and prolonged hospitalizations and lack of active management of the sensory deficit have contributed to his developmental delay.

- **Cardiovascular malformation**: He has an atrial and ventricular septal defect, and conotruncal malformation (aortic valve stenosis, aortic coarctation, interrupted
aortic arch). ECG showed right bundle branch block with right ventricular hypertrophy.

- **Growth deficiency:** He is below the 5th percentile for weight, height and head circumference secondary to growth hormone deficiency and poor caloric intake. A multi-planar multi-sequence MRI imaging of the brain showed significant loss of volume of the periventricular white matter of both cerebral hemispheres; thinning of the corpus callosum secondary to loss of volume of the white matter. The pituitary gland is small and empty sella is suspected.

- **Distinctive facial features:** Dysmorphic features with an asymmetric square face with a broad prominent forehead, prominent nasal bridge and columella, malar flattening and micrognathia.

**Additional examination:**

- Limb dysmorphology: bilateral syndactyly in the hands, overlapping finger, and calcaneovalgus deformity in the lower limbs.
- Skin: Hair distribution is normal with no low hairline or midline defect and the underlying skin was normal with no rashes or hyper or hypopigmentation.

**Additional tests:**

- EEG showed cortical irritability and supports the diagnosis of epilepsy.
- Water soluble GI series showed gastroesophageal reflux disease.

**DISCUSSION**

The molecular genetic test for diagnosing CHARGE syndrome is a test designed to identify a certain gene which can lead to the diagnosis of this syndrome. This test is however subject to limitations such as being expensive, the complete sequencing of the CHD7 gene costs €2000.00 and the MPLA deletion/duplication analysis of the CHD7 gene costs €500.00. Another limitation of this test is that it is sensitive but not specific as it fails to detect all cases of this syndrome, as is the case with this patient. Mutations in the CHD7 gene are detected in 65-70% of the cases. Rare mutations in the other parts of the gene than those investigated here (e.g. in regulatory regions, low grade mosaicism, larger heterozygous deletions or duplications or mutations in the other genes cannot be excluded with the molecular genetics analysis applied here. Hence, the diagnosis of CHARGE syndrome still remains rather clinical - grounded on the medical features appreciated in the child. The clinical diagnosis is reached using an amalgamation of major and minor features. Major features are features that are fairly collective in CHARGE syndrome but comparatively rare in other conditions, and mostly diagnosable in the neonatal period. Some minor characteristics and features of CHARGE syndrome are not specific to it and thus not clinically useful in distinguishing it from other syndromes.

Management of CHARGE syndrome starts from the first minute of life with providing a secure airway, stabilizing the patient, excluding major life-threatening congenital anomalies. After the initial neonatal and infantile period, individuals with CHARGE syndrome who survive require vigorous restoration of the sensory function to facilitate adequate psychomotor development. Therefore a patient with CHARGE syndrome necessitates a multidisciplinary team approach to deal with different medical issues that arise from this complex syndrome.

It is important to highlight the implications that our greater understanding of the prognosis of CHARGE has for clinical practice and health resource allocation. To this end, it is imperative for clinicians to thoroughly follow up patients in order to tailor therapeutic approaches to their early prognostic indicators and to recognize the development of any comorbid conditions. Ultimately, this may pave the way for improved clinical care of patients with CHARGE. Future research should focus on genetic counseling and modalities to improve the quality of life of these individuals and their families.

**CONCLUSION**

In the right environment, patients with CHARGE syndrome have the prospect of developing essential motor skills and a health-enhancing level of fitness. Improvement in their physical activity and education is limited mainly due to the natural history of the syndrome, in addition to the lack of trained specialist to work with the patient and their families.

This report underscores the importance of a detailed family history and physical examination along with the role serendipity and sound clinical judgment played in the diagnosis of CHARGE syndrome in this infant. Good insight about the pathogenesis and the clinical presentation can improve the effectiveness of medical therapies. Further research about CHARGE syndrome is essential in the Gulf Cooperation Council region; particularly the epidemiology, diagnosis and the impact on the quality of life. Additionally, the availability and effectiveness of a multidisciplinary approach to these patients should be studied in order to provide definite evidence for implementation in clinical practice. Finally, we are most certainly in need of a non-profit, charitable organization in the Kingdom of Bahrain that caters to providing support and educational information to families of children with rare diseases. Hence, becoming instrumental in bringing together parents and professionals involved in their care.

**REFERENCES**

11β hydroxylase deficiency in children: the first case reported from Bahrain

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ABSTRACT

Congenital adrenal hyperplasia (CAH) is an autosomal recessive disorder commonly caused by 21-hydroxylase deficiency. It accounts for 90-95% of cases. The second most common cause is 11β hydroxylase deficiency. We report on the first case of 11β hydroxylase deficiency in Bahrain with a review of the literature.

Keywords: 11β hydroxylase deficiency; congenital adrenal hyperplasia (CAH)

INTRODUCTION

Congenital adrenal hyperplasia (CAH) is an autosomal recessive disorder caused by a defect in any of the five enzymatic steps required to synthesize cortisol from cholesterol. 21-hydroxylase deficiency accounts for 90-95% of cases with CAH, and is considered the most common cause. The second most common cause of CAH is 11β hydroxylase deficiency which accounts for 5-8% of cases.

A high prevalence of 11β hydroxylase deficiency has been reported in different ethnic groups in Saudi Arabia (25.6%), while in Turkey a lower incidence has been reported (11.5%). In Moroccan Jews in Israel the disease incidence is 1 in 5,000 live births. Subsequent studies in the Jewish populations have shown that this type of congenital adrenal hyperplasia occurs less frequently but it remains more common than in other ethnic groups. Great variability in clinical expression has been reported.

There are two types of 11β hydroxylase deficiency, classical and non-classical. The classical form is associated with ambiguous genitalia in genetically female infants, while in males it presents at 2-4 years of age with signs and symptoms of androgen excess, including increased growth velocity, advanced bone age, pubic hair, increased penile length, and aggressive behavior. The non-classical form presents in girls or women with symptoms of androgen excess, such as hirsutism, cystic acne, or oligomenorrhea.

To our knowledge this is the first case to be reported in Bahrain with 11β hydroxylase being the cause of CAH in children.

THE CASE

A three-and-one-half-year-old Bahraini male presented at the age of 2 years and 6 months with an early development of pubic and axillary hair of 4 months’ duration. This was associated with a rapid increase in height, bowing of both legs and darkly pigmented acne over the face. During this period the parents also noticed increased activity and physical aggressiveness. There was no history of abdominal pain or vomiting. The patient had no history of change in body odor. The pregnancy was uneventful and the mother was not on any medication. The patient was born at term with normal genitalia with no history of neonatal hypoglycemia and no history of electrolyte imbalance. Medication history was not significant. The parents are cousins with no family history of early pubertal development, neonatal death or ambiguous genitalia.

Examination revealed hyper-pigmented acne over the cheeks, forehead, nose, skin and gums (See Figure 1). There were no dysmorphic features. Height was 102 cm (>98th centile), weight was 16.6 kg (>90th centile) and blood pressure was 173/84 mmHg. His genital examination revealed pigmented skin, pubic hair stage II, axillary hair stage II, penile length 9 cm (>98th centile for age) with significant increase in width, the testicular volume was 2ml (normal prepubertal testicular volume is <4ml). His systemic examination was unremarkable.

Figure 1. Hyperpigmentation and acne in patient with 11β hydroxylase deficiency

At this stage the patient was diagnosed to have precocious puberty most likely secondary to congenital adrenal hyperplasia. The patient was investigated and found to have an advanced bone age of six years at the chronological age of two years and seven months. Abdominal ultrasound showed normal adrenals. MRI of the brain was normal. Results of blood test showed an elevated ACTH, 11-deoxycortisol, deoxycorticosterone, testosterone, DHEAS and 17-OHP, with suboptimal response to Synacthen stimulation test.
This led to the diagnosis of 11β hydroxylase deficiency. The results of blood investigation are shown in Table 1. Synacthen test results are shown in Figure 2.

**Figure 2. Synacthen stimulation test showing suboptimal response at 30 and 60 minutes (normal response cortisol level >550nmol/l)**

<table>
<thead>
<tr>
<th>Laboratory test</th>
<th>Normal value</th>
<th>At presentation</th>
<th>After treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTH* (pmol/L)</td>
<td>0-10</td>
<td>156.3</td>
<td>36.4</td>
</tr>
<tr>
<td>LH† (IU/L)</td>
<td>0.0-0.9</td>
<td>0.5</td>
<td>-</td>
</tr>
<tr>
<td>FSH‡ (IU/L)</td>
<td>0.2-3.8</td>
<td>&lt;0.1</td>
<td>-</td>
</tr>
<tr>
<td>11-Deoxycortisol (micrograms/ml)</td>
<td>0.02-0.025</td>
<td>33.2</td>
<td>-</td>
</tr>
<tr>
<td>Deoxycorticosterone (ng/100 ml)</td>
<td>2-34</td>
<td>1170</td>
<td>677</td>
</tr>
<tr>
<td>Testosterone (nmol/L)</td>
<td>&lt;3.5</td>
<td>5.6</td>
<td>1.7</td>
</tr>
<tr>
<td>S. Calcium (mmol/L)</td>
<td>2.12-2.65</td>
<td>2.27</td>
<td>-</td>
</tr>
<tr>
<td>S. Sodium (mmol/L)</td>
<td>137-148</td>
<td>137</td>
<td>140</td>
</tr>
<tr>
<td>S. Potassium (mmol/L)</td>
<td>3.9-5</td>
<td>4.2</td>
<td>5.1</td>
</tr>
<tr>
<td>S. Chloride (mmol/L)</td>
<td>100-107</td>
<td>103</td>
<td>104</td>
</tr>
<tr>
<td>S. Bicarbonate (mmol/L)</td>
<td>24-30</td>
<td>20</td>
<td>19</td>
</tr>
<tr>
<td>FBG§ (mmol/l)</td>
<td>3.6-5.6</td>
<td>4.7</td>
<td>-</td>
</tr>
<tr>
<td>DHEAS** (umol/L)</td>
<td>0.27-1.63</td>
<td>5.3</td>
<td>4.1</td>
</tr>
<tr>
<td>17-OHP†† (nmol/L)</td>
<td>2.12-7.6</td>
<td>&gt;30.3</td>
<td>15.9</td>
</tr>
<tr>
<td>PRA‡‡ (ng/L)</td>
<td>0.2-2.8</td>
<td>0.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Aldosterone (nmol/L)</td>
<td>0.02-0.42</td>
<td>0.067</td>
<td>-</td>
</tr>
<tr>
<td>TSH§§ (uIU/ml)</td>
<td>5</td>
<td>(0.025-5)</td>
<td>-</td>
</tr>
<tr>
<td>T4*** (pmol/L)</td>
<td>15.4</td>
<td>(10-24)</td>
<td>-</td>
</tr>
</tbody>
</table>

*Adrenocorticotropic hormone, Luteinizing hormone,
†Follicle stimulating hormone, §Fasting blood glucose level, **Dehydroepiandrosterone sulfate,
††17-Hydroxyprogesterone, ‡‡Plasma renin activity,
§§Thyroid stimulating hormone, ***Thyroxine.

At this stage the patient was treated with oral hydrocortisone at a dose of 19 mg per m² per day. The patient was evaluated clinically after one week of starting treatment and found to have normal blood pressure. Repeated blood test four weeks after starting treatment showed suppression of deoxycorticosterone and 17-OHP with normalization of testosterone. In addition, there was improvement in his behavior and non-progression of puberty.

**DISCUSSION**

Deficiency of 11β hydroxylase is by far the second most common cause of CAH, corresponding to 5-8% of all cases in most ethnic groups. It occurs in 1 in 100,000 live births. However, it is more common in some populations, like in Saudia Arabia where it is estimated that there are up to 25.6% of cases diagnosed with CAH. The clinical features of 11β hydroxylase deficiency consist of virilization, hypertension and hypokalemia. Up to 35% of cases are normotensive and normokalemic.

**Genetic:**

Two 11β hydroxylase genes have been identified, located at chromosome number 8q. The first, termed CYP11B1, encodes for the P450c11B1 enzyme, and is located in the zona fasciculata. CYP11B1 is involved in the production of cortisol. The second, CYP11B2, encodes for the P450c11B2 enzyme, which predominantly synthesizes aldosterone in the zona glomerulosa.

**Prenatal diagnosis and treatment:**

Due to recent advances in the mutation identification in CYP11B1 and CYP11B2, molecular prenatal diagnosis is possible through DNA analysis that requires chorionic villus sampling in the ninth to eleventh week of gestation, or sampling of amniotic fluid cells obtained by amniocentesis in the second trimester. This is shown to be safe with no major side effects to the mother or the fetus. Administration of dexamethasone to pregnant mothers is shown to be effective as prenatal treatment if done before 9 weeks gestation.

**Pathophysiology:**

11β hydroxylase enzyme is responsible for the conversion of 11-deoxy cortisol (DOC) to corticosterone and 11-deoxycortisol to cortisol. The reduction in the cortisol leads to overproduction of adrenocorticotropic (ACTH), which in turn leads to overproduction of precursors proximal to the enzyme blockage, increasing the production of androgen. These non-11β-hydroxylated products include 11-deoxycortisol and DOC, plus upstream precursors such as 17α-hydroxyprogesterone (17-OHP) and D4-androstenedione (D4-A) which is the product of conversion of 17-OHP to D4. Similarly, our patient had an elevated ACTH, 11-deoxycortisol, deoxycorticosterone, testosterone, DHEAS and 17-OHP.

In female infants with ambiguous genitalia elevations of serum 11-deoxycortisol and DOC indicate 11β-OHD. Tetrahydro-11-deoxycortisol (THDOC) and tetrahydroledoxy corticosterone (THDOC), the principal metabolites of serum 11-deoxycortisol (S) and DOC, are significantly increased in the urine. Urinary 17-ketosteroids are elevated, reflecting the raised serum levels of adrenal androgens.
Due to excess fetal adrenal androgens, the affected female fetus will develop ambiguous genitalia (female pseudohermaphroditism) in all cases, while the internal genital organs are normal female.

It is not uncommon to misassign an 11β-OHD-affected female as male at birth.3,5 This excess of fetal adrenal androgens overproduction results in premature and inappropriate secondary sexual characteristics in both boys and girls, which may include progressive penile and clitoral enlargement, appearance of axillary pubic and facial hair, acne, deepening of voice, and rapid skeletal growth. If left untreated it may lead to early epiphyseal maturation resulting in short adult stature.

Additionally, patients may have premature development of sexual and body hair (premature adrenarche) and acne. Androgens may affect the hypothalamic-pituitary-gonadal axis, leading to amenorrhea or oligomenorrhea in females and true precocious puberty or, conversely, poor spermatogenesis in males.5,23

In our patient, the child presented at the age of two years and six months with premature development of pubic and axillary hair, acne, accelerated growth, skin hyperpigmentation and large phallus.

High level of DOC and failure of aldosterone production cause salt retention and hypertension.

Approximately two-thirds of patients with the severe “classic” form of 11β hydroxylase deficiency have high blood pressure,6 often beginning within the first few years of life, though it may present as early as three months of life. Although the hypertension is usually of mild to moderate severity, left ventricular hypertrophy, retinopathy, or both have been observed in up to one-third of patients, and deaths from cerebrovascular accidents have been reported.3,5,23 Our patient had hypertension at presentation which normalized after starting hydrocortisone. In addition, hypertension correlates variably with biochemical values, and clinical signs of mineralocorticoid excess and the degree of virilization are not well correlated. Some severely virilized females are normotensive, whereas mildly virilized patients might experience severe hypertension leading to fatal vascular accidents.3,5,23

Other signs of mineralocorticoid excess such as hypokalemia and muscle weakness or cramping occur in a minority of patients and are not well correlated with blood pressure. Plasma renin activity is usually suppressed in older children, and aldosterone levels are consequently low even though the ability to synthesize aldosterone is actually unimpaired.23 Aldosterone production is low secondary to low serum potassium and low plasma renin.

A mild non-classical form of 11β-OHD CAH has been detected among normotensive children with mild virilization or precocious pubarche23 and in an adult female with primary infertility and mild hirsutism.24 This mild form seems to be rare compared to non-classical 21OHD CAH which is common.

CONCLUSION

11β hydroxylase deficiency is the second most common cause of CAH in Bahrain. It is very rare and to our knowledge this is the first case to be reported. Clinical presentations are variable and may consist of virilization, hypertension and hypokalemia. It is an autosomal recessive condition. Prenatal diagnosis should be considered in mothers with previously affected children.

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consideration of primary hyperparathyroidism in primary care

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abstract

a sixty-seven-year-old female patient presented with symptomatic hypercalcemia as the first manifestation of primary hyperparathyroidism due to parathyroid adenoma. Initially the chronic hypercalcemia was investigated and then subsequent parathyroidectomy was done. she is doing very well six months following the surgery and the hypercalcemia has resolved completely.

introduction

asymptomatic hypercalcemia due to primary hyperparathyroidism is a common condition in primary care. most commonly primary hyperparathyroidism is caused by a solitary parathyroid adenoma (80%), and less frequently multi-glandular adenoma, parathyroid hyperplasia or carcinoma. patients rarely present with symptomatic hypercalcemia (mnemonic “stones,” “bones,” “abdominal moans,” and “psychic groans”) whereas usually patients remain asymptomatic and the condition is discovered during routine checkup investigations. the disorder can occur at any age, yet is more common in the middle age group (≥50 years). the ratio of such cases is equivalent to 1:1000 in males, whereas it is 3:1000 in the female population. hypercalcemia may be categorized based on total serum and ionized calcium levels (see figure 1).

the case

a sixty-seven-year-old female presented to the noninfectious chronic disease clinic in primary care (ncd) with controlled diabetes mellitus type 2, hypertension, and hyperlipidemia. there was a history of symptomatic hypercalcemia (fatigue, bone pain, mood disturbances, and cognitive impairment) which had gradually increased over the last 2 years. initially, she was diagnosed with drug-induced hypercalcemia due to iatrogenic use of calcium which was prescribed by another physician for osteopenia 6 months earlier. the patient stopped calcium tablets but the hypercalcemia remained high. there was a history of nephrolithiasis four years previously. there was no significant family history. the patient looked healthy and her vital signs were normal. cardiovascular, chest and abdominal examinations were unremarkable. no abnormality was detected in the musculoskeletal system. investigations showed wbc 14,000, lipase 1,395 u/l, serum calcium 3.5 mmol/l (2.13-2.63), phosphorus 0.7 mmol/l (0.8, 1.4) and magnesium 0.6 mmol/l (0.74, 1). the mean parathyroid hormone level (pth) was above 30.4 pmol/l (1.69-6.9) or 198.5 pg/ml (15-65), which confirmed our suspicion of hyperparathyroidism. in addition the calcium to creatinine ratio was increased to 0.11 (normal limit < 0.06). abdominal ultrasound showed multiple right renal...
calculi and mild hydronephrosis (see Figure 2); and neck ultrasound showed a low echogenic mass (1.3x1.5x3.3 cm) that intensified suspicion of a right inferior parathyroid adenoma (see Figure 3).

**Figure 2: Abdominal ultrasound showing right renal stone**

**Figure 3: Neck ultrasound showing enlarged right lower parathyroid lobe**

Chest x-ray showed mild cardiomegaly with both lung fields clear, while ECG was normal and cardiac stress test showed no significant cardiac lesion, whereas 2D echo with color Doppler showed concentric hypertrophy of the left ventricle with normal function (see Figure 4).

**Figure 4: Echo showing concentric left ventricular hypertrophy**

Parathyroid scintigraphy was suggestive of parathyroid adenoma of right inferior gland, and bone DXA result showed osteopenia with increased risk of major osteoporotic fracture to 5.7%.

Finally, the case was referred to a surgeon and a right inferior nodular mass measuring 3.2x1x0.4 cm was removed. Microscopic examination revealed features consistent with parathyroid adenoma (the lesion had a slender capsule all around and was composed of trabeculae of cells separated by vascular sinusoids with foci of hemorrhage and cystic change). The cells were large, polygonal with vesicular nuclei having small nucleoli and abundant finely granular-to-clear cytoplasm. There was no significant pleomorphism, mitosis, capsular or vascular invasion.

The patient was discharged from the hospital three days postoperatively and her follow-up investigation (six months later) showed parathyroid, calcium, magnesium and phosphate levels had returned to normal. Also, the patient had shown improvement of all her symptoms of hypercalcemia.

**DISCUSSION**

Primary hyperparathyroidism is the most common cause of hypercalcemia in primary care. Family physicians should be alert to the diagnosis of primary hyperparathyroidism. Symptomatic hypercalcemia occurs with longstanding elevated levels of PTH. This patient showed renal manifestation of nephrolithiasis, but no nephrocalcinosis, polyuria, or renal insufficiency. Although our patient showed left ventricular hypertrophy, other cardiac manifestations were not present (conduction abnormalities, endothelial dysfunction, and shortened QT intervals). Parathyroidectomy is the appropriate treatment in symptomatic hyperparathyroidism, and the patient’s clinical and biochemical status improved dramatically.

**CONCLUSION**

In most patients primary hyperparathyroidism is associated with hypercalcemia but the reverse is not the case. Screening for serum calcium for any patient above 50 years of age is essential to diagnose missed primary hyperparathyroidism. Surgery offers the only opportunity for permanent cure of primary hyperparathyroidism.

**REFERENCES**


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RESEARCH
From junk science pawn to public-led trials

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ABSTRACT
Junk scientists and unethical healthcare providers often tell the public that systematic reviewers reject real research because of bias or that universities and the FDA are paid off by the pharmaceutical industry. I was snared in this trap during my role in a spinal injury foundation after sustaining significant brain and spine injuries. I was too naïve and damaged to understand that not all doctors are ethical or that the role of the FDA is in protecting public health. As my brain started to recover I began attending classes at the Open University and I found the world of ethics, research methods and cell biology. Soon my days at the spinal organization were numbered as I pointed out errors in the protocols and discrepancies in what the participants should know. I shared that vulnerable persons need to be informed they are participants and not patients and that it was unethical to charge patients for experimental research or use them as shields against the recommendations of the FDA. The organization battled the FDA who won a permanent injunction against them. I was dismissed long before this but felt like I had blood on my hands. I decided I would become an informed healthcare provider and I proceeded to learn Evidence-Based Healthcare at the University of Oxford where I completed the Masters and went on to become a Doctor of Philosophy student to bring evidence-based healthcare and public led trials to the masses. This is my story:

Keywords: public-led trials; fecal implants; citizen health research; public engagement; evidence–based healthcare

THE CHANGE
At an Open University neuroscience class a list of extra reading was given. One series of papers on the list changed the way I read and understood research because I finally learned what was important and how methods speak. I learned that two-thirds of what I read was speculation and hope without an anchor and I learned that theory without evidence is like a boat with a leak. The series was “How to Read a Paper” authored by Trisha Greenhalgh1–4. The materials were linked to a site that led to the Center for Evidence-Based Medicine and the University of Oxford5.

THE NEED
I needed to know HOW to read a paper by myself without someone else’s filter confusing my simple mind. 50% of papers are now open access6. Patients and the public want to know does it work, and if not, why not. The public asks can I count on this and does it apply to me7. They want to know how many people will need to take an intervention before one gets well. They do not care about politics, dependencies and speculation. They want to be informed so they can participate in decision-making about their own health care without being manipulated8. More and more people are accessing the web for health information9. (See Figure 1.)

"If I read and memorized two medical journal articles every night, by the end of a year I’d be 400 years behind", states Donald Lindberg, the Director of the National Library of Medicine (NLM). In 2010 it was estimated that 75 RCTs and 11 systematic reviews are produced daily10. Information alone is not enough. Conversations can center around shared informed decision making, patient and public participation and putting academic copy into plain language but clearly online engagement is a fertile field that needs active engagement to harness information for the benefit of research11. Medical providers lack the time to stay abreast of the newest development for every condition yet for the patients, new developments may signal a window of opportunity for a failing life12. Many patients have the motivation and the focus for researching their own health conditions, why not use patients and the public to crowd-source evidence and get it into practice8?

Figure 1. The internet as diagnostic tool
There are many decisions about healthcare that are straightforward and need no extra discussion while others require more information and time to think about the risks and the options\textsuperscript{13}. At no time is this exchange equal in terms of experience and knowledge, my medical provider and I both bring strengths and weaknesses to the table, there is mutual respect because of relationship rather than the imagination of perceived rights. For decision making to be real, it needs to be informed and have elements of choice that consider personal values\textsuperscript{14}. A patient, doctor or research participant can use what is good for the population as a guide for care but it is not the whole story.

**DO IT YOURSELF HEALTHCARE AND RESEARCH**

Do it yourself healthcare can lead to great benefits or it can do more harm than good\textsuperscript{15}. For example fecal implants have recently come to the attention of the Food and Drug Administration (FDA) who indicate this intervention needs to be seen as an IND or investigative new drug. Their rationale is that the fecal matter could be contaminated by bacteria, carry disease, introduce donor complications or change the mechanisms of response within the body and for these reasons it should be classified and investigated as a new drug\textsuperscript{16}.

It was not always this way. In January 2014, the New England Journal of Medicine reported that just one fecal transplant helped 13 of 16 research participants with Clostridium difficile (C-Diff) to recover and that the sufferer’s condition improved with just one transplant. Two of the non-responders received a second transplant from an unrelated donor and their conditions also improved. C-Diff is a serious bowel infection that can lead to death. The study was stopped so that everyone in the control group could also benefit from the treatment. There were no complications and yet access to the treatment was limited by the FDA’s decision to consider this intervention as an investigative new drug\textsuperscript{17}. This classification comes at great cost to the patient who must suffer in agony with bowel distress and possibly bowel surgery or death as the wait for trials completion continues to validate the intervention. Drug research costs money and future patients will bear the increased cost for the intervention.

Patients and their relatives decided to take matters into their own hands with some hiring others to provide feces for transplantation and even parents performing the transplants on their own children. They report figuring out how to do this from do-it-yourself Internet sites and report greatly simplifying the process with good results. In the hospital this can be done through a colonoscopy procedure but at home people are using simple and inexpensive enema equipment with the same results.

The negative picture is that although hospital treatment sites report good results after 1-2 transplants people at home are afraid to stop and no one knows the results of long-term daily fecal transplants. It seems reasonable that it would increase the risk for parasites, infection and injury\textsuperscript{18}. Patients might use their own data assisted by responsible health professionals to contribute to a crowd-sourced cure or an effective targeted intervention. This was the result in the OMERACT\textsuperscript{19} research for rheumatoid arthritis where it was participants and not the researchers who identified exhaustion as the target for intervention.

**REAL EVIDENCE-BASED HEALTHCARE (EBHC)**

There is criticism about EBHC with some claiming that it is only formula driven medical care that fails to reflect patient values but this is a fallacy\textsuperscript{20}. What if we looked at evidence and shared informed decision making like two wheels on a bike? They both need to be full of substance, well connected, lubricated and working in balance with a competent driver with good vision on the seat to get the vehicle where we want it to go. By the same rationale that evidence is necessary but not sufficient for decision-making, values are necessary but not sufficient for evidence and they may default to feelings based on social pressures and peer influence without a focus on evidence and how to apply it. Maybe the bike needs a check-up from time to time and a little maintenance to run safely and at optimum performance, evidence based healthcare could be seen the same way. The effects of co-morbid conditions, age, access to diagnostic screening campaigns, social demographics, existing trauma, chronic pain and multiple pharmaceuticals on individual quality of life are under-reported in healthcare\textsuperscript{21}. The public are the authorities on their own lives but they are seldom granted a voice or the tools to self-implement testing and evaluation of interventions that affect them. Healthcare professionals could change how evidence is brought into practice by sharing what EBHC is and how to make use of it to embrace public and patient values. The platform from which we have chosen to consider public values in evidence-based healthcare and make evidence known is PLOT-IT\textsuperscript{22}.

**USING PUBLIC INITIATED HEALTH SCIENCE RESEARCH TO CURATE AND ENGAGE**

PLOT-IT (Public-led online trial-infrastructure and tools) is a platform where researchers, health care providers and the public share evidence-based public research solutions for all who value being active participants in their own healthcare. PLOT-IT collaborates with health science groups using an infrastructure for generating and running public-led online trials. The public will access real-time data from which they will be trained and equipped to do their own hypothesis generating and testing. Participants have full access to their own data and can choose to share it. Shared data will be de-identified and put into the public domain for discussion and analysis. PLOT-IT includes randomization algorithms and the use of validated Patient-Reported Outcome Measures. Communication is important for health knowledge delivery and moderated discussion groups are available for the formation of communities of interest. PLOT-IT supports the inclusion of solution based...
learning workshops to improve online trials methodology for the public and for those generating health research. In summary, PLOT-IT turns the current model of health research on its head by having research questions generated and answered by the public themselves. Health citizens will be supported by established health researchers to ensure that all research is methodologically sound, ethical and clinically safe. Public initiated research trials can capture observational data that may be otherwise lost to healthcare science. Access to these observations could potentially change the practice of medicine.

CONCLUSION

The public potential for improving decision-making, education and methodology in clinical trials is a valuable and untapped resource. It is exciting to be part of this new evolution in shared health research. By putting research tools in the hands of a hungry public we can engage citizens directly in health research. The time is ripe, the technology is ready and the passion and drive to engage the public in their own health research is now!

ACKNOWLEDGEMENTS

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REFERENCES


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Competing interest: None other than an interest in public-led trials

Ethical approval: Not applicable
Home visits by doctors: a much needed service in Bahrain

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ABSTRACT

In family medicine, a physician needs to identify the health beliefs of a patient from the patient’s family environment and from other social factors around the patient. To identify such potentially beneficial factors, home visits are highly recommended. The Arabian Gulf University practices home visits under the Family Studies Program to identify such factors. We present a case study on Mr. and Mrs. Y and their widow friend, Mrs. X, who were over 65 years of age, living below the poverty level, suffering from chronic stress, and with severe medical illnesses such as diabetes and osteoarthritis. They also did not have any children. In our home visit to these patients, we found that strong friendship and mutual cooperation are key social support mechanisms that help them overcome all their adverse situations. We have also highlighted the importance of home visits and general considerations in family-oriented health care and recommend regular home visits for better patient care in Bahrain.

Keywords: primary health care; family physicians; home visit; social support in Bahrain

INTRODUCTION

In family medicine, the family remains the most basic relational unit and there are major influences of the environment and society on the physical and mental health of its members. Therefore, understanding the family and social influences on health issues is essential for a family physician which can help to reduce the adverse effects of family stress and utilize the family as a resource in patient care.

Stress as a contributing factor in various illnesses is hard to define and study. According to the life-event scale by Holmes and Rahe, an increase in stressful life events precedes the development of a wide range of different diseases and most of the events on the Holmes and Rahe scale occur within the family, of which 10 of the 15 most stressful events are family events. Most of the stressful life events on the Holmes and Rahe scale represent major transitions in the family life cycle. These normative life events have powerful influences on physical and mental health and can result in symptoms that bring the individual to the physician’s office. Life events that are apparently negative or are not under the individual’s control have the most adverse effect on family health. Several studies have shown that overall morbidity and mortality is drastically reduced if patients receive strong family and social support.

Older persons with impaired social support have a higher death rate than those with good support and adult family members become the most important source of social support for the elderly.

Home visits or house calls offer an opportunity to see the patient and family in their own natural setting and therefore provide valuable information about how the patient is functioning and how the family is adapting to the health problem. Home visits are particularly important for elderly patients suffering from aging disorders or climatic and mental stress as well as for newborns with infectious or respiratory illnesses.

At the Arabian Gulf University (AGU), a Family Studies Program was started twenty years ago as part of the community health strand for third year medical students to enable the students to see part of their patients’ lives in the home setting. Students generally received the introductory courses and workshops after they started their attachment to families. One family was assigned to each pair of students for the academic year and they were required to conduct an average of six visits to complete their tasks. All information about these families was collected and analysed so that students could establish effective relationships with the families, as well as explore the impact of illness, major life events, their beliefs and their understanding of the problems facing them. They also evaluated the family function and dynamic, developmental stage, and risky health behaviours that affect family health. At the end of the course, students are required to write a report about their family visits and submit it to the Family and Community Department at AGU. We have selected Mr. Y’s family for this case study.

THE CASE

Mrs. Y and her old friend Mrs. X were both cheerful old ladies of above 65 years of age and had no children. Mrs. Y was suffering from type II diabetes which was controlled with insulin injections. She also had advanced arthritis of the knees. Mrs. X suffered from hypertension and had gastro-oesophageal reflux. 

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Mr. Y was a working class man and accompanied Mrs. Y and Mrs. X when they visited the health centre. He had recently lost his job, usually had an angry expression on his face, was always in a hurry, and generally opened the consultation room door for them and waited outside the room.

At the time of the home visits, it became apparent that Mr. Y’s family’s social class level had dropped from ‘blue-collar worker’, to “lumpenproletariat” level, which means they experienced poverty with all its effects. For both the Y family and Mrs. X, having no children meant the loss of the most important social support system for the elderly in our culture, which is number of living children they had. But the friendship between the couple and Mrs. X was an important social support mechanism for both of them which enabled them to cope with their problems. The relationship between the couple was excellent; they were caring and had effective communication. They showed initiative; practiced reciprocity, were cooperative, and negotiated differences. They were also open to expressing their feelings.

Their total income was 38 Bahraini dinars which is approximately 100 USD out of which 35 Bahraini Dinars went to the monthly rent of their accommodation. To cover other costs, Mr. Y took on minor temporary jobs including being a driver and a mechanic. Occasional charity donations were considered an important source of income. Mrs. Y and Mr. Y both had rich siblings, yet they do not visit them. However, Mrs. Y’s brother occasionally took her along to spend a half day in his villa for the Eid holiday.

Mrs. Y had to go down to Mrs. X’s house every morning to receive her insulin injection, as the community health nurse found it difficult for the patient to go up the stairs due to osteoarthritis. We also found out that Mrs. Y has to replace her insulin injections with oral hypoglycemic drugs on weekends and official holidays, as our community health nurse does not make home visits on those days. The three patients were unwilling to learn how to self-inject insulin for different reasons. Mr. Y refused because of his recent cataract operation, while Mrs. Y and Mrs. X both refused due to their weak vision and illiteracy. Mr. Y did not have a car and was unable to afford a taxi every week to take his wife to the local health centre for her insulin injection.

During our visit, we noticed that Mrs. Y changed her sitting position with ‘crawly’ movements. She had an old cardboard box containing all her medicines; one of these medications, Stemetil (prochlorperazine maleate) tablets, had expired. She had bought this from a private pharmacy and had been taking it for the past two years as a self-prescribed drug. The box also contained multiple eye drops and ointments of different types.

Mr. Y asked for a recommendation letter to the Ministry of Housing to get a house urgently, and another to the Ministry of Labour and Social affairs to request an increase in his retirement pension. During our visit, the request was frequently repeated, even separately to each one of us, making us feel helpless. When asked about their health needs, they replied rapidly, as if without thinking, saying that they are satisfied and that they only needed economic support.

After visiting the Y family, we decided to visit Ms. X’s house with the public health nurse. Ms. X lived alone, since her husband had died twenty years ago and her house is right beside Mrs. Y’s house. Her one-floor house had one bedroom but a large entry area, where she used to receive her friends, and which she used as a kitchen. Her stairs had no banister, which made it dangerous for her to use. Her income came from the Ministry of Social Affairs and charity.

During our visit, I noticed that for Mrs. X to call on Mrs. Y she had to shout from the street so that she could hear her and send her the door key through the window after tying it onto a rope. As Mrs. X opened the door and entered the house. Mrs. Y pulled the rope back up, this was due to Mrs. Y not being able to come down the staircase. Since that time, I started to visit them regularly, not as a doctor, but more as a friend, and every time I did so, I left feeling sad. The problems can be summarised as follows: the Y family was a small family with no children, with inadequate retirement income and poverty, chronic stress, and feeling that they were unjustly treated by the Ministry of Social Affairs and Ministry of Housing. Medically, they suffered from diabetic illness and advanced osteoarthritis, which caused disruption and disability to their daily functions. The only functional, available and interested social support systems for the family were the neighbour and friend Mrs. X and their family doctors as medical resources. Regarding Mrs. X, she had similar medical problems and was at risk by living alone, with no support except her friendship with the Y family.

DISCUSSION

At the primary care level in the Kingdom of Bahrain, family physicians treat walk-in patients and their families registered at the respective health centre catchment area. Home visits are only conducted by the public health nurse for families with chronic medical illness who have a member who is unable to attend the health centre.

Our experience suggests that, at primary health care centres in Bahrain, the severity and complexity of an illness that is directly associated with social problems or within families cannot be adequately explored considering any case, including the case of Mr. and Mrs. Y and their friend Mrs. X.

Since the rate of patient attendance is high at primary health care centres and there is a very short consultation time; within each consultation, the patients’ social health sometimes can’t properly be examined. The patient needs to understand and discuss their illness and how to cope with it using the family and social support during the consultation. However, physicians find themselves lacking time and experience to deal with all of these issues. Unfortunately,
the services of health social workers in Bahrain are still at an embryonic stage and importantly, there is no psychologist at primary care services. We have also failed to introduce the doctor-nurse team system as an effective tool to assist patients in need.

No matter how much time is spent with patients in the consultation rooms and whatever communication skills the physician uses, they cannot truly assess the situation beyond the consultation door. And therefore, a family-oriented approach to health care which is based on the bio-psychosocial model is required in Bahrain. This model emphasizes the interrelationships among biologic, interpersonal, and social factors on health, where a family can broadly be defined as “any group of people related either biologically, emotionally, or legally.” A family physician must recognize that the family and its behaviours are the primary source of health beliefs.11 Family physicians need to identify the family strengths and the resources such as social, cultural, religious, economic, educational, environmental and medical or technological for family medicine.12 It is the duty of a family physician to identify the problems and dysfunction within families and the family strengths and resources. Most of the patients overcome the stresses and major illness without serious difficulties partially due to the emotional and physical support its family members provide. An understanding of how family support promotes health and buffers the effects of stress will help a family physician to utilize these resources in patient care.13 Family members, particularly the spouse, appear to be the most important source of social support in old age and support from sources outside the family may not compensate the gap.1 However in our case, we found that a spouse may not always be the best support, but support from outside the family such as a friend may be a good positive social factor for old age patients having no children.

CONCLUSIONS

In our case study, we found that Mr and Mrs. Y and their old friend Mrs. X were suffering from severe socio-economic hardship and medical illness. However, their strong friendship allows them to cope with all adverse situations, although their life can’t be compared with patients above the poverty level. Our home visit was crucial in identifying positive social factors and negative circumstances and therefore we strongly recommend public health and family physicians to consider home visits or house calls for better family-oriented medical practice in Bahrain. In conclusion, we would like to end our case study with a quote from Cicely Williams that we believe reflects the importance of home visits: “practical experience in visiting homes and neighbourhoods will provide more understanding in a single glance and five minutes of listening than will volumes of written questionnaires.” 14

REFERENCES

Do physicians abuse radiation in the emergency department?

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**Specialist in General Surgery, Department of General Surgery, Al Basher Teaching Hospital, Amman, Jordan
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ABSTRACT

Background: The use of radiological investigation is an accepted part of medical practice. However, there is no known safe radiation dose. Man-made radiation accounts for 13% of total radiation burden, 90% of it is due to diagnostic medical exposure. The most significant studies of the effects of radiation came from the lifetime study of the approximately 90,000 survivors of the atomic bombs dropped over Hiroshima and Nagasaki in 1945. These studies considered survivors who received whole-body doses from photons and neutrons in excess of 2.5 mSv as population liable for excess cancers. These survivors include those who were 900 to 1,500 meters away from the “hypocenter,” just below the exploding bomb.

Objectives: The aim of this study is to make a comparison between the whole-body doses of radiation received by the survivors of Hiroshima and Nagasaki and the dose received by patients from diagnostic radiological examinations in the first day of admission to the ER department.

Materials and methods: In the period 19th October 2008 to 25th November 2008, 273 blunt trauma patients with a revised trauma score of <10 were studied prospectively in the emergency department of Al Basher Teaching Hospital, Amman, Jordan. 188 patients (68.87%) were male, 85 (31.13%) were female. Age range was from < 1 year to 95 years (mean age 18.06 years). On admission, a detailed history and physical examination were undertaken. The doses of radiation in millisieverts (mSv) received by patients from radiological examination performed during the first day of admission were calculated.

Results: Range of radiological examinations per patient was 1-14 (mean 4.63). Positive findings in these examinations were found in 27.83% (76 patients), the findings were negative in 72.17% (197 patients). Dose of radiation received by patients ranged between 0.1 and 18.5 millisieverts (mean 3.52 millisieverts). 41.76% of patients (114) received >2.5 millisieverts (similar to the dose of radiation received by survivors of the atomic bombs dropped over Hiroshima and Nagasaki), and are considered as liable for excess cancers. The additional risk for cancer ranges between 0.001% and 0.731% (a mean of 0.060%).

Conclusion: Patients are receiving an unusually high dose of radiation for diagnostic purposes. This brings an unacceptable additional risk of cancer for the patients.

Keywords: diagnosis; radiation; abuse

INTRODUCTION

The most significant studies of the effects of radiation came from the lifetime study of the approximately 90,000 survivors of the atomic bombs dropped over Hiroshima and Nagasaki in 1945. These studies considered survivors who received whole-body doses from photons and neutrons greater than about 2.5 mSv as population liable for excess cancers. The survivors included people who were 900 to 1,500 meters away from the “hypocenter,” just below the exploding bomb.

Radiological investigation is an accepted part of medical practice, but there is no known safe radiation dose. Man-made radiation accounts for 13% of the total radiation burden, 90% of it is due to diagnostic medical exposure. Conservative estimates show that more than 60 million CT examinations were done in 2002 in the United States, representing an estimated 70% of all medical X-ray exposure. It is estimated that 6% to 11% of these exams were performed in children. Although it is a challenge to define precise risk estimates related to low doses of radiation exposure, the ionizing radiation exposure from a single abdominal or chest CT scan may be associated with elevated risk for DNA damage and cancer formation.

The 7th National Academy of Sciences report on Biological Effects of Ionizing Radiation (BEIR VII) is the most recent update on this topic from a respected organization. This report indicated that a single population dose of 10 mSv is associated with a lifetime attributable risk of 1 in 1,000 for developing a solid cancer or leukemia, the overall risk from all causes would be 42 in 100.

The aim of this study:

To make a comparison between the whole-body doses...
of radiation received by the survivors of Hiroshima and Nagasaki and the dose received by patients from diagnostic radiological examination on the first day of admission to the ER department.

Patients and methods:
This study is a prospective, single-center observational study of patients admitted to the emergency department of Al Basher Teaching Hospital, Amman, Jordan, following blunt trauma. Patients admitted following penetrating trauma were excluded. In the period 19th October 2008 to 25th November 2008, a total of 273 blunt trauma patients with a revised trauma score of less than 10 were included in the study. 188 (68.87%) were male, 85 (31.13%) were female (see Figure 1). Age range was 16 days to 95 years (mean 18.06) (see Figure 2). The Revised Trauma Score (RTS score) (see Figure 3) is made up of a combination of results from three categories: Glasgow Coma Scale, systolic blood pressure, and respiratory rate. All of these results can be quickly assessed with minimal equipment. The score range is 0-12. In START triage, a patient with an RTS score of 12 is labeled DELAYED (walking wounded), 11 is URGENT (intervention is required but the patient can wait a short time), and 10-3 is IMMEDIATE (immediate intervention is necessary). The last possible label is MORGUE, which is given to seriously injured people with an RTS score of 3 or lower. These people would not receive certain care because they are unlikely to survive⁸.

<table>
<thead>
<tr>
<th>Average Dose (mSV)</th>
<th>Additional Cancer Risk (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest X-ray (2 views)</td>
<td>0.100</td>
</tr>
<tr>
<td>Abdomen X-rays</td>
<td>0.700</td>
</tr>
<tr>
<td>Pelvis X-rays</td>
<td>0.600</td>
</tr>
<tr>
<td>Hip X-rays (unilateral)</td>
<td>0.700</td>
</tr>
<tr>
<td>Neck X-rays</td>
<td>0.200</td>
</tr>
<tr>
<td>Upper Back X-rays</td>
<td>1.000</td>
</tr>
<tr>
<td>Lower Back X-rays</td>
<td>1.500</td>
</tr>
<tr>
<td>Extremity X-rays (Arm, Leg)</td>
<td>0.010</td>
</tr>
<tr>
<td>Skull X-rays</td>
<td>0.100</td>
</tr>
<tr>
<td>Brain CT (Standard)</td>
<td>2.000</td>
</tr>
<tr>
<td>Neck CT</td>
<td>6.000</td>
</tr>
<tr>
<td>Chest CT (Standard)</td>
<td>7.000</td>
</tr>
<tr>
<td>Abdomen CT</td>
<td>8.000</td>
</tr>
<tr>
<td>Abdomen and Pelvis CT</td>
<td>14.000</td>
</tr>
<tr>
<td>Chest, Abdomen &amp; Pelvis CT</td>
<td>18.000</td>
</tr>
<tr>
<td>Pelvis CT</td>
<td>6.000</td>
</tr>
</tbody>
</table>

Figure 3. Revised trauma score
The dose of radiation in millisieverts (mSv) received by patients and percentage of the additional cancer risk from radiological examination was calculated from (http://www.xrayrisk.com)⁹ (see Figure 4).
Examples of doses of radiation received from other sources are seen in Figure 5.

<table>
<thead>
<tr>
<th>Source</th>
<th>Dose (mSv/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Background</td>
<td>3.1 mSv/year</td>
</tr>
<tr>
<td>Domestic Pilots</td>
<td>2.2 mSv/year</td>
</tr>
<tr>
<td>Average US Exposure</td>
<td>6.2 mSv/year</td>
</tr>
<tr>
<td>7 Hour Airline Flight</td>
<td>0.02 mSv</td>
</tr>
<tr>
<td>Chest X-ray (2 views)</td>
<td>0.10 mSv</td>
</tr>
<tr>
<td>Chest CT</td>
<td>7.0 mSv</td>
</tr>
</tbody>
</table>

**Figure 5. Examples of doses of radiation received from other conditions**

The doses received by patients from diagnostic radiological examination on the first day of admission to the ER department and the additional risk for cancer was compared with that of the survivors of Hiroshima and Nagasaki.

**RESULTS**

This study included 273 patients: range of radiological examinations received by patients was 1-14 (mean of 4.63 examinations per patient) (see Figure 6).

**Figure 6. Range of radiological examinations received by patients**

Radiological examination positive findings were found in 27.83% (76 patients), the findings were negative in 72.17% (197 patients) (see Figure 7).

**Figure 7. Radiological examination findings in patients**

Dose of radiation received by patients’ ranges between 0.1 and 18.5 millisieverts (mean 3.52 millisieverts) (see Figure 8).

**Figure 8. Dose of radiation received by patients**

The additional risk for cancer ranges between 0.001% and 0.731% (mean 0.060%) (see Figure 9).

**Figure 9. The additional risk for cancer of diagnostic radiological examination**

37 (13.55%) of the patients received >5 millisieverts, while 236 (86.44%) of the patients received <5 millisieverts (see Figure 10).

**Figure 10. Number of patients received more than 5 millisieverts, and patients received less than 5 millisieverts**

The additional risk for cancer in patients receiving more than 5 mSv ranges between 0.021% and 0.523% with a mean of 0.108% (see Figure 11).
The risks varied depending on the age of the patient at the time of exposure and the organ-specific dose exposure. Even though the doses are higher for the head CT scan, the risks are higher for abdominal scans because the digestive organs are more sensitive than the brain to development of radiation-induced cancer. Extrapolating from the data provided, the risk for cancer-related death associated with one abdominal CT scan is 0.06% for a patient exposed at 25 years of age and 0.02% for a patient exposed at age 50\textsuperscript{12}.

The estimated risk for serious complications and death from receiving iodinated intravenous CT contrast is approximately 1 in 400,000\textsuperscript{13}, which is lower than the lifetime attributable risk from a single 10 mSv dose of radiation. Yet considerable attention is given to contrast risk during the consent process. This difference may be accounted for on the basis of a clear causal relation: Contrast is injected and the patient immediately develops symptoms. Radiation effects, however, may not manifest until 5-20 years after the scan, thus causal relations are not apparent on an individual basis. The US Food and Drug Administration (FDA) have listed medical X-rays as a known carcinogen\textsuperscript{13}. Ionizing radiation from diagnostic procedures has been postulated to cause several hundred cases of cancer per year in the United Kingdom\textsuperscript{14}.

In the United States, adjusting for the prevalence of CT use, it has been estimated that 1.5% to 2.0% of all cancers at present may be attributable to radiation exposure from CT scanning\textsuperscript{14}. In some countries (eg, Germany and Switzerland), radiation exposure for screening is forbidden by law\textsuperscript{14}. Referring physicians in the emergency department were largely unaware that there are potential harmful effects from CT radiation exposure, with only 9% aware of increased cancer risk\textsuperscript{12}. Radiologists performing CT examinations considered the radiation exposure of limited concern, with only 47% recognizing the increased risk for cancer and many unaware of the dose of radiation delivered to the patient during the examination\textsuperscript{12}.

Keeping in mind, the overall lifetime risk of developing an invasive cancer is 37.5% (1 in 3) for women and 44.9% (1 in 2) for men regardless of imaging history. These statistics are averages and do not predict what is going to happen. They do not take into consideration individual risk factors including lifestyle (smoking, diet, exercise, etc.), family history (genetics) or radiation exposure. The majority of cancers occur later in life and the average lifetime risk of dying from cancer is 25% (1 in 4)\textsuperscript{9}.

The majority of patients in this study (68.87%) were male; this is expected as they are more liable to trauma in Middle Eastern societies (representing most of the recruited workforce). The wide range of age of patients (<1 year to 95 years) is related to the liability of people at any age to trauma. Most of the patients had a large number of radiological examinations 1-14 (mean 4.63), with positive findings in only 27.83% of patients. This is related to the medico-legal aspect of trauma and drawbacks on the ER department were largely unaware that there are potential harmful effects from CT radiation exposure, with only 9% aware of increased cancer risk\textsuperscript{12}. Radiologists performing CT examinations considered the radiation exposure of limited concern, with only 47% recognizing the increased risk for cancer and many unaware of the dose of radiation delivered to the patient during the examination\textsuperscript{12}.

The dose of radiation received by the patients in this study ranges from 0.1 to 18.5 millisieverts (mean 3.52), due to increasing use of CT scan in trauma. CT scans are a valuable diagnostic tool despite the high dose of radiation involved. 13.55% of the patients in this
study received more than 5 millisieverts, the additional risk for cancer in these patients, ranges between 0.021% and 0.523% (mean 0.108%).

With the unacceptable high dose of radiation caused by radiological diagnostic imaging, physicians must try to avoid any unnecessary examination that adds to the risk of malignancy.

CONCLUSION

Patients may receive an unusually high dose of radiation during diagnostic procedures which represents an unacceptable additional risk of cancer.

Disclosure: The authors certify that they do not have any commercial associations (e.g., consultancies, stock ownership, and research support) that might pose a conflict of interest in connection with the article.

REFERENCES

LITERATURE REVIEW

The practice of circumcision and prostate cancer risk: A protective association?

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ABSTRACT

Background: Male circumcision is a common practice characterized by numerous religious and cultural connotations. The practice of male circumcision has been reported as a protective factor against the risk of Prostate cancer (PCAs).

Objective: The purpose of this study is to examine modern and contemporary literature and assess the extent to which circumcision as a religious and culture-based practice affects PCa risk.

Methods: An extensive search using five electronic databases was conducted using key terms and phrases associated with male circumcision and PCa.

Results: The search procedure identified 22 studies published between 1951 and 2014. Findings from the literature were tabulated and presented with interpretations and recommendations.

Conclusions: Based on the article sample included in this study, male circumcision could serve as a prophylactic measure against PCa risk. Additional implications and unintended findings are explored.

Keywords: male circumcision; Middle East; sexually transmitted infections; prostate cancer

INTRODUCTION

Prostate cancer (PCa) is the second most common cause of cancer and the sixth leading cause of cancer deaths in men globally.1 By 2030, the worldwide burden of PCa is expected to reach 1.7 million new cases and nearly 500,000 new deaths. The United States and Canada have among the highest PCa incidence worldwide, with age-standardized rates of 178.8 and 93.3 per 100,000 men respectively.1,2 In the United States, incidence rates and mortality rates for African American men were 1.6 and 2.3 times greater than Caucasian American men from 2003-2007.3 Compared to Western countries, the Middle East and North Africa have among the lowest incidence rates of PCa worldwide.4,5 These countries include Bahrain (14.3 per 100,000 men), Tunisia (14.1), Kuwait (12.3), Algeria (11.2), Oman (10.5), Egypt (8.5), Saudi Arabia (7.7), and the United Arab Emirates (5.4).4,6

Several risk factors have been identified as having a causal effect on the risk of PCa including obesity,4 physical inactivity,4 sexually transmitted diseases,10 smoking,11 and family history.11 According to some ethnographers,3 8 Middle Eastern and North African countries are quite comparable in their demographic and socio-cultural aspects and, consequently, the close frequency of incidence rates may not be surprising. Some explanatory factors associated with variation in PCa incidence1,5 between the Middle East/North Africa and Western countries include dietary composition (e.g. a Mediterranean-style diet) and ethnicity.13,15 Another possible risk factor that could explain this regional variation is the religious and cultural practice of male circumcision.16-18 The practice of circumcision among males, the surgical removal of the foreskin from the penis, has been a fundamental Judaic and Islamic ritual predating Biblical history. An ancient Egyptian relief on the sarcophagus of Ankh-ma-Hor at Saqqara shows a ritual involving male circumcision.19 In the 5th century BC, the Greek historian Herodotus recorded the practice of circumcision in Egypt as well as in Semitic traditions that date back to the covenant between God and Abraham.19 With the advent of Christianity, the practice of male circumcision was never banned, especially considering that Jesus Christ, who was born a Jew, was circumcised.20 Male circumcision remained primarily a traditional, cultural, or religious practice leading up to the mid-1800s. Circumcision was recognized as a modern surgical procedure with a variety of curative factors later dismissed due to lack of supporting evidence. By the early 1900s circumcision was considered standard as a procedure and included an extensive line of customized surgical tools.21 Within the last 40 years neonatal circumcision among males is standard practice across a broad spectrum of societies for elective, non-medical reasons and due to documented health benefits. However, circumcision is trending downward; in 1976 an estimated 80% of boys were circumcised and by 1985 this rate fell to 61%.21 Circumcision rates among U.S. infant boys was approximately 55% in 2013.22 Today, circumcision still carries significant religious and cultural connotations, particularly among Muslims and Jews. However, the issues of tradition, medical necessity, and medical beneficence are still under debate. Advocating male circumcision as a means of HIV prevention among public health practitioners is endorsed by the World
Health Organization, the Joint United Nations Programme on HIV/AIDS, and the Centers for Disease Control and Prevention. Circumcision among males is also associated with protection against urinary tract infections, localized inflammation, bacterial infections, a variety of sexually transmitted diseases, and invasive penile cancer. However, a significant number of resources based on empirical data and popular professional opinion suggest circumcision is neither medically necessary nor risk-prohibitive and in some instances harmful. These contemporary debates aside, PCa and circumcision are linked, studied and discussed in the literature, and in need of further analysis. The purpose of this review is to examine the association between circumcision among boys as a religious, traditional, cultural, or medical practice and PCa risk.

METHODS

A survey of the literature was conducted to investigate the strength of association between male circumcision and PCa risk. Relevant articles were identified by applying search strategies to five electronic academic databases: PubMed, Scopus, EBSCOhost, SpringerLink, and ScienceDirect. A combination of search terms included “male circumcision,” “prostatic carcinoma,” and “prostate cancer.” Only articles published in English were reviewed. A comprehensive search was undertaken for published literature between 1950 and March, 2014 eligible for inclusion in the review. Inclusion criteria for review articles identified case-control studies, case series studies, cohort studies, case reports, meta-analyses, literature reviews, and policy or position statements. Furthermore, references from retrieved articles were reviewed to identify additional applicable publications within the pre-defined time period. Publications were excluded if they described cancer risk other than PCa, non-cancerous prostatic health conditions such as benign prostatic hypertrophy, and non-peer reviewed publications.

This study organized and analyzed available data that met inclusion criteria for differences between modern (late 20th century literature up to 1999) and contemporary findings (2000 to present) (see Table 1). Further analysis compared empirical investigative findings (case-control studies, case series studies, etc.) versus non-investigative claims (reviews, policy statements, etc.) for significant differences among findings and recommendations. Finally, investigative findings and non-investigative claims were sorted by region and again compared for significant differences. Among investigative findings, odds ratios (ORs), relative risk (RR), and hazard risk (HR) with a minimum 95% confidence interval were tabulated and compared. Among non-investigative claims, protective effects, and non-protective effects were tabulated and compared.

<table>
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<tr>
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<th>Author(s)</th>
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<td>The incidence of carcinoma of the prostate in Jews and gentiles</td>
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<td>Case-control</td>
<td>A case-control study of cancer of the prostate in Somerset and east Devon</td>
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Table 1. Study Sample
* Location not provided for sample articles that did not collect primary data.

RESULTS
The literature search yielded 22 relevant articles published between 1951 and 2014. Ten articles were modern, 12 were contemporary; 7 articles included sample populations from the United States, 15 investigated non-U.S. populations. Fifteen articles (2 literature reviews, 5 case-control, 1 cost-benefit analysis, 2 case series, 3 commentaries, 1 correspondence letter, and 1 brief report) found a statistically significant protective effect against PCa risk. Seven articles (1 literature review, 1 cohort, 1 case-control, 3 correspondence letters, and 1 brief report) suggested no significant effect. Eighty-six percent of all articles originating in the United States reported a protective effect for PCa risk, 60% of non-U.S. articles reported the same effect. Sixty percent of modern articles and 75% of contemporary articles reported a protective effect for PCa risk. Among empirical studies, 86% of modern articles and 67% of contemporary articles reported a protective effect. Among the strongest empirical designs (case studies), a protective effect for PCa risk was seen in 89% of the articles in this literature review sample study (see Figure 1). Additional unintended results were found during this review; the central theme is general protective effects of male circumcision that go beyond PCa risk such as cervical cancer, penile cancer, and STIs. Although it has been suggested that smegma may be carcinogenic, there is insufficient evidence to confirm this.

DISCUSSION
Several lines of evidence point towards a possible inflammation and infectious basis towards the development...
of PCa with special consideration given to sexually transmitted infections (STIs) potentially implicated in the development of PCa. A meta-analysis identified 29 case-control studies that found an increased risk of PCa among men who had a history of any STI. A cost-benefit analysis determined that in the United States, had circumcision been performed universally it could have decreased the annual number of PCa cases by 45-67,000 with a reduction of medical costs by $0.8–1.1 billion in 2006. The data offered in this review study, particularly from the empirically-based findings, demonstrates an overall protective association between the practice of male circumcision and PCa risk.

The literature samples reviewed within this study reveal a larger pool of data within the last 13 years than the previous 50 years. As scientific research moves forward chronologically, the gap widens between peer-reviewed sources identifying male circumcision as a protective effect for PCa and no effect. This finding is more pronounced when non-empirical literature samples are factored out. Within case studies as a subset, the protective effects of circumcision are significant and this pattern is equally pronounced among contemporary empirical findings. These relatively straight-forward findings and the recent popularity of studies examining the relationship between male circumcision and PCa risk has not translated into significant changes in male circumcision rates.

Historically, circumcision has been referred to as the world’s oldest surgical controversy and this debate will likely continue. Arguments made by anti-circumcision advocates have often been represented through a mixture of emotive opinion, prejudice, and social or cultural preference as opposed to empirical judgments. The current body of evidence surrounding the benefits of circumcision is in such abundance that future research is likely to confirm its utility. However, circumcision rates among newborn males have declined by 10% overall from 1979 through 2010. Circumcision prevalence among all males is much higher outside the U.S. and “almost universal” in the Middle East, Central Asia, and in Muslim/Asian countries such as Indonesia, Pakistan, and Bangladesh. The disconnect between regions well represented by incidence and prevalence of circumcised males and the origin of modern and contemporary empirical data suggests cultural implications are more predictive of and more relevant to circumcision rates.

The cultural foundations associated with the high rates of male circumcision globally need to be understood within the context of specific cultures where rates are comparatively lower. Development of a cultural framework or model dedicated to understanding and predicting circumcision rates could benefit regions like the North and South America, Australia, and sections of Europe and Asia where male circumcision rates remain well below global averages or in regions such as the North America where rates are in recent decline. Identifying protective factors associated with circumcision represents a valuable starting point. Operationalizing these findings into health communication campaigns and re-evaluation of position and policy statements that minimize this protective relationship should be the next logical step. In addition, public health lessons may be learned from the Islamic rite of universal male circumcision as a proposed surgical vaccine against an array of genitourinary infections and cancers.

**CONCLUSION**

With several risk factors associated with the development of PCa, circumcision among males has been identified as a modifiable preventive factor. Compared to the United States and Western countries, PCa incidence rates are substantially lower in the Middle East and North Africa, which comprises the majority of circumcised males worldwide considering the practice of circumcision in these respective regions has been closely associated with its historically religious and cultural connotations. This observation based on the review of literature, in conjunction with the tabulation of publications, suggests male circumcision likely serves as a protective measure against PCa risk. In addition, the protective association between circumcision and PCa risk is probable considering circumcision’s prophylactic ability to reduce STI rates compared to uncircumcised men. Retrospective cohort studies may be warranted to determine if circumcision status among males played a protective role against STI and the development of PCa.

**LIMITATIONS**

This study was limited to five databases that were selected based on their collective academic rigor, aim and scope (biomedical), and accessibility. Additional databases would likely have added to the study in both complexity and additional sample studies. If the scope of this study were expanded, additional region-specific data sources might need to be explored given the general protective effects of male circumcision that appear to extend well beyond PCa risk, an unintended finding within this study. Only articles printed or made available in English were used for this study. The authors felt non-English resources in need of translation could potentially and adversely affect the quality of the sample; this study analyzed conclusions by other authors without relying on interpretations of translated information. The authors acknowledge that valuable and applicable data may have been excluded as a result of this delimitation. Four articles included in the study sample were produced by the same author and colleagues. Six other article samples were produced by three authors and their colleagues – two articles each. It is an assumption that 10 sample articles by four authors and their colleagues did not significantly affect the conclusions of this study.

**REFERENCES**


CLINICAL SPOTLIGHT

Low-molecular-weight heparins for managing vaso-occlusive crises in people with sickle cell disease

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Sickle cell disease is one of the most common and severe genetic blood disorders in the world. The prevalence is highest among people whose ancestors come from sub-Saharan Africa, India, Saudi Arabia and Mediterranean countries. In 2011, a study was published by El-Hazmi et al. which covered the frequency and distribution of sickle cell gene among Arabs, and includes data from Bahrain.

The term sickle cell disease covers several common genotypes:

- Sickle cell anaemia: homozygosity for the sickle haemoglobin gene (HbS). This is the most prevalent form of SCD and is caused by inheritance from both parents with an HbS gene.
- Sickle cell-haemoglobin C (HbSC) disease; compound heterozygosity for HbS and haemoglobin C (HbC) genes. This second most common type of SCD is caused by inheritance of one sickle cell gene from one parent and another abnormal haemoglobin gene (HbC) from the other.
- HbS-β-thalassaemia: compound heterozygosity for HbS and a β0 or β+-thalassaemia gene (Sβ0, Sβ+). The third major type of SCD, caused by inheritance of one sickle cell gene from one parent and one β0 or β+-thalassaemia gene from the other.
- Other double heterozygous conditions such as haemoglobin SD disease (HbSD), haemoglobin SE disease (HbSE), etc.

The phenotypic complications can be divided into three major types: hemolytic anaemia and its sequelae: pain syndromes and related issues, and organ damage and/or failure. Pain arising from vaso-occlusion during a sickle cell crisis is the hallmark of sickle cell disease and can be excruciating. Hypercoagulability is a well-established pathogenic phenomenon in sickle cell disease and a number of investigators have suggested the use of low-molecular-weight heparins (LMWH) to control the hypercoagulable state and to possibly shorten the duration as well as reduce the severity of vaso-occlusive crises. The management of vaso-occlusive crises is complicated and there is not one single treatment that addresses all the consequences of the disease. In addition to the more standard treatments in the therapeutic arsenal that are generally tailored to the disease-specific features and complications of the individual patient, additional alternative approaches that have anti-adhesion, anti-inflammatory and anticoagulant effects might be useful. We conducted a systematic review to assess the effects of low-molecular-weight heparins for managing vaso-occlusive crises in people with sickle cell disease. We included both randomised controlled trials (RCT) and controlled clinical trials (CCT) in people with sickle cell disease of all ages. Any LMWH administered subcutaneously was compared to placebo or standard care.

Only one study with an overall unclear-to-high-risk-of-bias, comprising 253 participants could be included. In this study tinzaparin was compared to placebo. Tinzaparin resulted in a more rapid resolution of pain as measured with a numerical pain scale. The mean difference in duration of painful crises was statistically significant, with a reduction of 1.78 days in favour of the tinzaparin group (95% confidence interval (CI) -1.94 to -1.62). Participants treated with tinzaparin had statistically significant fewer hospitalization days than the group treated with placebo, with a mean difference of -4.98 days (95% CI -5.48 to -4.48). Two minor bleeding events were reported as adverse events in the tinzaparin group compared to none in the placebo group. The data are summarized in the Summary of Findings table below.

Based on the results of one study there is incomplete evidence to support or refute the effectiveness of low-molecular-weight heparins in people with sickle cell disease. More studies with different types of LMWHs, as well as in different types of sickle cell disease are necessary to confirm or dismiss the results of this single study.

REFERENCES

## SUMMARY OF FINDINGS TABLE

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Illustrative comparative risks* (95% CI)</th>
<th>Relative effect (95% CI)</th>
<th>No of Participants (studies)</th>
<th>Quality of the evidence (GRADE)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Assumed risk</td>
<td>Corresponding risk</td>
<td></td>
<td></td>
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<tr>
<td>Placebo</td>
<td>Tinzaparin</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Pain intensity</strong></td>
<td>Numeric pain scale</td>
<td>[See comment]&lt;sup&gt;1&lt;/sup&gt;</td>
<td>See comment&lt;sup&gt;1&lt;/sup&gt;</td>
<td>253 (1 study)</td>
</tr>
<tr>
<td>Follow-up: mean 7 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pain duration</strong></td>
<td>Scale from: 1 to 7.</td>
<td>The mean pain duration in the control groups was 4.35 days</td>
<td>The mean pain duration in the intervention groups was 1.78 lower (1.94 to 1.62 lower)</td>
<td>253 (1 study)</td>
</tr>
<tr>
<td>Follow-up: mean 7 days</td>
<td></td>
<td></td>
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<tr>
<td><strong>The requirement for opiate treatment</strong></td>
<td></td>
<td>See comment&lt;sup&gt;1&lt;/sup&gt;</td>
<td>See comment&lt;sup&gt;1&lt;/sup&gt;</td>
<td>253 (1 study)</td>
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<tr>
<td>Follow-up: mean 7 days</td>
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<tr>
<td><strong>Number of serious complications of SCD</strong> - not reported</td>
<td>See comment</td>
<td>See comment</td>
<td>Not estimable&lt;sup&gt;4&lt;/sup&gt;</td>
<td>-</td>
</tr>
<tr>
<td><strong>Number of other sickle-related events</strong> - not reported</td>
<td>See comment</td>
<td>See comment</td>
<td>Not estimable&lt;sup&gt;4&lt;/sup&gt;</td>
<td>-</td>
</tr>
<tr>
<td><strong>Quality of life (e.g. absence from school, lost time at work, mobility) as assessed by any validated questionnaire either generic or SCD specific</strong> - not reported</td>
<td>See comment</td>
<td>See comment</td>
<td>Not estimable&lt;sup&gt;4&lt;/sup&gt;</td>
<td>-</td>
</tr>
<tr>
<td><strong>Hospitalization (number and duration)</strong></td>
<td>Scale from: 0 to 12.</td>
<td>The mean hospitalization (number and duration) in the control groups was 12.06 days</td>
<td>The mean hospitalization (number and duration) in the intervention groups was 4.98 lower (5.48 to 4.48 lower)</td>
<td>253 (1 study)</td>
</tr>
<tr>
<td>Follow-up: mean 7 days</td>
<td></td>
<td></td>
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<tr>
<td><strong>Participant satisfaction with the medication assessed by any appropriate and validated questionnaire (either generic or SCD specific)</strong> - not reported</td>
<td>See comment</td>
<td>See comment</td>
<td>Not estimable&lt;sup&gt;4&lt;/sup&gt;</td>
<td>-</td>
</tr>
<tr>
<td><strong>Adverse events associated with the use of anticoagulants (e.g. bleeding)</strong></td>
<td></td>
<td></td>
<td>RR 4.96 (0.24 to 102.31)</td>
<td>253 (1 study)</td>
</tr>
<tr>
<td>Follow-up: mean 7 days</td>
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</table>

*The basis for the assumed risk (e.g. the median control group risk across studies) is provided in footnotes. The corresponding risk (and its 95% confidence interval) is based on the assumed risk in the comparison group and the relative effect of the intervention (and its 95% CI).

CI: Confidence interval; RR: Risk Ratio


GRADE Working Group grades of evidence

High quality: Further research is very unlikely to change our confidence in the estimate of effect.

Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.

Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.

Very low quality: We are very uncertain about the estimate.

*No precise data were reported. The authors indicated that at day 2 and 3 the pain severity score was lower in the tinzaparin than the placebo group P < 0.01 (ANOVA) in addition to day 4 P < 0.05 (ANOVA).

Sequence generation is unclear as well as allocation concealment and measurements to blind the investigators and participants. A potential conflict of interest cannot be excluded as one of the investigators is an employee of the manufacturer of tinzaparin. The NMS scale is not a validated tool for pain assessment.

All participants received standard analgesia therapy consisting of morphine 1 mg/h intravenous infusion and rehydration with normal saline.

This outcome measure was not assessed.
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