



PREVALENCE OF HYPERTENSION IN TYPE II DIABETIC MELLITUS SUBJECTS AMONG DIABETIC CARE CENTRES IN ABHA AND KHAMIS MUSHAYAT, SAUDI ARABIA

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ARTICLE INFO

Article History:

Received 19th January, 2018

Received in revised form

20th February, 2018

Accepted 20th March, 2018

Published online 30th April, 2018

Key Words:

BMI-hypertension-diet-exercise-pregnancy

ABSTRACT

Background: Hypertensive disorders have become increasingly prevalent and complicate an increasing number of pregnancies. Hypertensive disorders are the most common medical complications of pregnancy. 1 Hypertension affects 10% of all pregnancies and is accompanied by an increase in fetal and maternal morbidity and mortality.

Objectives: 1) To study the prevalence of hypertension in pregnant women 2) To create awareness among pregnant women about prevention of hypertension during pregnancy.

Methodology: A cross sectional study was conducted on 200 pregnant women attending antenatal clinic of Khamis Mushayathospital aged 20-45 years. Interview questionnaire containing details such as number of pregnancies, number of current pregnancy, BMI, weight of the mother, blood sugar levels, abortions, blood pressure of the mother, diseases if any other than hypertension such as diabetes mellitus, renal diseases, etc. The association between variables was studied on SPSS 22 platform using Chisquare. Also a live presentation on hypertension in pregnancy was given to Khamis Outpatient clinic pregnant subjects to create awareness.

Results: In a majority of the subjects, there was a highly significant relationship between number of pregnancies and age at 2nd pregnancy, weight of the mother and abortion history. Again in a majority of the subjects there was a highly significant relationship between age at 1st pregnancy and education of the mother, weight of the mother and previous history of fetal death. There was a highly significant relationship between education of the mother and occupation and income in a majority of the subjects. Also a highly significant relationship existed between income of the family and presence of disease. Also weight of the mother highly significantly related to the BMI and presence of other diseases in the mother. In a majority of the subjects, there was a highly significant relationship between family history of hypertension and BMI of the mother; hypertension in previous deliveries and dietary recommendations; pre abortion history and son's fetal death; history of son's fetal death and dietary recommendations; age at onset of hypertension and renal disease; dietary recommendations given and followed; following dietary recommendations and hypertension for previous deliveries.

Conclusion: A highly significant relationship existed between some of the background variables such as BMI of the mother related to many variables and hence the role of BMI, dietary recommendations and exercise in decreasing hypertension cannot be overruled.

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Citation: Vedavalli Sachithanathan, 2018. "Prevalence of hypertension in type ii diabetic mellitus subjects among diabetic care centres in abha and khamis mushayat, Saudi Arabia", *International Journal of Development Research*, 8, (04), 19859-19862.

INTRODUCTION

The prevalence of diabetes mellitus over the past 40 yearshas increased worldwide. The worldwide prevalence of diabetes in 2000 was approximately 2.8% (171 million) and is estimated to grow to 4.4% (350 million) by 2030 (Wild *et al.*, 2004).

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Since there is a growing prevalence of obesity in children which predisposes to diabetes, the incidence of diabetes will continue to rise (Pinhas-Hamiel and Zeitler, 2005). There is considerable evidence for an increased prevalence of hypertension in diabetic persons (3). In a large prospective cohort study that included 12,550 adults, the development of type 2 diabetes was almost 2.5 times more likely in persons with hypertension than in their normotensive counterparts (3, Gress *et al.*, 2000).

Similarly, evidence points to increased prevalence of hypertension in diabetic persons (Sowers *et al.*, 2001; Govindarajan *et al.*, 2006). The presence of one increases the risk of having the other. This close relationship between diabetes and hypertension suggests a possible common genetic or pathophysiological process or both. Hypertension and diabetes are associated with increased risk of CVD and renal disease. The risk is exacerbated when both are present (Govindarajan *et al.*, 2006). Hypertension is a major modifier of the natural course of diabetes and a key culprit in the accelerated cardiovascular morbidity and mortality in this disease (7). The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) has recommended a downward shift in target blood pressure to <130/80Hg in diabetic patients (article). Several large multicenter studies have reported that relative and absolute benefits of hypotensive treatment in preventing coronary events and stroke were larger in diabetics than in the rest of the treated hypertensive population (Pressel *et al.*, 1996; Hansson *et al.*, 1998 and 10). In a study conducted in Israel, the prevalence of hypertension as a function of three threshold levels— 140/90, 130/85, and 130/80 mm Hg— in 2217 diabetic subjects was determined, followed by three diabetes clinics in central Israel: one hospital-based referral clinic and two community-based clinics. The prevalence of hypertension in the entire 2227 diabetic patients was 60.2%, where the blood pressure was defined as BP \geq 140/90 mm Hg. Around 76.5% and 85.8% of the entire study population had BP levels equal to or higher than 130/85 and 130/80 mm Hg, respectively. The prevalence of high BP was generally somewhat higher in diabetic women than in diabetic men. However, when current cutoff BP levels (\geq 130/80 mm Hg) were applied to define hypertension, the gender-related difference in the rate of hypertension was no longer detectable (Greenman *et al.*, 2006).

In accordance with previous reports in the general population, the prevalence of hypertension increased with age and reached almost 95% among diabetic patients over the age of 80 (Vasan *et al.*, 2002). A highly significant correlation existed between the degree of obesity (according to BMI groups) and the prevalence of hypertension. For example, while the prevalence of hypertension (\geq 130/80 mm Hg) in type 2 diabetics with BMI < 25kg/m² was \approx 82%, the presence of hypertension was nearly universal among diabetic subjects with morbid obesity. Finally, the relation between the severity of obesity and the prevalence of hypertension was maintained among diabetic women as well as men (Greenman *et al.*, 2006). In a study conducted in UK to determine the prevalence of hypertension in newly diagnosed type 2 diabetic patients and its association with risk factors for cardiovascular and diabetic complications, it was found that thirty-nine per cent of the patients (35% of the males, 46% of the females) were hypertensive (mean blood pressure $>$ or = 160 systolic and/or $>$ or = 90 mmHg diastolic 2 and 9 months after diagnosis of diabetes, or taking antihypertensive therapy). The hypertensive patients had a greater mean body mass index (30.1 versus 28.0 kg/m², $P < 0.0001$) than the normotensive patients (13). The hypertensive diabetic patient should incorporate lifestyle changes as a first move. These changes should include an improved diet, regular physical activity, weight management and cessation of smoking. An effective therapy in hypertension management is weight loss. Moreover, studies have shown that modest weight loss can lower or even eliminate the need for antihypertensive medication (Wassertheil-Smoller *et al.*, 1992).

The Dietary Approach to Stop Hypertension (DASH) eating plan, consisting of a low sodium, high potassium, low calorie (800-1,500kcal/day) and high fibre diet, is shown to be effective in lowering BP (Sacks *et al.*, 2001). Along with diet, increased physical activity, such as walking for 30-45 minutes three to five days a week, has been shown to improve lipid profiles, BP and insulin resistance (Sacks *et al.*, 2001; Halbert *et al.*, 1999 and Whelton *et al.*, 2002).

MATERIALS AND METHODS

One thousand (1000) female subjects in the age group of 30-50 years with type II diabetes mellitus were selected from Abha and Khamis Mushayat diabetic centres. Data on their socio economic background was collected using a questionnaire. Height, weight, waist circumference, hip circumference, blood glucose (fasting and random) and blood pressure were measured using standard equipment. The fasting blood glucose level of $>$ 126mg/dl and the random blood glucose of $>$ 200mg/dl were taken to be indicative of the presence of diabetes mellitus in type II diabetes mellitus patients (standard). The presence of hypertension was defined for the entire patient population according to three different criteria: 1) the classic criterion of hypertension used in the general population, i.e., BP \geq 140/90 mm Hg; 2) the criterion used for the definition of hypertension during the years 1993–2000, i.e., BP \geq 130/85 mm Hg; and 3) the new cutoff levels applied for the detection of hypertension in diabetes as of the year 2000, i.e., BP \geq 130/80 mm Hg (Greenman *et al.*, 2006). BMI was calculated to identify obese diabetic subjects (\geq 30). The data collected were loaded on SPSS 20 and analyzed to study the significant correlations between diabetes mellitus and the incidence of hypertension and obesity in the selected subjects.

RESULTS AND DISCUSSION

Socioeconomic background: such as area of residence, education of the subjects, occupation of the subjects and ancestral history of diabetes did not correlate with hypertension or obesity.

Anthropometric profile

The BMI was computed with height and weight measurements and presented in Table 2. The mean of all the above parameters such as mean waist circumference (103.86cm), hip circumference (115.44cm) and waist hip ratio (WHR = 0.91) were well above the standards (WC $>$ 88cm and WHR $>$ 0.85) (18), thus indicating obesity and central obesity. A majority of the study subjects were in Grade I (31.1%-BMI=30-34.9) and Grade II (29.8% - BMI = 35 -39.9) categories. Twenty-five percent of the subjects were overweight (25-29.9 BMI). Only 5.3% of the subjects were of normal weight BMI. Around 8.6% of the subjects had morbid obesity (\geq 40 BMI). Totally the prevalence of obesity in type II diabetic mellitus subjects was 69.5%. Fasting (137.2mg/dl) and random (251.42mg/dl) blood sugar levels were also well above the diagnostic criteria for diabetes mellitus. Hence it can be stated that the subjects did not have controlled blood sugar levels. The complications of diabetes mellitus will set in, if hyperglycemia is not controlled. The prevalence of hypertension in type II diabetic mellitus at levels of 130/80 mm Hg was found to be 15.5% and at levels of 13/85 and 140/90 mm Hg were 15 and 69.5% respectively.

Table 1. Anthropometric profile of the selected subjects

| Parameters | Minimum | Maximum | Mean | Std.Deviation |
|--------------------------|---------|---------|----------|---------------|
| Height (cm) | 140.00 | 170.00 | 156.8146 | 5.00720 |
| Weight (kg) | 55.00 | 115.00 | 81.3974 | 13.04713 |
| Waist circumference (cm) | 77.00 | 140.00 | 103.8675 | 13.58267 |
| Hip circumference (cm) | 85.00 | 150.00 | 115.4437 | 12.36535 |
| Waist hip ratio | 0.90 | 0.93 | 0.91 | 0.03 |

Table 2 - BMI of the selected subjects

| BMI | Percent |
|-----------------|---------|
| Normal weight | 5.3 |
| Overweight | 25.2 |
| Grade 1 obesity | 31.1 |
| Grade 2 obesity | 29.8 |
| Morbid obesity | 8.6 |
| Total | 100.0 |

Table 3 . Glycemic profile of the selected subjects

| Parameters | Minimum | Maximum | Mean | Std. Deviation |
|-----------------------------|---------|---------|----------|----------------|
| Fasting blood sugar (mg/dl) | 70.00 | 305.00 | 137.2185 | 48.85132 |
| Random blood sugar (mg/dl) | 100.00 | 460.00 | 251.4172 | 89.92837 |

Table 4 – Hypertension in the selected subjects at different obesity levels

| Obesity/Hypertension parameters | 130/80mm Hg | 130/85 mm Hg | 140/90 mm Hg |
|---------------------------------|-------------|--------------|--------------|
| Normal weight | 5.3 | - | - |
| Overweight | 5.0 | 6.0 | 14.2 |
| Grade I obesity | 2.6 | 3.0 | 25.5 |
| Grade II obesity | 1.6 | 4.0 | 24.2 |
| Morbid obesity | 1.0 | 2.0 | 5.6 |
| Total | 15.5% | 15% | 69.5% |

This shows that all the subjects had different levels of hypertension, significantly highest being in the level of 140/90 mm Hg. A majority of the type II diabetic mellitus subjects with Grade 1 obesity (25.5%) had significantly high blood pressure levels of 140/90 mm Hg than the other levels of obesity and hypertension. Only 5.6% of the morbid obesity subjects and 14.2 % of the overweight subjects had the same high blood pressure levels. A majority of the overweight subjects also had the same blood pressure levels. A significantly higher percentage of subjects (5.3%) with 130/80 mm Hg of blood pressure were of normal weight and subjects with 130/85 mm Hg blood pressure (6.0%) were overweight.

DISCUSSION

The socioeconomic background parameters such as area of residence, education, occupation and ancestral history of diabetes, did not correlate with hypertension and obesity. Totally the prevalence of obesity in the study subjects was 69.5%. The prevalence of hypertension was highest in the 140/90 mm Hg group (69.5%) and the least (15%) in the 130/85 mm Hg group. Also the group with 130/80 mm Hg had only 15.5% incidence of hypertension. However, all the subjects in the present study had different levels of hypertension. The total prevalence of obesity and hypertension were very high in the study group increasing the risk for diabetic complications. In a study (Vasan *et al.*, 2002) on the prevalence of hypertension in Israel, the prevalence of hypertension in the entire 2227 diabetic patients was 60.2%, where the blood pressure was defined as BP \geq 140/90 mm Hg. Around 76.5% and 85.8% of the entire study population had BP levels equal to or higher than 130/85 and 130/80 mm Hg, respectively. At these levels the prevalence of hypertension was very much higher than in the present study (15% and 15.5% respectively).

However, the prevalence of hypertension in the present study in the 140/90 mm Hg group was slightly higher (69.5%). Whatever the hypertension levels, all the subjects in the present study had some degree of hypertension. The mean of anthropometric parameters such as mean waist circumference (103.86cm), hip circumference (115.44cm) and waist hip ratio (WHR = 0.91) were well above the standards (WC > 88cm and WHR >0.85) (18), thus indicating obesity and central obesity. Grade I and Grade II obesity were the most prevalent forms in the present study and it could be attributed to the prevalence of hypertension in all the type II diabetic subjects under study. Also the glycemic indices were not controlled and could lead to complications of both type II diabetes mellitus and hypertension.

Conclusion

Diabetic counseling to reduce obesity, blood glucose levels and hypertension is the need of the hour to prevent the complications of type II diabetes mellitus such as cardiovascular diseases, retinopathy, nephropathy and neuropathy. The high prevalence of hypertension, obesity and central obesity demands stress on the importance of a balanced low glycemic, DASH diet and adequate physical activity, to treat and prevent hypertension and obesity in the long run.

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