PREVALENCE OF DIABETES MELLITUS AMONG BAHRAINIS ATTENDING PRIMARY HEALTH CARE CENTRES

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ABSTRACT

Diabetes mellitus is an important health problem because of its high morbidity and mortality even though its complications are partially preventable. Diabetes has not been previously studied on a population-wide scale in Bahrain. The aim of this study is to provide an estimate of the prevalence of diabetes, taking into account the fraction of known and unknown diabetes and other associated risk factors.

A sample of 573 subjects from a Bahraini population aged 20 years and above was randomly selected from persons attending four health centres. The capillary blood glucose level was measured with reflectance meter after two-hour after administering 75 g oral glucose in people with negative history for diabetes. An alarmingly high prevalence of total glucose intolerance was found. the observed prevalence rate of diabetes mellitus was 25.5% with a further 14.7% prevalence for glucose intolerance. Hypertension and positive family history of diabetes among diabetic subjects were 27.6% and 41.7% respectively, and mean body mass index (BMI) was 27.9 $\pm$ 5.2. Effective primary prevention strategies are needed to be intensified among high risk groups. Awareness of the disease needs to be promoted.

INTRODUCTION

The World Health Organization has declared that the number of people with diabetes is rapidly increasing world wide and has become a major public health concern (1-5). Many countries in the Eastern Mediterranean Region, recognising the magnitude of the problem, have taken active measures by establishing national diabetes control programmes (2,6-10) as one strategy in combating non-communicable disease. However, to elucidate the magnitude of the problem more epidemiological studies will be required at countries level (1-3,11,12). In the past two decades, significant demographic changes have taken place in the Eastern Mediterranean Region. The population has almost doubled; infant mortality has progressively declined with a resulting increased survival; and life expectancy continues to increase (3). In the region generally the rapid socioeconomic development which started in the 1970s has led to a proliferation of educational establishments, health centres, hospitals, and other medical facilities. These social advances have been accompanied by the characteristic cultural changes that are observed in rapidly developing societies. Alterations in life style, unhealthy nutritional habits and a more sedentary life have led to an increase obesity (3,11,12). Several countries of the Region have reported data on the epidemiology of diabetes. The prevalence rate of diabetes in this Region ranged from 2.3% to 13.6% (1,3,8,13). In Saudi Arabia the prevalence was 4.6%. Further, in those aged 30 years and above an additional 10.6% demonstrated impaired glucose tolerance (IGT). Prevalence in Oman was 10% and a further 10.9% had IGT (aged 20 years and above). Egypt reported the highest rate of 13.6% (in press for publication in Diabetic Medicine). The studies conducted in Bahrain showed a prevalence rate ranging from 1.8 to 3.1%. However, these studies were done on a limited group of patients and not drawn from population based samples (11,12,14). It should be noted that many of the studies mentioned above did not use the recommended WHO criteria for diagnosis (15). In addition, most of the surveys showed that over 50% of diabetes was undiagnosed (5,7,16,17). Given that diabetes was a growing regional problem and in response to the recommendations made by WHO and the Arab Group for the Study of Diabetes that epidemiological studies were needed to assess the magnitude of the problem of diabetes, such a study was undertaken in Bahrain. The objective was to define the prevalence rate of diabetes mellitus in Bahrain among the Bahraini population aged 20 years and above. This included classifying cases into known diabetes mellitus (diagnosed prior to survey), unknown diabetes mellitus (detected during the survey) and impaired glucose tolerance (IGT). Additional objectives were to describe the distribution of the associated hypertension, obesity and positive family history of diabetes (1).

BACKGROUND

The State of Bahrain consists of over 33 islands, with a total area 706.55 km^2, and an estimated population (1993) of 540,400 of which 340,000 are Bahrainis (172,000 males and 168,000 females) (18,19). The Government is committed to the Alma-Ata declaration and the goal of "Health For All by the year 2000" and has adopted the strategy and policies of "primary health care" as a tool for achieving that goal. Free and comprehensive health care is provided through 21 primary care health centres distributed throughout the country thus making

health services easily accessible to all citizens (18,20). Health statistics show a decline in communicable diseases and an increase in the prevalence of non-communicable and chronic diseases such as metabolic disorders (19,20).

METHODS

Target group and Sampling (sample size and site of study). The target group was all Bahraini nationals aged 20 years and above attending primary health care centres. Assuming that the prevalence rate is 5% (±2) and a population is 340,000 with a confidence level of 95%, the sample size is 455 (Epi Info software statistical programme) (1,3,10). Since the expected response rate was 80%, 573 cases were selected from the population attending four health centres (HCs) for any problem. The four HCs (Region I: Sh. Salman HC, Region II: Naim HC, Region III: JidHafs HC, Region IV: Sitra HC) are scattered geographically throughout Bahrain, each serving a population > 30,000(23).

Data collected – Age, sex, personal past history of diabetes mellitus (first and second degree only) and hypertension, weight and height to calculate the BMI, blood pressure measurement (using standard mercury sphygmomanometers) (1), estimation of blood glucose levels 2-hour after 75 g oral glucose tolerance test (OGTT) in non-diabetic subjects. The medical records of all cases were also inspected in addition to those of non-respondents (10). Hypertension was defined and classified according to the old as well as the new classifications, that is systolic BP 160 or over, or a diastolic pressure of over 95 or over in the old classification, and a systolic of 140 or over, or a diastolic of 90 or over according to the new criteria (22).
Technique and criteria for diagnosis – A computer generated simple random list was used (1,3,10). Subjects were interviewed the same day of selection. A blood test was done the following day after an overnight fast. The measurement used was the capillary blood glucose concentration in the morning, two hours after subjecting the cases to an oral glucose tolerance test with a 75 g oral glucose (dextrose monohydrate) load. Subjects known to have diabetes prior to the survey were exempted from the blood testing. Reflolux (Boehringer Mannheim) meters were used to estimate the blood glucose levels (1). WHO criteria were used to classify the subjects. Diabetes was diagnosed when the blood glucose level was > 200 mg/dl (11.1 mmol/l); and (IGT) when the level was > 140 mg/dl (7.8 mmol/l) and < 200 mg/dl (11.1 mmol/l) (3,5,7,8,10,15,22). Non-respondents were re-invited once by telephone. The demographic data of the defaulters were kept for further evaluation.

RESULTS

Of the 573 subjects selected 498 (86.9%) completed the study. The 2-hour post-75 g oral glucose blood sugar was estimated. Diabetes (DM) was defined according to the WHO criteria or if the case had a previous history of diabetes. The age and sex distribution of all subjects including the non-respondents, are shoin **(Table 1)** . The age range was between 20 and 90 years with a mean of 43.9 + 15.3 (s); for men it was 44.9 + 17.3 (s) and women 43.2 + 14.1 (s). The non-respondents were mostly from the younger age group. The ratio of females to males were 1.7:1 and 1.8:1 in all subjects selected and diabetic suvjects respectively.The number od diabetic subjects and of diabetes and IGT among different age groups and gender are shown in**(Table 2)** The prevalence rate of known diabetes (previously diagnosed) was found to be 17.3 (95% CI, 13.9% - 20.6%), Males 18.4%, Females 16.7%. Prevalence rate of unknown diabetes (newly diagnosed) was 8.2% (95% CI, 6.0% - 11.0%), Males 8%, Females 8.3%; making the total rate of diabetes 25.5% (95% CI, 21.7% - 29.3%), Males 26.4%, Females 25%. The prevalence rate of IGT was 14.7% (95% CI, 11.6% - 17.8%), Males 10.9, Females 16.7%.There was a variation in prevalence rates among different Regions in the previously diagnosed diabetes, while the difference in the rate disappeared in the newly detected diabetics and was small in subjects with IGT **(Table 3).** Considering people aged 30 years and above alone, the prevalence rate of previously diagnosed diabetes was 21.1% (95% CI, 17.1% - 25.1%), and for the newly detected diabetes 8.5% (95% CI, 6.0% - 11.7%), with a further 14.8% (95% CI, 11.3% - 18.3%) for IGT. Using the standard world population of Segi for the age group 30-64 year, the age-adjusted prevalence of diabetes was 27.7% (95% CI, 27.2% - 28.1%), and the prevalence of impaired glucose tolerance was 14.7% (95% CI, 14.3% - 15.0%).There was a positive family history of diabetes in 41.7% of diabetics, and in 32.9% of individuals within IGT. The frequency of hypertension, as defined above, was 27.6% (95% CI, 19.8% - 35.3%) among diabetics compared to 13.1% (95% CI, 9.3% - 16.9%) among non diabetics. Among those with IGT, the frequency was almost similar (27.4%). Using the new criteria for the diagnosis of hypertension, i.e. systolic blood pressure > 140 mm Hg and/or diastolic blood pressure > 90 mm Hg, This study showed a frequency of hypertension of 58.3% (95% CI, 49.7% - 66.8%) among all diabetics, and 53.4% (95% CI, 41.4% - 65.2%) among those with IGT **(Table 4)**. Of individuals with diabetes or IGT, 74% overweight (BMI > 25). Gross obesity (BMI > 30) was found in 31.5% and 34.2% of individuals with diabetes and IGT, respectively, compared with 56.4% and 24.52% as overweight and gross obesity among non-diabetics, respectively.

DISCUSSION

Although the sample was drawn from persons attending the primary health care centres, given the high rate coverage of Bahrain's health services the sample fairly represents the population. In many studies, over 50% of diabetes was undiagnosed prior to survey (3,5,7,17). In one of the Saudi Arabian studies, 86% of diabetics were diagnosed prior to the survey (3). In this study 67.7% of people with diabetes were diagnosed as having diabetes prior to the survey, with a variation in different regions, ranging from 62.5% to 82.7%. The high prevalence rate of known to unknown diabetes may be attributed to several factors, such as awareness among qualified family physicians in the primary care centres, awareness of those people with positive family history of diabetes concerning the disease, easy accessibility of health care services to all people, free of charge, and high frequency of visits to health services per year per capita. The prevalence of diabetes rose with age. It was observed that there was a sharp increase in the over all prevalence of known diabetes after 40 years of age (36.9% as compared with 10% above 40 years of age). In the total glucose intolerance in general (51.6% compared with 24.2% below 40 years of age). The prevalence of IGT fluctuated throughout the different age groups. Contrary to other studies (1,3,17), the prevalence of IGT was less than one-half of that of all diabetes, except in the age groups below 40 years (1.5 times). It was observed that the prevalence rate of diabetes among men and women was almost equal in this survey, similar to other results from other surveys (3), but that of IGT was more in women, as also shown other studies (7). In general, the prevalence rates for diabetes mellitus and IGT for those subjects aged 40 years and above were 36.9% and 14.6% respectively. Diabetes was highly associated with the risk factors of diabetes mellitus, such as age, obesity, hypertension and family history, as in other studies (3). The proportion of diabetics with positive family history of diabetes was high (41.7%). The high frequency of positive family history in previously known diabetes subjects (47.7%) compared to 29.3% in newly diagnosed diabetics may be attributed to awareness of the problem among those with positive history of diabetes and the higher percentage of intermarriage in Bahrain. The non-diabetic subjects had a lower frequency of positive family history (only 23.2%) while the non-respondents had an even lower positive family history (16%).The frequency of hypertension in diabetic subjects was found to be similar to that found in other studies (14, 24). The prevalence of hypertension among diabetic subjects was twice that of non-diabetic subjects, which is similar to other studies. Obesity was observed to be high among subjects with abnormal glucose metabolism (mean BMI: 28.1 ± 5.1 (s)) compared to non-diabetic subjects (mean BMI: 26.2 ± 5.3 (s)). Analysis of high risk groups showed a strong association with high prevalence rate of glucose intolerance. Thus, 46.9% of hypertensive subjects (a new criterion) and 52.7% of subjects having positive family history of diabetes mellitus were found to have glucose intolerance. This prevalence increased to 67.2% when hypertension was associated with positive history of diabetes.

CONCLUSION

An alarming 40.2% of the total sample had an abnormal glucose tolerance, although this may not reflect the true prevalence of diabetes among Bahraini population, since the individuals subjected to testing may have a higher prevalence of diabetes than those not tested. However, effective primary prevention strategies are needed urgently, and these efforts need to be intensified among high risk groups. Since diabetes frequency is relatively high, promotion of awareness of the disease is needed in order to improve the competency of the health-care team and to utilize the existing screening programmes to detect more of the unknown cases.

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