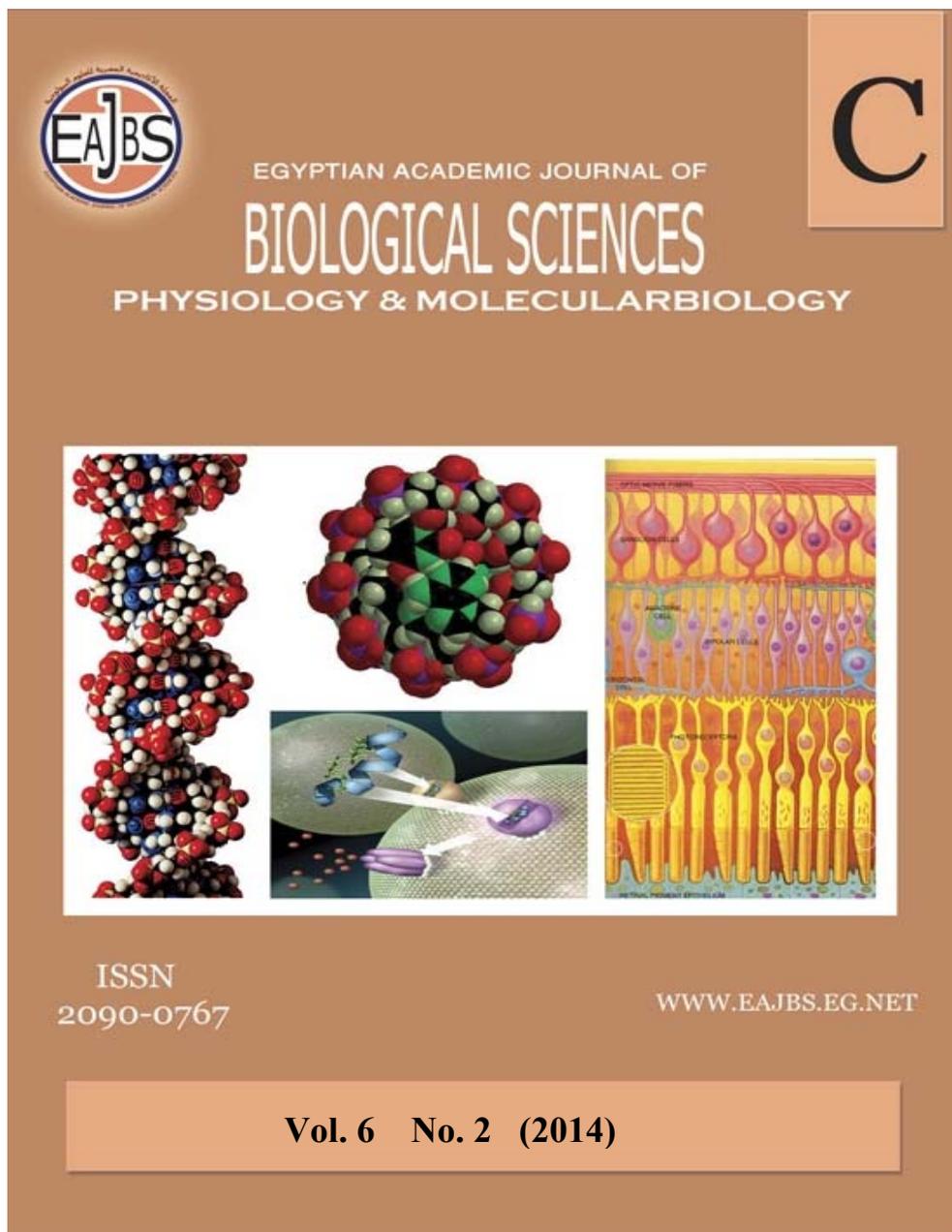


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Prevalence Rates of Diabetes and Obesity in 4 Provinces in Hail Region, KSA

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ABSTRACT

Background: Diabetes Miletus (DM) and obesity are the major public health challenge nowadays that contributes considerable morbidity and mortality rates worldwide. It is a well known that overweight or obese are at greater risk of developing type 2 diabetes. Therefore, objective of this study was to estimate the prevalence rates of Diabetes and obesity in a community base survey.

Methodology: Data were collected during cross sectional survey involved 4 provinces (Hail, Baqaaa, Ash Shinan and Ghazala) representing Hail in Kingdom of Saudi Arabia (KSA).

Results: The prevalence rates of DM and obesity in Hail, Baqaaa, Ash Shinan and Ghazala were (27% and 64%), (35% and 70%), (18.6% and 69%), (35% and 55%), respectively.

Conclusion: Both DM and Obesity are prevalent in all 4 provinces of Hail Region which requires interventions at community base including educational programs raising awareness towards these preventable factors.

INTRODUCTION

Diabetes mellitus (DM) and obesity have a multifarious association; in particular, type 2 diabetes is strongly linked with obesity (Fagot-Campagna, *et al.* 1998). Obesity stands out as a risk factor for Type 2 DM, although some lean type 2 diabetes subjects probably having Latent Autoimmune Diabetes in Adults (LADA). Therefore obesity may be a precursor for Type 2 DM, following insulin resistance (Frayn *et al.* 1996). Most researchers consider that this relationship is different in different types of obesity and Type 2 DM (Boden, 1997).

Diabetes mellitus (DM) is a chronic disorder of glucose metabolism with serious clinical consequences. The prevalence of diabetes has been rising in the recent decades, due to the global changes in lifestyle (Nita and Nicholas, 2010). Globally, it is estimated that 382 million persons suffer from diabetes for a prevalence of 8.3% (WHO, 2013). Eventually, diabetes can damage the heart, blood vessels, eyes, kidneys, nerves, increases the risk of heart disease and stroke (Morrish, *et al.* 2001).

Obesity is the fifth leading threat for deaths worldwide. Approximately 2.8 million adults die annually as a result of being obese. Obesity is responsible of 44% of the diabetes burden, 23% of the ischaemic heart disease burden and between 7% and 41% of certain cancer burdens are attributable to overweight and obesity (WHO, 2013). Obesity co-morbidities include coronary heart disease, hypertension and stroke, certain types of cancer, non-insulin-dependent diabetes mellitus, gallbladder disease, dyslipidaemia, osteoarthritis and gout, and pulmonary diseases, including sleep apnoea (WHO, 2000).

The shift towards high-energy diet and an inactive life style has turned obesity from a developed-world event into a global epidemic (Kelly, *et al.* 2008). Obesity prevalence rates, as well as, food intake habits, vary by demographic and socioeconomic groups (Clarke, *et al.* 2009). Obesity is preventable. At an individual level, a combination of excessive food energy intake and a lack of physical activity are thought to explain most cases of obesity (Lau, *et al.* 2007). A limited number of cases are due primarily to genetics, medical reasons, or psychiatric illness (Barnes, *et al.* 2007; Bleich, *et al.* 2008).

Kingdom of Saudi Arabia (KSA) is one of the top rising economies of the world. This growth has attracted noticeable changes in the lifestyle of people. Eating habits are unhealthy and the level of physical activity is very low. Consequently, obesity is dramatically increasing parallel with its peer

diabetes. Therefore, the purpose of this study was to estimate the prevalence rates of DM and obesity in 4 provinces in Hail area, KSA.

MATERIALS AND METHODS

This study involved a community based cross-sectional survey covered randomly selected towns from each province of the 4 provinces that constitute Hail Region. Hail Province (data collected from: Hail city, Jubba, Umm Algulban, and Alqaid towns), Baqaa (data collected from: Baqaa, Turba, Alajfar and Alsaayra towns) Ash Shinan ((data collected from: Shinan, Samira and Rowdah) and Ghazala (data collected from: Ghazala, Solymi and Alhayet). Data regarding DM were collected from 4525 participants, since data regarding obesity were collected from 3853 participants. Data were collected by a professional medical team from College of Medicine, and College of Applied Medical Science, University of Hail. A form was design to collect the demographic information, such as previously diagnosed DM, age and sex.

Diagnosis of diabetes in this survey was based on the information provided by the participant of being under treatment for diabetes due to a previous well-established diagnosis then confirmed with new blood glucose estimation.

BMI was calculated from measured height and weight (wt) and classified as: 18.5 kg/m²) under wt normal wt (18.5-24.9 kg/m²); overweight (25 -29.9 kg/m²); and obese (30+ kg/m²) (Flegal, *et al.* 2013).

RESULTS

The mean age of the study population was 44.5 ± 17.5 years with 45±19.2 for males and 43.4±15.8 for females. Males' females' ratio was 1.00: 1.01. The prevalence rates of DM and obesity in Hail, Baqaa, Ash Shinan and Ghazala were (27% and 64%), (35% and 70%), (18.6% and 69%), (35% and 55%), respectively, as indicated in Fig.1.

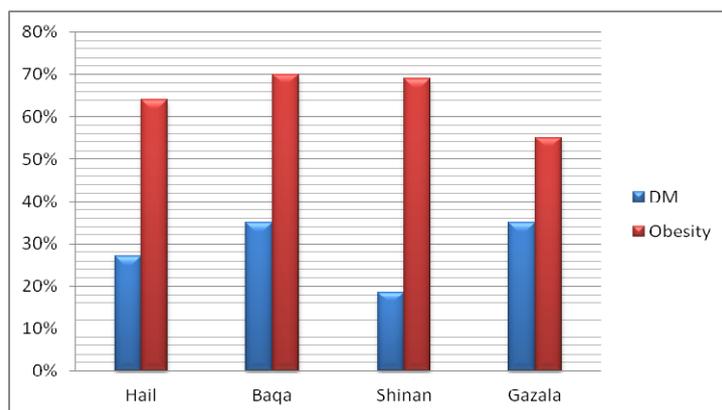


Fig. 1: Description of the study population by DM and Obesity prevalence rates

In categorizing over wt and obese individuals by province, the highest frequencies of both over wt and obesity were found in Hail province, representing 823 and 655 for over wt and obesity, in this order, followed by Ghazala, as indicated in Fig.2

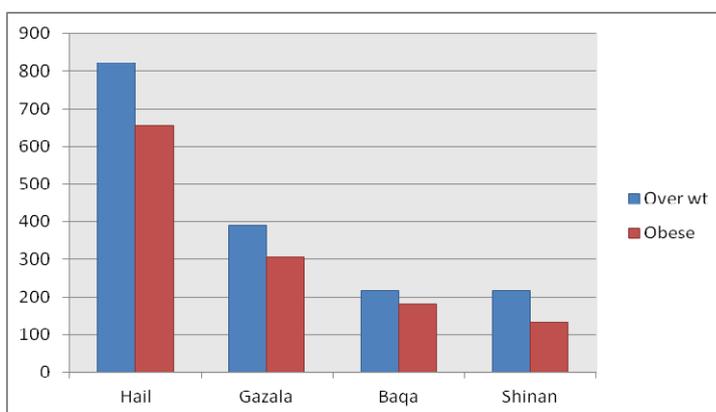


Fig.2: Description of BMI categories by province

Table 1. Summaries, the distribution of study population by DM and obesity. Of the 1099 diabetic patients, 182, 506, and 411, were categorized as normal wt, over wt and obese, respectively. Over wt and obese represent 83.4% of the diabetic patients. The risk of DM increases the obesity and this was found to statistically significant ($P = 0.000$). Furthermore, the proportions of DM increase with increasing of obesity, as shown in Fig.3

Table1: Distribution of the study population by DM and Obesity.

BMI	Diabetic	Non-Diabetic	Total
Normal wt	182	813	995
Over wt	506	1170	1676
Obese	411	754	1165
Total	1099	2737	3836
P value = 0.000			

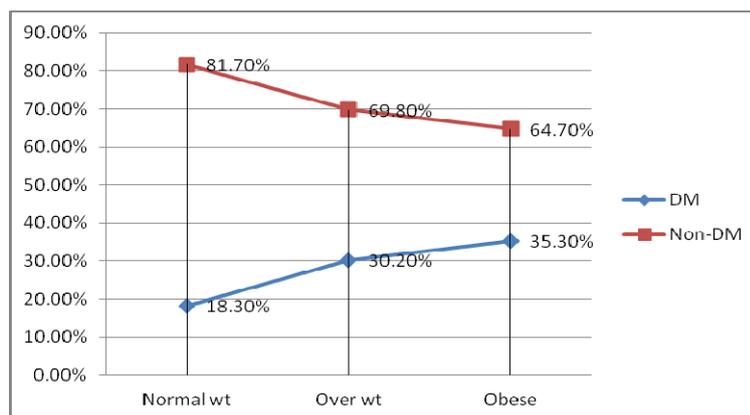


Fig. 3: Description of the BMI categories by DM

DISCUSSION

Obesity is one of the most essential risk factor for type 2 DM. In the present study, there is a significant association between DM and obesity ($P < 0.0001$). However, controlling bodyweight plays an important role in the prevention and treatment of diabetes. In patients with type 2 diabetes, weight loss by any means is followed by an improvement of metabolic control and associated risk factors. The most appropriate recommendation for obese patients with type 2 diabetes is a nutritionally balanced, moderately hypocaloric diet with a reduced intake of saturated fat and an increase in physical activity (Hauner, 2004).

In the current study the prevalence rates of DM were found to be high in all provinces with exception with one province showing relatively lower prevalence rate. The prevalence rates of DM in Hail, Baqaa, Ash Shinan and Ghazala were 27%, 35%, 18.6% and 35%, respectively. However, KSA is among the top 10 countries with higher prevalence of diabetes globally. Highest prevalence rate is Tokelau (37.5%), hence, the lowest among the top 10 is Qatar (22.9%) (WHO, 2013). A study from KSA reported an overall prevalence of DM of 23.7% in KSA, with the highest prevalence rates were among the Northern Saudi population of 27.9% followed by the Eastern region of 26.4%, then Saudis from the Western region of 24.7%, and from the Central region of 23.7%, whereas the lowest prevalence was from the Southern region of 18.2% (Mansour, *et al.* 2004). Another,

study showed that the prevalence of diabetes in general Saudi population was 30%. The prevalence of diabetes was 34.1% in males and 27.6% in females ($P < .0001$). The mean (SD) age for onset of diabetes in males and females was 57.5 (13.1) and 53.4 (13.1) years, respectively ($P < .0001$) (Khalid, *et al.* 2011).

In the present study the prevalence rates were found to be high in different provinces that constitute Hail region. The prevalence rates of obesity in Baqaa, Ash Shinan and Ghazala were, 64%, 70%, 69%, and 55%, respectively. These values are relatively higher than most reported prevalence rates worldwide. The prevalence of overweight and obesity were highest in the Americas (62% for overweight in both sexes, and 26% for obesity) and lowest in South East Asia (14% overweight in both sexes and 3% for obesity) (GHO, 2013).

The increased intake of fast foods and sugar-dense beverages, as well as, the extensive use of cars, elevators, escalators, remotes in recent years have dramatically increased the burden of obesity in KSA. Thus the increased prevalence rate of obesity in the present study indicates that the lifestyle is changed even in villages and nomad community in KSA. A recent study from Hail Region, KSA, has shown that the overall prevalence of obesity in Hail was 63.6%. Moreover, the prevalence of males was 56.2% and females were 71% (Ahmed, *et al.* 2014). According to epidemiological studies and surveys, obesity was found to have an effect on more than one quarter

while overweight affects about one-third of the adults in Saudi Arabia (AL-Nozha, *et al.* 2005; Al-Othaimeen, *et al.* 2007; Barrimah, *et al.* 2009; Al-Daghri, *et al.* 2011). The prevalence of overweight among adults population was 36% and prevalence of obesity among the adult population was 35.6% (AL-Nozha, *et al.* 2005). In a study (2009-2011) to measure the prevalence of obesity among military personnel in KSA, has found that 40.9% of the participants were overweight, 29% obese, and 42.4% had central obesity (Bin, *et al.* 2013). However, these studies were performed before many years and since there is a global rapid increase in obesity and in KSA particularly, the high increase in the prevalence rates is probable due to strong dependent relative on factors that increase the risk of obesity among Saudi population.

Furthermore, the results of this study showing strong association between obesity diabetes, which showing statistically significant difference ($P < 0.001$). The relationship between obesity and diabetes is well established in several studies (Maria, *et al.* 2001). In a study from KSA to assess the effect of overweight and obesity on diabetes and hypertension, the prevalence of obesity among diabetics and hypertensive patients was 46% and 54%, respectively (AL-Shahrani and Al-Khaldi, 2013).

In conclusion: There is strong association between obesity and DM which are both prevalent in all Hail Region provinces. This strong association necessitates urgent interventions at community base. Feasible solutions include health education regarding the right food choices and encouraging physical exercise at community bases is highly required.

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ARABIC SUMMARY

معدل انتشار الإصابة بالسكري والسمنة في أربعة محافظات في منطقة حائل، المملكة العربية السعودية

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خلفية: يعتبر مرض السكر والسمنة من أكبر التحديات في الصحة العامة في وقتنا الحاضر، حيث يتسببان في عدد كبير من معدلات الإصابة والوفيات على مستوى العالم. من المعروف أن زيادة الوزن والسمنة من أكبر عوامل الخطورة المسببة لمرض السكري النوع الثاني. لذلك كان الهدف من هذه الدراسة هو تقدير معدلا انتشار السكري والسمنة في دراسة مسحية مبنية على المجتمع.

المنهجية: تم جمع البيانات خلال دراسة مقطعية على أربعة محافظات بمنطقة حائل وهي (حائل، بقعاء، الشنان، الغزالة) وهي تمثل منطقة حائل بالمملكة العربية السعودية.

النتائج: معدل انتشار السكري والسمنة في كل من حائل، بقعاء، الشنان، الغزالة هو (٢٧% و ٦٤%)، (٣٥% و ٧٠%)، (١٨.٦% و ٦٩%)، (٣٥% و ٥٥%) على التوالي.

الخاتمة: ينتشر كل من السكري والسمنة في المحافظات الأربعة بمنطقة حائل مما يستدعي تدخل على مستوى المجتمع يشمل برامج التثقيف الصحي ورفع مستوى الوعي الأسباب المؤهبة للإصابة والتي يمكن الوقاية منها.