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RESEARCH ARTICLE

DIABETES MELLITUS AMONG ADULT MALE POPULATION OF ARAR CITY, NORTHERN SAUDI ARABIA.

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Arar city; prevalence; Diabetes Mellitus; adult males; risk factors; Saudi Arabia.

Abstract

Background: There is increase in the prevalence of diabetes in Saudi Arabian population, due to significant changes in cultural factors, in addition to changes in dietary habits and socio-economic factors in addition to the high prevalence of physical inactivity.

Objective: The aim of this study is to measure the prevalence of Diabetes Mellitus, and to identify some of the associated risk factors in adult educated and employed males of Arar city, Northern Saudi Arabia.

Participants and methods: A cross-sectional study was carried out in Arar city, during the period from January to February 2016. A total of 325 educated and employed male Saudi nationals aged ≥ 30 years were included in the study. Data were collected by means of personal interview with the participants using a predesigned questionnaire covering the medical history of diabetes, age, family history of diabetes and physical activity. Anthropometric examination included height and weight measurements and calculation of body mass index (BMI). Blood sample is drawn under complete aseptic conditions to determine random blood glucose level. Person considered diabetic if random blood sugar was ≥ 200 mg/dl

Results: The prevalence of Diabetes Mellitus among adult educated and employed males of Arar city was 14.8%. There is high statistically significant difference between different age groups of the participants as regard diabetes (P value < 0.001) but there is no statistically significant difference between obese and non obese (P value > 0.05). There is also highly significant relation between the family history of diabetes and diabetes (P value < 0.001). Diabetes was found in 17.8% and 9.8% of physically inactive and physically active participants respectively and there is statistically significant relation between diabetes and physical activity (P value < 0.05).

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Conclusion and recommendations: The prevalence of diabetes is relatively high among the male Arar city, Northern Saudi Arabia population and represents a major clinical and public health problem. Factors such as aging, family history of DM and physical activity are associated with diabetes. A national prevention programs to prevent diabetes and address the modifiable risk factors should be implemented.

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INTRODUCTION:

A major international study collating and analyzing worldwide data on diabetes found that the number of adults with this disease has doubled since 1980, reaching up to 347 million in 2008 [1].

Another significantly large study, which assessed obesity as a diabetes risk factor across five continents, showed more than 60% of men and 50% of women being overweight or obese, thereby contributing immensely to this global health problem [2].

A prominent example of a country with a sharp increase in its diabetes prevalence rate as a result of rapid economic and cultural change is the Kingdom of Saudi Arabia. Over the last four decades, the data in Saudi Arabia show an ever increasing prevalence of physical inactivity, unhealthy dietary habits and sedentary behavior in its population [3], which in turn resulted in Saudi Arabia being ranked as the third country in the world with the highest prevalence of diabetes [4].

The prevalence of diabetes in Saudi Arabia increased from 4.3% in 1987 to 23.7% in 2004 [5]. This increase has been attributed to significant changes in cultural factors, such as increase in affluence, which unmasks an increase in the genetic or ethnic propensity for diabetes, in addition to changes in dietary habits with the substitution of animal products and refined foods [6], along with the socio-economic factors. This is in addition to the high prevalence of physical inactivity among Saudi Arabian population that reached 96.1% [7] and ranged from 43.3% to 99.5% [8].

Study objective:

The aim of this study is to measure prevalence of diabetes, and to identify some of the associated risk factors in adult educated and employed male population of Arar city, Northern Saudi Arabia.

PARTICIPANTS AND METHODS:

A cross-sectional study was carried out in Arar city, the capital of the Northern Province of KSA, during the period from January to February 2016.

Sampling

A total of 325 educated and employed male Saudi nationals aged ≥ 30 years were included in the study. Data were collected by means of personal interview with the participants using a predesigned questionnaire covering the following items:

- Medical history of diabetes, age, family history of diabetes and physical activity.
- **Anthropometric examination included height and weight measurements** with the use of a calibrated balance beam scale and a wall-mounted stadiometer and calculation of body mass index (BMI). Normal weight was defined as $18 \leq \text{BMI} < 25 \text{ kg/m}^2$, overweight as $25 \leq \text{BMI} < 30 \text{ kg/m}^2$ and obesity as $\text{BMI} \geq 30 \text{ kg/m}^2$ [9].
- Blood sample is drawn under complete aseptic conditions to determine random blood glucose level. Person considered diabetic if random blood sugar was $\geq 200 \text{ mg/dl}$ [10].

Any participant suspected as diabetic was advised to visit a nearby primary health care center to complete investigations, start management and follow up.

Ethical considerations

This study was reviewed and approved by the Research Ethics Committee of Faculty of Medicine, Northern Border University. Participants were informed that participation is completely voluntary, and written consent was obtained from each participant before being subjected to the questionnaire and after discussing the objective with the participants. No names were recorded on the questionnaires. Adequate training of data collectors took place to ensure protection of confidentiality, and all questionnaires were kept safe.

Statistical analysis

Collected data were coded and analyzed using statistical package for the social sciences (SPSS, version 15) [11]. The w2-test was used as a test of significance, and differences were considered significant at P value 0.05 or less.

Results:-

Table (1) shows the background characteristics of studied Participant. The majority of the Participants in the study were between 40 and 50 years of age, and only 2.8% were between 30 and 40 years of age. More than half of participants have no Family History of DM (52%). About 36 % of the participants are obese (BMI >30). About 37.8% recorded physical activity. Blood samples revealed that 14.8 % of the participants showed measured random blood glucose > 160 ml/dl and considered as diabetic.

Table (2) shows the relationship between DM and age group, family history of DM, presence of obesity and physical activity in studied adult males of Arar population. There is high statistically significant difference between different age group of the participants as regard D.M (P value < 0.001). The percentage of diabetes among obese and non obese was 18.6% and 12.6% respectively. But the difference was not significant between obese and non obese regarding D.M (P value >0.05). 25.6% of participants having positive family history of diabetes were diabetic and there is high statistically significant difference (P value <0.001). Diabetes was found in 17.8% and 9.8% of physically inactive and physically active participants respectively. There is statistically significant relation between physical activity of the participants and D.M (P value <0.05).

There is significant weak positive correlation between age and random blood glucose in the studied population ($r = 0.286$ and $P \text{ value} < 0.001$). (Table 3).

Table (1): percentage distribution of DM, age groups, family history of DM, presence of obesity and physical activity in studied adult males of Arar population, KSA, 2016

Variable	No.	%
Diabetes Mellitus		
Yes (random blood glucose ≥ 200 ml/dl)	48	14.8
No (random blood glucose ≤ 200 ml/dl)	277	85.2
Mean\pmSD	121.6\pm47.0	
Age group		
30-	9	2.8
40-	211	64.9
50-	91	28.0
60+	14	4.3
Mean\pmSD	38.0\pm6.12	
Family History of DM		
Yes	156	48.0
No	169	52.0
Obesity		
Yes	118	36.3
No	207	63.7
Physical activity		
Yes	123	37.8
No	202	62.2

Table (2): relationship between DM and age group, family history of DM, presence of obesity and physical activity in studied adult males of Arar population, KSA, 2016

Agegroup		Diabetes Mellitus (n=325)		Total (n=325)	Chi-Square Value	P value		
		Yes (n=48)	No (n=277)					
30-	No.	7	3	10	28.36	0.000		
	%	70.0%	30.0%	100.0%				
40-	No.	23	188	211				
	%	10.9%	89.1%	100.0%				
50-	No.	17	74	91				
	%	18.7%	81.3%	100.0%				
60+	No.	1	12	13				
	%	7.7%	92.3%	100.0%				
Total	No.	48	277	325				
	%	14.8%	85.2%	100.0%				
Obesity								
Yes	No.	22	96	118			2.21	0.094
	%	18.6%	81.4%	100.0%				
No	No.	26	181	207				
	%	12.6%	87.4%	100.0%				
Family history of DM								
Yes	No.	40	116	156	28.16	0.000		
	%	25.6%	74.4%	100.0%				
No	No.	8	161	169				
	%	4.7%	95.3%	100.0%				
Physical activity								
Yes	No.	12	111	123	3.95	0.032		
	%	9.8%	90.2%	100.0%				
No	No.	36	166	202				
	%	17.8%	82.2%	100.0%				

Table (3): Correlation between age and random blood glucose in the studied population

R	0.286
P value	0.000

Discussion:

Determining the prevalence of diabetes mellitus is important to allow for rational planning and allocation of resources. Therefore, we designed this study to determine the prevalence of diabetes among adult male Saudi nationals.

This study is a cross-sectional study was carried out in Arar city, the capital of the Northern Province of KSA, during the period from January to February 2016.

A total of 325 male Saudi nationals aged ≥ 30 years with Mean age (\pm SD) was 38.0 (\pm 6.1) were selected.

In the present study revealed that the prevalence of Diabetes among adult males of Saudi Arabia was 14.8 % . Our finding is less than that reported by **Khalid et al, (2011)**, the prevalence of diabetes among adult males in KSA was 34.1% [11]. and less than the reported prevalence in Gulf region (25.7%) and Oman (16.1%).[12,13]. Our figure is quite lower than the prevalence found in other Arab countries and other regions of KSA, this is mostly attributed to the relatively health awareness of our target group and the strict health measures and health education adopted by local health authorities in Arar city to prevent and control Diabetes Mellitus.

Our data demonstrate that 18.7% of individuals aged 50-60 years have diabetes. Studies from Saudi Arabia have shown different age-specific prevalence rates of diabetes. Our data demonstrate also an positive correlation between

age and random blood sugar level; the fact that diabetes prevalence increases with age is consistent with the findings in previous studies [11,14].

It is well documented that obesity is a strong risk factor for the development of DM as shown by several studies, however, In this study, the data showed that (36.3%) of Arar men population are obese and that (18.6%) of them are diabetics (P value = 0.094). This finding isn't in accordance with findings of Daousi et al., 2006 who reported higher prevalence of obesity in diabetics with 80% to 90% of people diagnosed with type 2 diabetes being obese [15]

Both obesity and diabetes are preventable. Previous studies have demonstrated that changes in lifestyle are effective in preventing both diabetes and obesity in high-risk adults with impaired glucose tolerance [16,17].

The current study reported that, diabetes was found in 17.8% and 9.8% of physically inactive and physically active participants respectively. There is statistically significant relation between physical activity of the participants and D.M (P value <0.05). Increasing physical activity, improving diet and then sustaining these lifestyle changes can reduce both body weight and risk of diabetes. Health professionals must continue to stress the importance of a balanced diet and physical activity for healthy weight loss [9].

Age, physical activity and family history of DM were major contributors significantly associated with DM. This significant relationship has been found consistently in different populations. In United Arab Emirates [18], the significant risk factors for DM were age, family history of DM and obesity and in Greece, age, obesity, family history of DM, hypertension, and elevated triglyceride levels were significantly associated with the presence of DM [19].

In the Saudi society, men and women must overcome many obstacles to make the best choices for optimal health. The provision of clinical preventive services to identify and control hypertension, elevated cholesterol levels, obesity and diabetes remain important medical priorities nationally. Development and implementation of national programs to promote a balanced diet, increased physical activity and weight control must be national priorities as well.

Conclusion and recommendations:-

The prevalence of diabetes is relatively high among the male Arar city, Northern Saudi Arabia population and represents a major clinical and public health problem. Factors such as aging, family history of DM and physical activity are associated with diabetes A national prevention programs to prevent diabetes and address the modifiable risk factors should be implemented.

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