Factors associated with fatigue in a Family Medicine clinic in the United Arab Emirates

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Introduction

Many factors have been shown to be associated with fatigue. A past history of psychological problems, social difficulties, chronic illness and certain drugs are known to be causes of fatigue. Inactivity and obesity contribute to the problem, and other aspects of lifestyle such as smoking and alcohol ingestion may have an adverse effect on general well-being. Many women complain of tiredness related to child care and family responsibilities, with stress and overwork adding to the prevalence of conditions such as chronic fatigue syndrome.

The Arabian Gulf region provides a unique area to study such factors. The opposing influences of traditional culture with extremely rapid social change, affluence with high levels of illiteracy, substantial households with large numbers of children and an entourage of servants are factors which can only be studied in this particular location. The United Arab Emirates (UAE) is situated on the southern side of the Arabian Gulf and consists mostly of sand deserts. The population (~2 million) is made up of 75% expatriate workers and the economy is based on oil revenues. The UAE people were nomadic bedou but, with the discovery of oil in 1959, have undergone tremendous social change. Illiteracy is estimated at 15%, although many of the young people have higher education degrees. As in other transitional populations, the incidence of diabetes mellitus is high, with hypertension and ischaemic heart disease increasing. The tradition is to have large families, with eight being the average parity; however, many families have servants to help with child care and housework.

The setting for this study was a walk-in Family Medicine clinic within a district general hospital which is a common way of providing primary health care in the region. The clinic was staffed by 25 GPs and had 170 000 visits per year. A previous study found the prevalence of fatigue among attenders at the clinic to be much higher than in western populations (64.8%). This was attributed to fatigue being considered a cultural idiom of distress. Traditionally patients have not talked to doctors...
Methods

Fukuda’s approach to chronic fatigue syndrome was used as a basis for evaluating patients. He advocated a comprehensive evaluation including: (i) a thorough medical history; (ii) a mental status examination; (iii) a thorough physical examination; and (iv) a minimum battery of laboratory screening tests. The presence of fatigue was assessed using a fatigue scale developed in London. It provided a scale of fatigue from 0 to 11 and covered two domains, physical and mental fatigue. A cut-off point (3/4) enabled subjects to be divided into two groups, ‘fatigue’ and ‘no fatigue’. The scale had been translated into Arabic and revalidated on a UAE population and had been used in the previous prevalence study. Comparing the Arabic translation with the original Gold standard, ROC curve analysis showed the Arabic cut-off point (4/5) to be very similar to the English version (see Appendix 1). To detect psychological morbidity, the Hospital Anxiety and Depression (HAD) scale was chosen. It was composed of 14 items, seven for anxiety and seven for depression, so that separate scales for anxiety and depression could be generated (maximum score 21). The Arabic version of the HAD scale had been revalidated in a UAE primary health care setting and the cut-off points re-determined. The suggested cut-off points to determine the prevalence of the conditions were 8/9 for anxiety and 5/6 for depression.

Demographic data were collected and a past medical history taken, which included any association with infection at the onset of fatigue, regular drugs and pregnancy. A social history detailed marital status, number of children, number of servants or helpers at home, stress at home or at work, smoking and exercise habits. Education level was categorized into primary, secondary or tertiary education, while literacy was assessed as ‘read and write’, ‘read only’ and ‘completely illiterate’. The physical examination included weight, height, pulse and blood pressure, and systemic examination looking particularly for evidence of chronic illness. Laboratory testing was according to Fukuda’s evaluation of chronic fatigue, i.e. complete blood count (CBC), erythrocyte sedimentation rate (ESR), total protein, albumin and globulin, alkaline phosphatase, calcium, phosphate, glucose, BUN, electrolytes, creatinine, thyroid-stimulating hormone (TSH) and urinalysis.

The first five consecutive male and female patients who attended the clinic for any reason each day were recruited into the study. Due to the high level of illiteracy, a nurse interpreter administered all the questionnaires. The subject then attended the doctor for physical examination and laboratory testing. The data were transferred onto the SPSS 6.1.2 statistical program. Fatigue score was categorized into ‘fatigue’ (a score of ≥5) and ‘no fatigue’. As there was a non-normal distribution of fatigue scores, the Mann–Whitney non-parametric test, chi-square and correlations were used to look for an association between various factors and fatigue. A 5% level of significance was chosen to use in hypothesis testing and a 95% confidence interval (CI) for the population difference between means. Multiple regression analysis was carried out to test which factors had the most influence on fatigue. Factors were selected on the basis of previous research and significant associations in this study, indicating those factors which were known to affect fatigue levels. A process of backward elimination was used to remove variables from the equation which were not associated with fatigue.

Results

Three hundred patients were asked to participate in the study. Twenty-three refused consent, and 23 did not complete all parts of the study. Therefore, 254 patients were entered into the study, 97 males (38.2%) and 157 females (61.8%). The age of the subjects varied from 18 to 94 years and the mean age was 31.5 years. The fatigue scores are shown in Figure 1. Thirty-four percent of males and 38.2% of females were fatigued according to the questionnaire. Fatigue was not associated with
The scores for anxiety and depression are shown in Figures 2 and 3. Females had higher anxiety and depression scores than males. Using the calculated cut-off points, anxiety and depression were recoded into yes/no for males and females. The prevalence of anxiety was 25.8% in males, 47.1% in females, and the prevalence of depression was 39.2% in males, 54.8% in females. A young age was associated with anxiety in both males \((P = 0.002)\) and females \((P = 0.007)\), and anxiety was significantly associated with fatigue (males \(r = 0.42, P < 0.001\); females \(r = 0.46, P < 0.001\)). Depression was significantly associated with fatigue in females only \((r = 0.46, P < 0.001)\) (males \(r = 0.36, P = 0.074\)). Figures 4 and 5 show the relationship between fatigue, anxiety and depression. Twenty-five patients had a past history of psychological problems, and a history of depression was significantly associated with fatigue in females \((P = 0.008)\).

Of the subjects, 62.9% of males and 72.0% of females were married; 35.1% of males and 20.4% of females were single. Six subjects were widowed and eight were divorced. Fatigue was not affected by marital status but there was significantly less anxiety in married than single males. Stress at home was significantly associated with fatigue, anxiety and depression in females \((P < 0.001)\). In males, stress at home was associated with fatigue \((P = 0.020)\) and anxiety \((P = 0.049)\) but not depression \((P = 0.095)\). The number of children ranged from 0 to 22 for males (mean 5.13) and from 0 to 16 for females (mean 4.76), and the age of children ranged from 1 to 33 years. The number of children was higher for males due to them.
having more than one wife. Fatigue was not significantly associated with the number of children nor was it associated with the number of children still living at home (males \( P = 0.482 \), females \( P = 0.457 \)). Fatigue was not decreased with the number of servants in the house. Twenty females were pregnant and 11 females were within 1 year postnatal at the time of the study. Fatigue was not associated with pregnancy or being in the postnatal period.

Only 8.3% of males had no education and 20.6% had gone on to tertiary education. In females, 20.4% had no education, but 22.9% had gone on to tertiary education. In females, those with no education were more likely to be fatigued (\( P = 0.022 \)). Twenty-one percent of females were illiterate, whereas only 6% of males were illiterate. Fatigue was significantly more prevalent in females who were illiterate (\( P = 0.027 \)). Regarding occupation, the armed forces and police were the largest employers. In males, 12.4% were not working but did not consider themselves unemployed. One woman was actively seeking work and 13.4% of women were employed. Stress at work was not associated with fatigue (males \( P = 0.767 \), females \( P = 0.150 \)).

A total of 52.6% of males and 39.5% of females exercised regularly, mainly walking and football. Most subjects claimed to exercise either every day or at least weekly. Exercise was not associated with fatigue in males (chi-square 2.06, df 1, \( P = 0.150 \)), but was associated with less fatigue in females (chi-square 3.99, df 1, \( P = 0.046 \)). Physical fatigue was less in those who exercised, but exercise had no effect on mental fatigue. Being a smoker was not associated with fatigue (\( P = 0.316 \)). Body mass index (BMI) ranged from 15.0 to 42.2 in males and from 15.5 to 44.2 in females. Nine males (9.3% of males) and 54 females (34.4% of females) had a BMI >30 and were considered obese. A high BMI was significantly associated with fatigue in females (\( P = 0.010 \)). On physical examination, one subject had a diastolic blood pressure of 110 mmHg, and two murmurs were noted which were assessed as functional. Apart from the murmurs, no new physical findings were noted among the subjects.

Twenty-five subjects had a history of diabetes mellitus, 11 had hypertension, eight had thyroid disease, 13 had asthma, two had ischaemic heart disease and two had valvular heart disease. Eight subjects had osteoarthritis and one had osteoporosis. Two subjects had recent surgery and one had chronic renal failure. Sixty patients were taking regular medication for chronic diseases or contraception, but there was no association between any particular drug and fatigue. Five subjects had a past history of fatigue recorded in their medical records. Three of these patients were still fatigued, one was anxious and four were depressed. Only one patient attributed their fatigue to a viral infection which was diagnosed as viral hepatitis.

Nine males (9.3%) had haemoglobin <13 g/dl; 19 females (12.1%) had a level <11 g/dl. Fatigue was not associated with haemoglobin value in males (\( P = 0.597 \)) or females (\( P = 0.642 \)). Twenty-two females (14.0%) had a history of anaemia and seven others had a history of other chronic blood disorders. Twenty-four subjects (9.4%), three males and 21 females, had an ESR >40. Of these subjects, nine had a chronic illness, one had a urinary tract infection (UTI), four were pregnant and two were taking the oral contraceptive pill. No new diagnosis of serious illness was detected in the rest of the subjects with a high ESR. Fatigue was not associated with a high ESR (\( P = 0.799 \)). Three slightly raised potassium levels were detected, two slightly raised \( \gamma \)-GT levels in males, and one low phosphorus. Thirteen subjects had a random blood glucose >11.0 g/dl; all of these were known diabetics. Only three subjects had an abnormal TSH result above 5.0 mIU/l, and two of these had already been diagnosed as hypothyroid. Therefore, one new hypothyroid subject was diagnosed. One subject had a UTI confirmed by urine culture.

In multiple regression analysis, the population was divided into males and females and the regression model was carried out on each sex. Anxiety and depression were known to be associated with fatigue, stress at home, literacy and education, lack of exercise and BMI, and these were all entered into the equation. The results are shown in Tables 1 and 2. Anxiety was a significant factor for fatigue in both males and females. Depression and stress at home were highly significant for fatigue in females, as was illiteracy. Regular exercise was associated with less fatigue in males.

### Discussion

The prevalence of fatigue in this study (34.0% of males and 38.2% of females) was high compared with western populations. Fatigue was associated with factors such as illiteracy, low education, lack of exercise, high BMI, and psychological factors like stress and depression. The prevalence of fatigue decreased with the number of servants in the house. Twenty females were pregnant and 11 females were within 1 year postnatal at the time of the study. Fatigue was not associated with pregnancy or being in the postnatal period.

<table>
<thead>
<tr>
<th>Variable</th>
<th>( B )</th>
<th>( SE ) ( B )</th>
<th>( \beta )</th>
<th>( T )</th>
<th>( Sig ) ( T )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>0.339121</td>
<td>0.060131</td>
<td>0.506957</td>
<td>5.640</td>
<td>0.0000</td>
</tr>
<tr>
<td>Exercise</td>
<td>-1.222976</td>
<td>0.485269</td>
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<td>-2.520</td>
<td>0.0135</td>
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<tr>
<td>(Constant)</td>
<td>1.765068</td>
<td>0.495748</td>
<td>3.560</td>
<td>0.0006</td>
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studies. David et al. found the prevalence to be 10% in a study of GP attenders using the same questionnaire.\textsuperscript{8} There was no significant difference in fatigue between males and females. Most other studies have found a higher prevalence of fatigue among females; however, Cathebras found no difference in fatigue prevalence between males and females in a primary care setting.\textsuperscript{9} Age and marital status had no effect on fatigue, and this is in agreement with other studies.\textsuperscript{2}

The prevalence of anxiety was 25.8% in males and 47.1% in females, and this is higher than found previously. El-Rufaie found the prevalence of minor psychiatric morbidity to be 27.6%.\textsuperscript{10} The community prevalence of anxiety globally ranges from 3 to 8%, so the prevalence is also high compared with cross-cultural studies.\textsuperscript{11} It was interesting that anxiety was related to a young age and that in young males it decreased with married status. Anxiety had the strongest association with fatigue in the regression model and was associated with physical and mental fatigue in both sexes.

The prevalence of depression was 39.2% in males and 54.8% in females, higher than the prevalence of psychological morbidity found previously.\textsuperscript{10} There is a wide variation in the prevalence of depression across cultures, with the previous highest occurring in Africa (14.3% for males and 22.6% for females).\textsuperscript{11} Depression was strongly associated with fatigue in females. There was a poor association between depression and fatigue in males, and when it occurred it caused mental but not physical fatigue. This is interesting because past studies have shown depression to be associated more with fatigue than other psychological categories such as anxiety or somatization disorder.\textsuperscript{3} Stress at home was significantly associated with fatigue, anxiety and depression especially in females, but few cases of social problems were recorded in the medical records. This may have been for confidentiality reasons but may also have been because the problem was not elucidated by the physician in the face of a different cultural presentation of distress.

There were a large number of children born to the study subjects, consequently there was a longer gap in years between the youngest and oldest child, resulting in many years of parenting. Valdini noted an increase in fatigue with the presence of children <6 years of age in the house, but in this study there was no association between the number of children and fatigue. In the Gulf states, young married couples tend to live with the extended family so there is ample social support with child-rearing. The other factor associated with child care is the number of servants available to help with household duties, and it was surprising that having a large number of servants did not decrease fatigue.

In the UAE, education is free and compulsory for all children from the age of 6 years, but the enrolment of females has, until recently, lagged behind that of boys. A high percentage of females were illiterate (21.1%) compared with males (6.2%). Fatigue was increased in those females who were illiterate or had no education, and this has been noted in other studies.\textsuperscript{2,8}

Over half the male subjects and a third of female subjects exercised regularly. Exercise was associated with less physical fatigue in males, and increasing BMI was mildly associated with fatigue in females, confirming previous study findings.\textsuperscript{1,2} Over a third of females had a BMI $>$30. Obesity is becoming an increasing problem in the community, especially among women, mainly because of the high fat diet and lack of exercise. Smoking was not associated with fatigue, as found in previous western studies. There are health education activities to discourage smoking, but the prevalence of smoking generally in the community is high, as in other developing countries.

Fatigue was not associated with any of the chronic illnesses tested (diabetes mellitus, hypertension and asthma); however, the numbers in each group were small. This is in contrast to other studies where fatigue has been associated with arthritis, asthma, emphysema, anaemia and diabetes mellitus.\textsuperscript{1} The prevalence of diabetes mellitus in the UAE is estimated at 11%, and the rates are increasing with urbanization and obesity.

The prevalence of anaemia in females in the UAE is 15%. Thalassaemia is an important cause of anaemia and it has been estimated that $>$40% of the pure Arabic population in the region carry the gene for thalassaemia. Fatigue was not associated with a history of anaemia, a low haemoglobin or with pregnancy. Although anaemia has been associated with fatigue in other studies, patients with chronic anaemia, e.g. $\alpha$-thalassaemia trait or chronic iron deficiency, do not often complain of fatigue as they

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### Table 2: Multiple regression analysis in females

<table>
<thead>
<tr>
<th>Variable</th>
<th>$B$</th>
<th>SE $B$</th>
<th>$\beta$</th>
<th>T</th>
<th>Sig T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>0.159</td>
<td>0.064</td>
<td>0.234</td>
<td>2.470</td>
<td>0.0148</td>
</tr>
<tr>
<td>Depression</td>
<td>0.180</td>
<td>0.068</td>
<td>0.238</td>
<td>2.639</td>
<td>0.0093</td>
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<tr>
<td>Literacy</td>
<td>-0.767</td>
<td>0.263</td>
<td>-0.215</td>
<td>-2.970</td>
<td>0.0043</td>
</tr>
<tr>
<td>Stress at home</td>
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<td>0.157</td>
<td>0.183</td>
<td>2.270</td>
<td>0.0248</td>
</tr>
<tr>
<td>(Constant)</td>
<td>1.701</td>
<td>0.604</td>
<td></td>
<td>2.819</td>
<td>0.0056</td>
</tr>
</tbody>
</table>

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### Table 2: Multiple regression analysis in females

<table>
<thead>
<tr>
<th>Analysis of variance</th>
<th>df</th>
<th>Sum of squares</th>
<th>Mean square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>4</td>
<td>334.678</td>
<td>83.669</td>
</tr>
<tr>
<td>Residual</td>
<td>132</td>
<td>769.423</td>
<td>5.82</td>
</tr>
</tbody>
</table>

$F = 14.354$ Significant $F = 0.0000$
have a lifelong compensation for the low haemoglobin. Fatigue was not associated with a high ESR and it has been shown that a significant number of non-Europeans have abnormally high ESRs. Further studies need to be carried out in this population in order to establish the normal range of ESR and its association with disease.

Only one new case of hypothyroidism was diagnosed as a result of the study. Other studies have shown that minor laboratory abnormalities are relatively common but do not contribute to the diagnostic process in fatigue. Valdini found that the presence of an abnormal laboratory result in a fatigued individual did not necessarily indicate the cause of the fatigue. Physical examination and laboratory testing rarely reveal unknown physical causes, and in this study only one patient had a new physical cause for fatigue diagnosed.

In summary, the most important variable associated with fatigue in this population is anxiety. The UAE has had one of the most rapid social developments in evidence anywhere in the world, and studies suggest that adolescents and young adults at the forefront of change are particularly vulnerable to its anxiety-inducing effects. This development may also explain the high incidence of anxiety and depression in the study group. In females, depression and stress at home are also important factors, and illiteracy contributes to fatigue. Lack of physical exercise increases the severity of fatigue, along with a high BMI. Many of these factors can be attributed in some degree to the rapid social change of the community and the westernization of the traditional lifestyle. As the prevalence of fatigue in this population is high, strategies to manage the problem need to be developed. These should include the traditional rituals and customs used to treat illness in the past, which could be combined successfully with a bio-psychosocial approach. The problems associated with rapid development should be recognized by health care planners, and further research into this issue would benefit from a multidisciplinary approach, appropriately led by the Primary Health Care team.

Acknowledgements
We would like to thank all the staff in the Family Medicine Department and the Laboratory of Tawam Hospital for their help with this study.

References
3. McIlvenny SP. Fatigue in a developing country. Thesis for Doctorate of Medicine, Queen’s University, Belfast, 1998.

Appendix 1. The fatigue scale

**Physical symptoms**
1. Do you have problems with tiredness?
2. Do you need to rest more?
3. Do you feel sleepy or drowsy?
4. Do you have problems starting things?
5. Are you lacking in energy?
6. Do you have less strength in your muscles?
7. Do you feel weak?

**Mental symptoms**
8. Do you have difficulty concentrating?
9. Do you have problems thinking clearly?
10. Do you make slips of the tongue when speaking?
11. Do you have problems with your memory?