Journal Homepage: - www.journalijar.com
INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)
Article DOI:10.21474/IJAR01/2788
DOI URL: http://dx.doi.org/10.21474/IJAR01/2788
ISSN NO. 2320-5407

RESEARCH ARTICLE

EPIDEMIOLOGY OF OBESITY IN ARAR CITY, NORTHERN SAUDI ARABIA.

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Manuscript Info

Manuscript History

Received: 15 November 2016
Final Accepted: 17 December 2016
Published: January 2017

Key words:-
Obesity; overweight; Northern Border University; Kingdom of Saudi Arabia

Abstract

Background: Obesity is a common health problem and rapidly increasing among Saudi Arabians. There is no studies that aim at identifying the prevalence and the main risk factors of obesity in Arar city.

Objective: to determine the prevalence of obesity and overweight among Northern Saudis of both gender, aged 15 years or older and to study some of obesity related risk factors in that population.

Methods: A cross-sectional study was carried out during the period from 1, January 2016 to 29, April 2016. A total of 592 subjects attending 3 randomly selected primary healthcare centers in Arar city. Each participant was interviewed separately, and confidentiality was assured. Data were collected by means of personal interview with the sampled women using a predesigned questionnaire covering the needed data**.**

Results: The majority of participant in the study was a females 75% , and only 25 % were male. The overall prevalence of obesity was 35.3% and the overall prevalence of overweight was 27.2%. Obesity was found in 32.2% of females and 44.6% of males while 26.1% of females and 30.4% of males were overweight. (P value = 0.002). 13.8% of obese have history of childhood obesity, 56.8% had family history of obesity in 1st degree relatives and 25.7% of overweight and obese prefer the takeaway meals. Regarding the previous trials of treatment of obesity, diet regulation was tried in more than half (57.3%) of patients while medical treatment was followed in only fifth (20.8%) and 15.1% tried surgical treatment of obesity. More than half (59.2%) of overweight and obese don't perform any muscular exercise, 13.0% performing daily muscular exercise, 27.8% performing muscular exercise 1-3 times/week.

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Conclusion and recommendations: The results of this study indicate an increased rate of obesity and overweigh in the Arar population. Male sex, middle age, history of childhood obesity, family history of obesity in 1st degree relatives and takeaway meals are risk factors for both overweight and obesity. Therefore, a community-based multiple strategies are required to combat with increasing rate of obesity and its subsequent complications such as diabetes, coronary artery disease, hypertension and osteoarthritis.

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Introduction:-

Obesity is actually an epidemic problem in the world; it has become truly a global problem affecting countries rich and poor. An estimated 500 million adults worldwide are obese and 1.5 billion are overweight or obese [1].

Much of the information about obesity among adults rest in the use of body mass index (BMI) to define obesity, which will be defined as a BMI 30 kg/m^2 or greater unless otherwise stated [2]. The World Health Organization (WHO) categorizes adults with a BMI of 25 to 30 as overweight, whereas obesity is classified according to stages or grades - Grade 1: BMI 30.0-34.9, Grade 2: BMI 35.0-39.9 and Grade 3: BMI ≥40.0 [3].

Obesity is a consequence of many risk factors, as increased energy consumption and reduced physical exercise [4].

Obesity is a major risk factor for illness and death. It is associated with diabetes, hypertension, hyperlipidemia, obstructive sleep apnea, and osteoarthritis [5].

Previous studies in KSA indicate an increasing trend in the prevalence of obesity. Data from the late 1980s through mid-1990s show a prevalence of obesity averaging about 20%, ranging from as low as 13.1% among men to as high as 26.6% among women. However, all prevalence estimates from 1995 and beyond are above 35% [6,7,8].(11–13).

Obesity and overweight are increasing in KSA with an overall obesity prevalence of 35.5%. The prevalence of overweight was 36.9%. Overweight is significantly more prevalent in males (42.4%) compared to 31.8% of females. Females are significantly more obese with a prevalence of 44% than males 26.4%.Reduction in overweight and obesity are of considerable importance to public health [9].

In the (2013) survey all over the KSA, Of the 10,735 participants evaluated, 28.7% were obese (body mass index ≥30 kg/m2). Prevalence of obesity was higher among women (33.5% vs 24.1%). Among men, obesity was associated with marital status, diet, physical activity, diagnoses of diabetes and hypercholesterolemia, and hypertension. Among women, obesity was associated with marital status, education, history of chronic conditions, and hypertension [10].

Hence, the increased cost of obesity and its sequelae will put a strain on the resources of governments and individuals [11].

The influence of genetics on obesity is well established. Adoption studies and twin studies suggest that about 80% of the obesity risk is genetic. We designed a tool to predict outcomes of treatments in patients with sporadic or familial obesity [12].

Studies have linked a familial predisposition of obesity, CVD (hypertension, dyslipidaemia and thromboembolic events), and type 2 diabetes mellitus to BMI as well as other adiposity measures in children, suggesting degrees of familial aggregation of metabolic derangements. A pattern of predispositions arising from mothers, parents or grandparents as being most influential have been found, but further comprehensive studies are needed in order to specify the exact implications of familial predisposition [13]. Overweight children have an increased risk of being overweight as adults [14].

In Iranian, population-based cross-sectional study conducted to determine the prevalence rate of obesity, overweight, central obesity and their associated factors in the north of Iran. In the population aged 20-70 years, the

overall prevalence rates of obesity and overweight were 18.8% and 34.8% respectively. The overall prevalence rate of central obesity was 28.3%. The rate of obesity in women was higher than men. In both genders, particularly in the women, the rate of obesity was raised by increasing age. Marriage, history of parental obesity and parity > or =5 were associated with increased risk of obesity. With respect to these findings, low level of activity and education, parity, family history of obesity, marriage at earlier age and ageing are responsible for both obesity and central obesity in the north of Iran [15].

Rationale:-

obesity is a common health problem and rapidly increasing among Saudi Arabians. Moreover obesity is considered to be a burden on the health system. There is no studies that aim at identifying the prevalence and the main risk factors of obesity in Arar city. Since we are medical health workers, we saw the necessity of conducting a study that could give a vivid idea of prevalence and the main risk factors of obesity in Arar city, Northern Saudi Arabia.

Objective:-

Obesity and overweight are well known risk factors for coronary artery disease (CAD), and are expected to be increasing in the Kingdom of Saudi Arabia (KSA) particularly among females. Therefore, we designed this study with the objective to determine the prevalence of obesity and overweight among Northern Saudis of both gender, aged 15 years or older and to study some of obesity related risk factors in that population.

Participants and methods:-

Study sitting:- The present study was conducted in Arar which is the regional headquarter of the Northern Border Province of Saudi Arabia.

Study type:- A community-based cross-sectional study was carried out during the period from1, January 2016 to 29, Abril 2016.

Sampling:- A total of 592 subjects aged 15 years and above (75.0% women) attending 3 randomly selected primary healthcare centers in Arar city. They were selected using a systemic random sampling procedure. Each participant was interviewed separately, and confidentiality was assured. Health centers provide healthy and sick citizens with healthcare services in an acceptable atmosphere of both privacy and confidentiality.

Data collection methods:- Data were collected by means of personal interview with the sampled women using a predesigned questionnaire covering the following items:

(1) Socio-demographic characteristics , including age, educational and marital status.
(2) Data related to obesity as physical activity, obesity of 1st degree relative, Family income/month , History of childhood obesity, Takeaway meals , consumption of milk, dairy products and egg, performing muscular exercise, history of consumption of fatty meals, consumption of fruits and vegetables, history of associated chronic diseased and history of trials of treatment of obesity among overweight and obese was obtained.

The exclusion criteria were, significant liver or kidneys disease and mal-absorption syndrome. 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 BMI<25 kg/m^2, overweight as 25≤BMI<30 kg/m^2 and obesity as BMI≥30 kg/m^2 **[16].**

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). The chi square test was used as a test of significance, and differences were considered significant at P value 0.05 or less.

Results:-

Table 1: Sex, age group and family income/month of the studied population, Arar, KSA, 2016 (n= 592)

Sex	No.	%
Female	444	75.0
Male	148	25.0
Age group		
15 – 25	229	38.7
26 – 35	211	35.6
36 – 50	122	20.6
> 50	30	5.1
Family income/month (*SR)		
< 5000	86	14.5
5000 - 10,000	305	51.5
> 10,000	201	34.0

* Saudi Real

Table (1)shows the socio-demographic characters of studied male and female . The majority of participant in the study was a female 75% , and only 25 % were male .

38.7 % aged between 15 – 25 , while 35.6 % between 26 – 35 , and 20.6% were between 36 – 50 , and only 5.1 % were > 50 years old .The family income per month of the studied participant was between 5000 – 10,000 in nearly more than the half (51.5 %) of the participant , and less than 5000 in 14.5 % while more than 10,000 was 34% of participant .

Table 2:- Obesity and its associated risk factors in the studied population, Arar, KSA, 2016 (n= 592)

Obesity	No.	%
Underweight	29	4.9
Normal	193	32.6
Overweight	161	27.2
Obese	209	35.3
History of childhood obesity		
Don't know	316	53.4
No	220	37.2
Yes	56	9.5
Takeaway meals		
Sometimes	313	52.9
No	116	19.6
Yes	163	27.5
Family history of obesity in 1st degree relative		
No	213	36.0
Don't know	57	9.6
Yes	322	54.4
Associated chronic diseases		
No	555	93.7
DM	23	3.9
DM and hypertension	8	1.3
Hypertension	6	1.01

Table (2) shows obesity and its associated risk factors beside presence or absence of chronic disease, according to BMI the table revealed that the majority of studied participant was classified as obese 35.3% while 32% of the participant was normal .

27.2% of participant was classified as overweight and only 4.9% of the studied participant was underweight . As regard History of childhood obesity , nearly more than the half of the participant 53.4% does not know whether they were obese in childhood or not , and more than one-third (37.2%) of them denied childhood obesity and about a 10th (9.5%) were obese in childhood. Takeaway meals habit was found as sometimes in more than the half (52.9%) of

participant , while (27.5%) of participant was regular on takeaway meals , and only (19,6%) don't mention takeaway meals . The highest percentage of studied participant (54.4%) reported that they have family history of obesity in 1st degree relative, and (9.6%) of participant don't know whether they have family history of obesity in 1st degree relativeor not, and more than one-third (36.0%) don't have family history of obesity in 1st degree relative. As regards presence or absence of chronic disease, the highest percentage of participant (93.7%) mention no association with chronic disease, (3,9%) have only diabetes mellitus, while (1.3%) have both diabetes mellitus and hypertension and only (1.01%) have hypertension .

Table 3: Trials of treatment of obesity among overweight and obese (Total =370)

Treatment of obesity by Diet regulation	No.	%
No	158	42.7
Yes	212	57.3
Medical treatment by drugs		
No	293	79.2
Yes	77	20.8
Surgical treatment of obesity		
No	314	84.9
Yes	56	15.1
Performing muscular exercise		
Daily	48	13.0
1-3 times / week	103	27.8
No	219	59.2

Table (3) illustrates the trials of treatment of obesity among overweight and obese (n=370). Diet regulation was tried in more than half (57.3%) of patients while medical treatment was followed in only fifth (20.8%) and 15.1% tried surgical treatment of obesity. 13.0% of overweight and obese performing daily muscular exercise, 27.8% performing muscular exercise 1-3 times / week but unfortunately more than half (59.2%) don't perform any muscular exercise.

Table 4:- Relationship between sex and age group and body weight among the studied population

Variable	**Obesity**				**Total (n=592)**	**P value**
	Underweight (n=29)	**Normal (n=193)**	**Overweight (n=161)**	**Obese (n=209)**		
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**	
Sex						
Female	26(5.9)	159(35.8)	116(26.1)	143(32.2)	444(100.0)	0.002
Male	3(2.0)	34(23.0)	45(30.4)	66(44.6)	148(100.0)	
Age group						
15 – 25	16(7.1)	77(34.2)	43(19.1)	89(39.6)	225(100.0)	0.000
26 – 35	4(1.9)	57(26.5)	63(29.3)	91(42.3)	215(100.0)	
36 – 50	6(4.9)	48(39.3)	47(38.5)	21(17.2)	122(100.0)	
> 50	3(10.0)	11(36.7)	8(26.7)	8(26.7)	30(100.0)	

Table (4) demonstrates the relationship between sex and age group and body weight among the studied population. From the table it is clear that, 26.1% of females and 30.4% of males are overweight , on the other hand, 32.2% of females and 44.6% of males are obese. With statistically significant difference between males and females (P value = 0.002). As regards age, 39.2% of overweight were from the age group 26-35 years old and 29.2% from 36-50 years and least proportion (26.7%) aged 15-25 years. As regards obesity, the highest proportion (43.5%) were from the age group 26-35 years followed by 42.6% from the age group 15-25 years and least proportion (3.8%) aged more than 50 years

Table 5: History of childhood obesity, obesity in 1st degree relatives and takeaway meals and body weight among the studied population

	Body weight			Total (n=592)	P value
History of childhood obesity	Underweight (n=29) No. (%)	Normal (n=193) No. (%)	Overweight and obese (n=370) No. (%)	No. (%)	
Don't know	**28(96.6)**	**159(82.4)**	**129(34.9)**	**316(53.4)**	0.000
No	**1(3.4)**	**29(15.0)**	**190(51.4)**	**220(37.2)**	
Yes	**0(0.0)**	**5(2.6)**	**51(13.8)**	**56(9.5)**	
Obesity in 1st degree relatives					
Don't know	**3(10.3)**	**22(11.4)**	**32(8.6)**	**57(9.6)**	0.349
No	**8(27.6)**	**77(39.9)**	**128(34.6)**	**213(36.0)**	
Yes	**18(62.1)**	**94(48.7)**	**210(56.8)**	**322(54.4)**	
Takeaway meals					
Sometimes	**10(34.5)**	**118(61.1)**	**185(50.0)**	**313(52.9)**	
No	**1(3.4)**	**25(13.0)**	**90(24.3)**	**116(19.6)**	**0.000**
Yes	**18(62.1)**	**50(25.9)**	**95(25.7)**	**163(27.5)**	

Table (5) illustrates the relationship between history of childhood obesity, obesity in 1st degree relatives and takeaway meals and body weight among the studied population. 13.8% of obese have history of childhood obesity, 56.8% had family history of obesity in 1st degree relatives and 25.7% of overweight and obese prefer the takeaway meals .

Discussion:-

The present study was conducted in Arar city. Arar is the regional headquarters of the northern border province of Saudi Arabia. It has a watering station and a power station. It engages in a wide range of agricultural activities including the production of dates and the managing of livestock (camels, goats and sheep). Arar is the crossing point for many of the Iraqi pilgrims entering the Kingdom to perform Hajj.

Our study indicated high rates of overweight obesity in male and female population of Arar. Our findings showed that most Northern Saudis are physically inactive and don't perform regular muscular exercise.

In the current study, the overall prevalence of obesity was 35.3% and the overall prevalence of overweight was 27.2% .

The overall prevalence of overweight is less than findings of 2005 **[9]** study which reported prevalence of overweight 36.9%. The overall prevalence of obesity is in accordance with findings of 2005 **[9]** study (35.6%). while our figure was more than findings of 2013 study which found 28.7% of participants were obese (body mass index ≥30 kg/m^2) **[10].** These finding is in accordance also with Kavadar, et al, (2015) who found Mean (± SD) of BMI in non diabetic population were 28.2 ± 3.16 kg/m^2. **[12]**.

On the other hand, in the current study, 32.2% of females and 44.6% of males were obese while 26.1% of females and 30.4% of males were overweight. Our findings are also not in accordance with findings of 2005 study that females are significantly more obese with a prevalence of 44% than males 26.4% **[9]** and those estimated for 2010 study who reported 23% for males and 36% for females respectively **[13].**

This overall increase in obesity prevalence in Arar city is bad news for the Arar's, Saudis' health. Over the last decade, the Saudi Ministry Of Health has implemented several public health programs to reduce obesity. Most of these programs have focused on awareness and behavioral changes **[14**].

In the current study, 56.8% of overweight and obese had family history of obesity in 1st degree relatives which is supported by findings of Thirlby and Randall (2002) who reported that, about 85% of patients who are candidates for bariatric surgery have elements in their history to suggest a genetic risk for morbid obesity. About 15% have extremely strong genetic Obesity Risk Index **[17].**

Familial predisposition to obesity and related cardiovascular disease (CVD) complications constitute the presence of obesity and/or obesity-related complications in primarily blood-related family members **[18].**

In the current study, 13.8% of overweight and obese had history of childhood obesity, which is supported by findings of Indian study which reported that, Overweight children have an increased risk of being overweight as adults **[19].**

Conclusion and Recommendations:-

The results of this study indicate an increased rate of obesity and overweigh in the north population of KSA. With respect to these findings, Sex, age, history of childhood obesity, family history of obesity in 1st degree relatives are responsible for both overweight and obesity in the north of KSA. Therefore, a community-based multiple strategies are required to combat with increasing rate of obesity and its subsequent complications such as diabetes, coronary artery disease, hypertension and osteoarthritis.

Acknowledgment:-

The success and final outcome of this research paper required assistance from many people and I am extremely fortunate to have got this all along the completion of this work. My thanks go to Mohammed Faried Mourad, Sara A Alsaddique, Nawaf Abdullah Almohaisen and Faiz Faisal Alanazi (Intern, Faculty of Medicine, Alfaisal University, Riyadh, KSA)Ali GhannamAlmuhawwis, Othman Mashfi Alshammari, (6th year medical students, Northern Border University) and WalaaMohamed Bakr Ali for their cooperation in different steps of the research.