AMERICAN JOURNAL OF PHARMTECH RESEARCH

Journal home page: http://www.ajptr.com/

Evaluation of Obesity and Use of Weight Loss Methods with Relation to Sociodemographics

Ahmed A. Elberry[1,2*], Bayan Rambo[1], Hanan Abu-Rizaiza[1], Fairose Al-Shathli[1], Wedd Bahha [1], Ameen M. Almohamadi[1]

1 Department of Clinical Pharmacy, Faculty of Pharmacy, King Abdulaziz University, Jeddah21589, Saudi Arabia

2. Department of Pharmacology, Faculty of Medicine, Beni-Suef University, BeniSuef, Egypt

ABSTRACT

Obesity and its comorbidities represent major concern worldwide, so the aim of the current study is to investigate the prevalence of obesity and the use of weight loss medication in Saudi populations. A community-based, cross-sectional survey, conducted in Jeddah, Saudi Arabia from September to November 2013. Enrolled participant was asked to complete a self-administered questionnaire; the questionnaires were distributed to friends, relatives, and governmental sector hospitals. Body mass index (BMI) was used as an obesity indicator. A total of 312 participants were enrolled, 262 participants were included. The prevalence rate of overweight and obesity in the present study were 26% and 16.1%, respectively. Overweight and obesity prevalence were showed in age (36-45years) (34.6% and 42.2%), respectively. Surprisingly, 47.2 % of bachelor carriers did not know their IBW and 66.6% of participants with above bachelor degree were wrong about their IBW. 48.8% of the participants had no family history of obesity. Additionally, the current study showed that 22.5% had chronic diseases, 5% of them had diabetes. Regarding the use of weight loss managements, only 10% of the participants used pharmacological treatments, 25% used herbs and only 1.5% underwent a bariatric surgery. The current study revealed an increase in the prevalence of overweight and obesity among study participants that indicates the necessity of more population's education and governmental cooperation to increase the community awareness for the importance of doing physical activity and cut off dietary risk factors.

Keywords: obesity, weight loss medications, questionnaire, body mass index, Saudi Arabia

*Corresponding Author Email: berry_ahmed@yahoo.com

Received 20 February 2014, Accepted 28 February 2014

Please cite this article in press as: Elberry AA *et al* Evaluation of Obesity and use of Weight Loss Methods with relation to Sociodemographics. American Journal of PharmTech Research 2014.

INTRODUCTION

The prevalence of obesity in the United States increased during the last decades. According to the Centers for Disease Control and Prevention, 35.7% of adults and 16.9% of youths were obese in 2009–2010[1]. The worldwide prevalence of adult obesity 9.8% in men and 13.8% in women in 2008[2], while in Saudi Arabia, the prevalence of overweight and obesity were 33.6% &33.8%[3.] Hypertension, hyperlipidemia, insulin resistance, and glucose intolerance are all known cardiac risk factors that tend to cluster in obese individuals[4]. Current researches revealed that obesity is a multifactorial and can be affected by many factors, including genetic, demographic and lifestyle[5] Several studies have investigated the relationship between obesity and socioeconomic status [6, 7, 8.] Management of obesity includes exercise, diet, surgery, behavioral therapies, and pharmacological treatment. These approaches may be used alone or in combination for greater effectiveness[9]. Appropriate goals of weight management emphasize realistic weight loss to achieve a reduction in health risks[10]. Therefore the aim of the current study is to investigate the prevalence of obesity and to evaluate the use of weight loss methods among the population in Jeddah, Saudi Arabia. Moreover, the study investigates the correlation between obesity and different sociodemographic factors such as age, gender, race and educational level.

MATERIALS AND METHOD

The current study was a community-based, cross-sectional survey, conducted in Jeddah, Saudi Arabia from 30 September 2013 to 30 November 2013. A total of 262 Saudi adults aged ≥18 years were enrolled in the study. Each participant in the present study was asked to complete a self-administered questionnaire, available in both Arabic and English languages. The questionnaires were distributed to friends, relatives and governmental sector hospitals. The questionnaire did not include participant's name or any other identifying information and participants were not paid for participating in the study.

Anthropometric variables included body weight, height and body mass index, were completed by nurses, trained students or the researchers. Body weight was measured with the exact kilogram without shoes, using electronic weight measuring device. Height was measured to near centimeter with the subject in the full standing position without shoes using calibrated portable measuring rod. Using metric units, body mass index (BMI) is defined as weight in kilograms divided by height in meters squared (kg/m^2). Those with a BMI of 18.5-25 are considered to have "normal" weight; overweight, obese, and severely obese are reserved for those with a BMI of 25- 30, 30- 40, and over 40, respectively[4]. Data were expressed as absolute numbers and

percentages and were analyzed descriptively. The questionnaire used in the present study consisted of three main sections. The first section concerned about demographic data. The second section of the questionnaire was concerned with life style, while the third section of the questionnaire was concerned about drugs or other methods used to lose the body weight (table 1).

Table 1: The survey questions

First section
Name (optional)
Age
Gender
Race
Nationality
Height
Weight
Do you know your ideal body weight?
If yes: IBW
BMI
Educational level
Work description
Living income
Marital status
Second section
1- Are you a smoker?
2- Do you have any chronic disease?
3- Do you exercise?
4- Do any of your relatives suffer from obesity?
5- Do you consider yourself obese?
Third section
1- Have you ever been on a diet?
2- Have you ever taken any medication to reduce weight?
3- Do you know what the name of the medicine is?
4- How long did you use it?
5- From where did you get the medicine?
6- Was the medicine effective?
7- Did you notice any side effects?
8- Did you rely on the drug alone?
9- Did you ever take any herbs to lose weight?
10- From where did you get the herbs?
11- Did you ever undergo bariatric surgery?

Participants were categorized into several categories as showed in the questionnaire according to their age, race, nationality, body mass index, educational level, nature of work, income level,

family history and marital status.

Regarding participants' age, they were categorized into four groups (18-25), (26-35), (36-45) and above 45, They were also divided by BMI into five groups; underweight, normal, overweight, obese and extreme obese. Educational level was divided into 3 categories, patients who did not complete their education after high school, patients who have bachelor degree and patients who complete their education after the bachelor. Income level was also categorized into low, average and high. Marital status was classified into single and married.

Family history was categorized into first, second degree relatives and others (the first degree relative was defined as close blood relative which include the individual's parents, full siblings or children, while the second degree relative was defined as blood relative which includes the individuals grandparents, grandchildren, aunts, uncle, nephews and nieces).

RESULTS AND DISCUSSION

From a total of 312 participated in the present study, 262 participants were enrolled in the analysis as 50 were excluded because of incomplete information. The current study showed that the mean height and weight were 161±15 cm and 83±13 kg respectively. The highest number of participants were normal 134 (51.1%), 18 (6.9%) were underweight, 68 (26%) were overweight, and 42 (16.1%) were obese and extremely obese (figure 1).

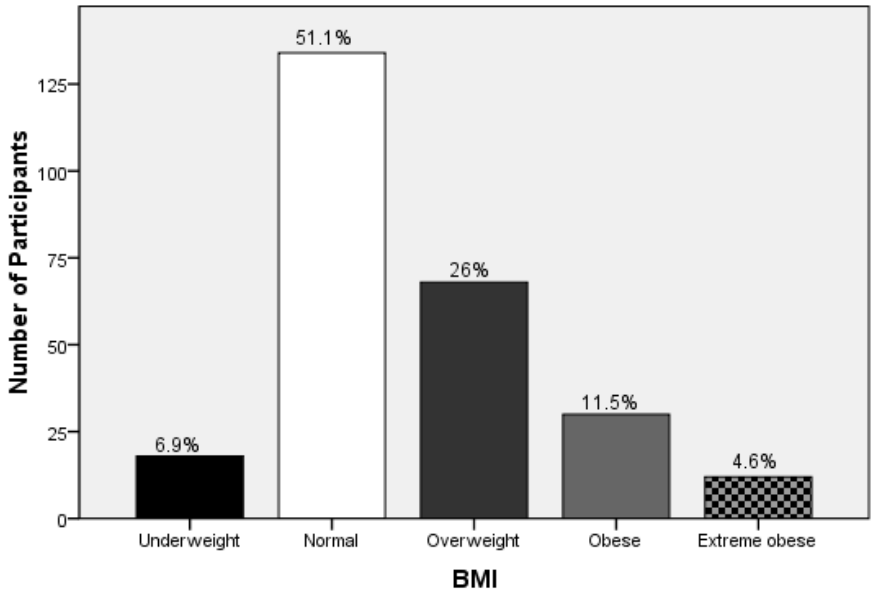

Figure 1. Body Mass Index (BMI) Among Participants

In contrast, another Saudi study by Habib [3] showed that the prevalence of overweight and obese were 33.6% and 33.8%, respectively. However, these differences may be attributed to having a larger sample size in Habib's study [3] and that the current study included all the community

population, Saudi and non-Saudi. Moreover, data from the National Health and Nutrition Examination Survey in U.S, 2011-2012 and Ogden et al [11] found that more than one-third (34.9%) of adults were obese in 2011-2012.

Figure 2 shows the correlation between BMI and self-categorization. From underweight participants, 5.5 % miss categorized themselves as obese, 11.9% of normal weight participants were miss categorized themselves as obese. On the other hand, among actual obese participants, 13.3% miss categorized themselves as normal and from extremely obese participants 25% miss categorized themselves as normal. However, among actual overweight participants equal percent were seen, 50% miss categorized themselves as normal and 50% miss categorized themselves as obese.

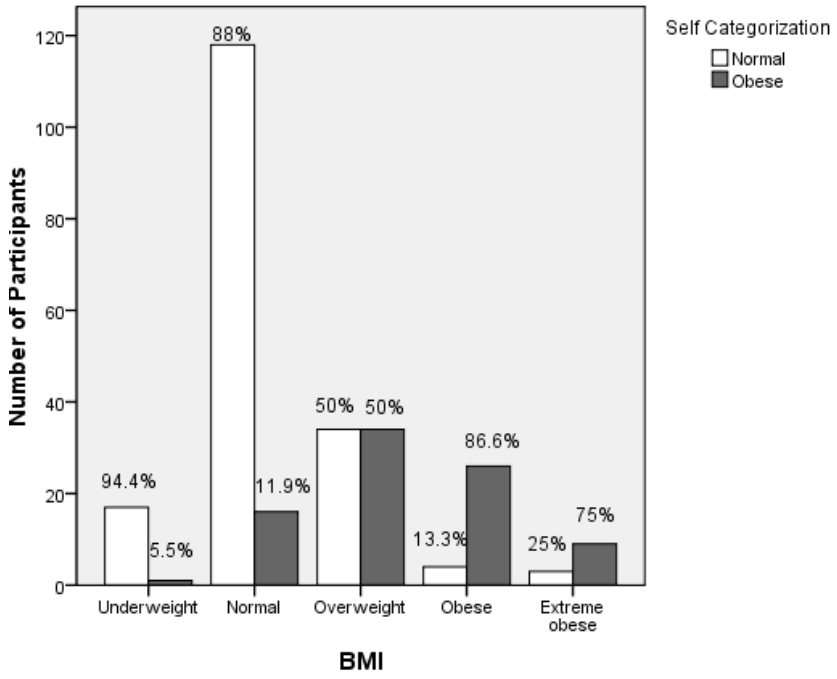

Figure 2.The association between BMI and Self Categorization.

The descriptive sociodemographic characteristics and relationship to body weight are shown in table 1. In comparison with earlier Ogden study[1] conducted to evaluate the prevalence of obesity 2009–2010, highest prevalence of obesity were found with age of ≥60 (39.7%) and the lowest prevalence were in age of 20-39 (32.6%) [11]. In contrast, the results in the current study showed highest prevalence of obesity in age (36-45) and lowest with age over 45 years. Similarly, the previous Ogden's study (2013) found that the obesity prevalence were highest among middle-aged adults (39.5%) than among younger (30.3%) or older (35.4%) adults. These differences in the results may be attributed to differences in time of conduction of the studies as the U.S studies were conducted in 2011-2012, having different culture, life styles, age group categories and the

huge sample size that was studied in the US studies. Moreover, an Egyptian study showed that overweight and obesity was peaking in the upper-middle age groups of 40–49 and 50–59 years, then tapering among those over 60 years and half of normal weight subjects were found in the younger age groups less than 40 yrs.[12]

Table 1.Demographic Characteristics of participants

Variables, No.(%)	Underweight No.(%)*	Normal No.(%) *	Overweight No.(%)*	Obese No.(%)*	Extreme obese. No.(%) *
Total	18	134	68	30	12
Age(years)					
18-25 , 170 (64.9)	17(10)	106(62.3)	36(21)	9(5.2)	2(1.17)
26-35, 38 (14.5)	1(2.6)	16(42.1)	13(34.2)	3(7.89)	5(13.1)
36-45, 26 (9.9)	0(0)	6(23)	9(34.6)	10(38.46)	1(3.8)
>45(28), 28 (10.7)	0(0)	6(2.3)	10(3.8)	8(3.1)	4(1.5)
Gender					
Male 90 (34.4)	6(6.6)	43(47.77)	24(26.66)	13(14.44)	4(4.44)
Female 172 (65.6)	12(6.9)	91(52.9)	44(25.5)	17(9.88)	8(4.6)
Race					
White 238(90.8)	17(7.14)	126(52.9)	61(25.6)	25(10.5)	9(3.78)
Black 24(9.2)	1(3.44)	8(33.3)	7(29.16)	5(20.8)	3(12.5)
Nationality					
Saudi 205(78.2)	16(7.8)	113(55.12)	53(25.85)	15(7.3)	8(3.9)
Non-Saudi 57(21.8)	2(3.5)	21(36.84)	15(26.3)	15(26.3)	4(7.0)
Educational level					
Less than BA 50(19.1)	1(2)	19(38)	12(24)	14(28)	4(8)
BA 203(77.5)	16(7.88)	111(54.6)	54(26.6)	15(7.3)	7(3.44)
Above BA 9(3.4)	1(11.1)	4(44.4)	2(22.22)	1(11.1)	1(11.1)
Nature of work					
Unemployed 181(69.1)	16(8.8)	99(54.6)	44(24.3)	17(9.39)	5(2.7)
Office work 33(12.6)	0(0)	11(33.33)	11(33.33)	4(12.1)	7(21.21)
Field work 48(18.3)	2(4.1)	24(50)	13(27)	9(18.7)	0(0)
Income level					
Low 7(2.7)	0(0)	2(28.57)	2(28.57)	3(42.8)	0(0)
Average 221(84.4)	14(6.33)	116(52.48)	54(24.4)	26(11.7)	11(4.9)
High 34(13)	4(11.76)	16(47)	12(35.29)	1(2.9)	1(2.9)
Marital status					
Single 178(67.9)	17(9.55)	103(57.8)	40(22.47)	14(7.8)	4(2.2)
Married 84(32.1)	1(1.19)	31(36.9)	28(33.33)	16(19)	8(9.5)
Smoking					
Smoker 35(13.4)	4(11.4)	15(42.85)	12(34.28)	3(8.57)	1(2.8)
Non Smoker 227 (86.6)	14(6.1)	119(52.4)	56(24.66)	27(11.8)	11(4.8)
Having Chronic Disease 59(22.5)	3(5)	19(32.2)	19(32.2)	12(20.3)	6(10.1)
Exercising 125(47.7)	10(8)	67(53.6)	27(21.6)	13(10.4)	8(6.4)

* The number and percent in each column are corresponded to the number and percent in the variable column

Regarding the association between gender and obesity, the previous mentioned U.S study[1] showed that there was no significant difference in prevalence between men and women at any age and this was in accordance with the results of the current study which revealed that both females and males have close overweight prevalence. On the other hand, another Chinese study showed that female had higher prevalence of overweight and general obesity (35.1% and 9.7%) than males (32.0% and 6.7%) [13] Moreover, another study in north-eastern Nigeria evaluated the prevalence of overweight and obesity showed that 40.6% of men were either overweight or obese, while 51.9% of women were either overweight or obese [14] These dissimilarities may be due to differences in ethnicity, races and lifestyle factors.

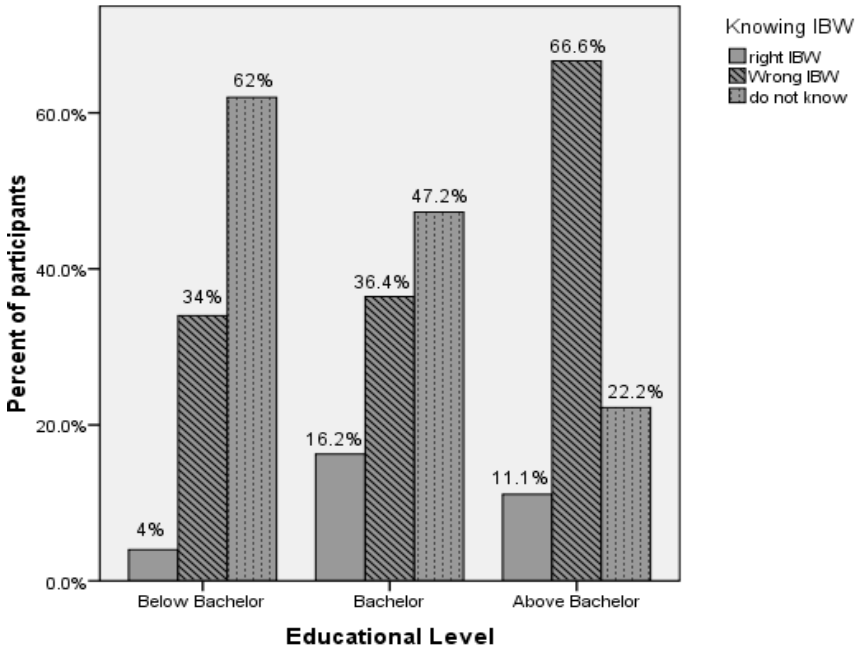

Figure 3.The association between educational level and the knowledge of ideal body weight

Figure 3 showed the correlation between Educational level and knowledge of IBW, among participants having below bachelor degree, 4% knew their right IBW, 34% were wrong and majority of them 62% did not know their IBW. For bachelor degree carriers, 16.2 % knew their right IBW, 36.4% were wrong and 47.2% did not know it. On the other hand, 66.6% of highest education participants with degree above bachelor knew the wrong IBW, 22.2% did not know it and only 11.1% knew their right IBW. Jin et al [13] suggested that educational level was negatively associated with general obesity and among women but positively associated with abdominal obesity among men. In contrast, a study conducted in Iran by Maddah et al. [15] showed that prevalence of overweight and obesity was positively related to educational level in men, the lowest rate of overweight/obesity was observed in very low educated men and very high

educated women. Another study done in Egypt by Mowafi et al. (2014) demonstrated that high percentage of both men (62.1%) and women (40.8%) had at least high school education. Women with greater than a high school education were three times more likely to be normal weight compared with women with a high school education or less [12]. Comparing with the previous Iranian and Egyptian studies, the present study did not categorize the participants according to the gender, instead the study found the association between educational level and weight status, the highest prevalence of obesity was found in participants with low education (below bachelor degree).

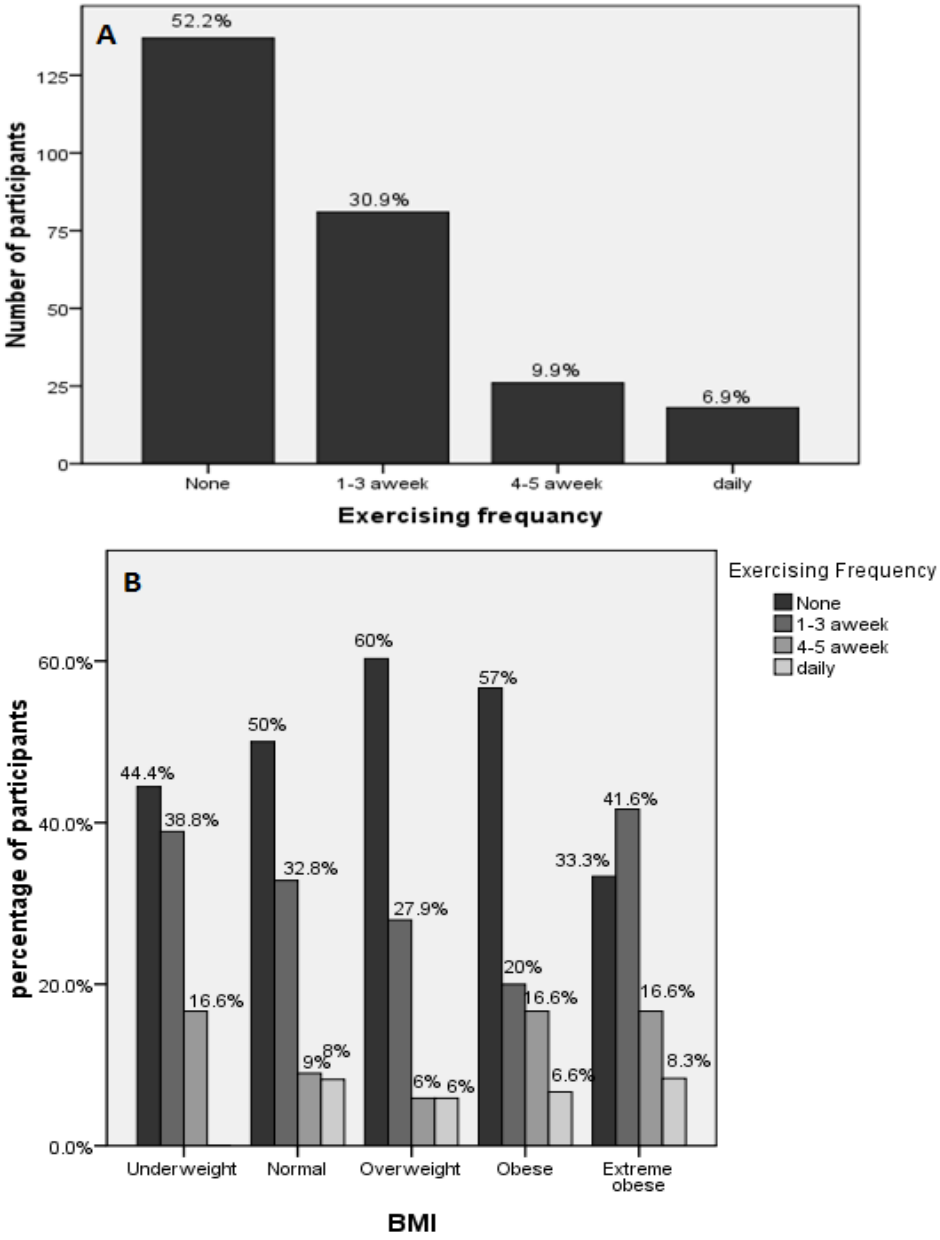

Figure 4.Exercising among all participants (8A) and in relation to BMI (8B)

A study that conducted by Charles et al [16] showed that adult body weight and obesity are negatively related to social and economic advantage for most groups. Controversially, an Iranian study by Maddah et al. [15] suggested that the prevalence of overweight and obesity was higher in women living in high income area than those who live in low income area. The present study showed that higher prevalence of obesity was found in participants with average income level, while low income had 42.7% obese and extreme obese and high income level showed 5.8%.

Regarding life style and physical activity among all participants, 137 (52.3%) do not exercise while 81 (30.9%) exercise 1-3 times a week, 26 (9.9%) exercise 4-5 times a week and 18 (6.9%) exercise daily (Figure 4A). Figure 4B showed the association between BMI and physical activity among study participants. 47.7% of study participants were exercising. Surprisingly, extremely obese participants were has the highest percentage of exercising 66.5%, overweight participants were having the lowest percentage of exercising 39.9%. Among overweight participants 38.8% and 16.6% were exercising 1-3 times a week and 4-5 times a week, respectively. For obese participants 20%, 16.6% and 6.6% were exercising 1-3 a week, 4-5 times a week and daily, respectively. Among extremely obese participants, 41.6% were exercising 1-3 a week, 16.6% were exercising 4-5 a week and 8.3% were exercising daily.

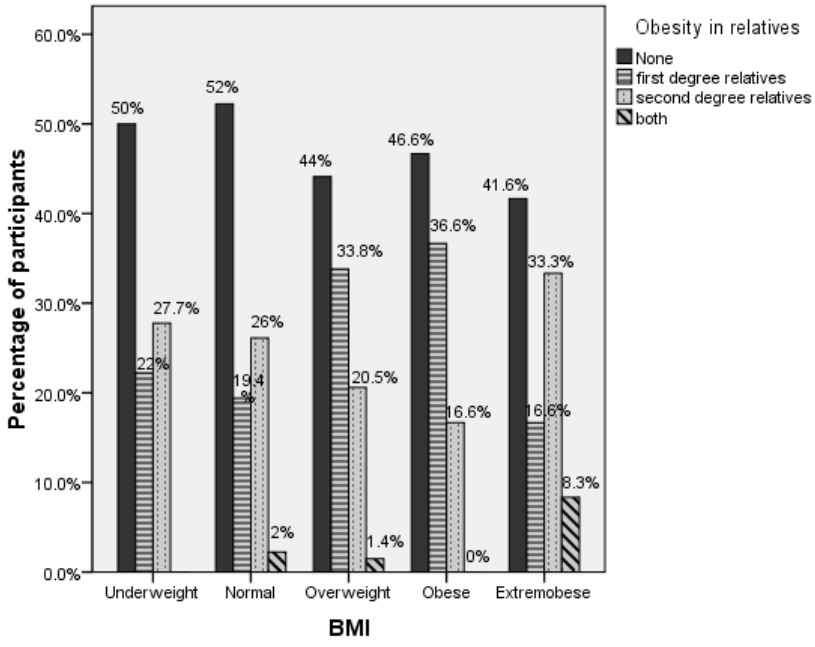

Figure 5. The association of obesity(BMI) and family history

The current study showed the correlation between obesity and family history (figure 5). 48.8% of the participants does not have family history of obesity, while participants who has positive family history, has similar percentage between first and second degree relatives 25.1% and 24%,

respectively. Only 1.9% of the study participants have both first and second degree obese relatives. Higher percentage of first degree obese relatives was seen in overweight and obese participants (33.8% and 36.6%, respectively). Higher second degree obese relatives seen in extremely obese participants 33.3%, lower in underweight and normal participants (27% and 26%, respectively), and lowest with overweight and obese participants with 20.5% and 16.6% respectively.

The present study showed that 22.5% of the participants had chronic associated diseases including diabetes mellitus 13 (5%), hypertension 6 (2.3%), 29 (11.1%) and other chronic diseases, while 11 (4.2%) have more than one comorbidities (table 3). Highest diabetic percentage of participants was among extremely obese participants then in obese participants and lower in overweight participants. Among overweight participants, 27.9% had chronic diseases, 3 (4.4%) were diabetics, 4 (5.8%) were hypertensive, and 8 (11.7%) had other chronic diseases while 4 (5.8%) had more than one comorbidity. For obese participants, 40 % had chronic diseases, 2 (6.6%) were diabetics, 1.5 % were hypertensive, and 26.6% had other conditions while only 1 (1.5%) have more than one comorbidity. Among extremely obese participants, 33.3% were diabetics, 50% were having more than one comorbidity and 16% had other comorbidities. The other chronic conditions were asthma, thyroid irregularity, hepatitis, anemia, polycystic fibrosis, renal insufficiency and others.

Table 3. Association between obesity and chronic diseases

	Total	**Extreme obese No(%)**	**Obese No(%)**	**Overweight No(%)**	**Normal No(%)**	**Underweight No(%)**
203	6(50)	18(60)	49(72)	115(85.8)	15(83.3)	None
3	2(16.6)	2(6.6)	3(4.4)	6(4.4)	0	Diabetes
6	0	1(3.3)	4(5.8)	1(0.7)	0	Hypertension
29	1(8.3)	8(26.6)	8(11.7)	9(6.7)	3(16.6)	Other
11	3(25)	1(3.3)	4(5.8)	3(2.2)	0	More than one
262	12	30	68	134	18	Total

A study by Astrup et al [17] revealed that there was a strong association between excess body fatness and type 2 diabetes. Obesity is usually linked to diabetes because both are caused by lifestyle factors such as high-fat diet and low physical activity. Therefore, weight loss by pharmacological or surgical treatments can improve but does not normalize these factors and it can also prevent or reverse type 2 diabetes. Similarly, the current study showed the association between obesity and diabetes as 4.4%, 6.6% and 16.6% of the overweight, obese and extremely obese participants were diabetics. Surprisingly, the present study showed that the prevalence of hypertension was unlinked to IBW. This was in accordance with the results of the study of Mark

et al [18] which focused on the sympathetic, vascular and renal mechanism of leptin and melanocortin receptor agonist, and suggested that obesity not consistently associated with increase blood pressure

After lifestyle modification, pharmacotherapy is the second step in the treatment of obesity and it is indicated only when weight loss targets are not achieved[19]. The present study found that 90% of the participants have not use any medication to lose weight, none of the underweight participants used any weight loss medication, while 8 (5.9%) of normal weight participants took medications to lose weight, the prevalence of participants who used medication to lose weight were almost similar in overweight, obese and extreme obese participants (16.17%, 16.66% and 16.66% respectively). In the present study, Xenical (orlistat) has the highest number of usage among participants who use weight loss medication 9\26 (34%) followed by Chitosan 2\26 (7.6%) and one patient used Hi-chrome. In contrast, another study done in the United States revealed that the use of prescription orlistat and sibutramine was relatively uncommon, while the most commonly used drug was phentermine[20]. Several studies have demonstrated the efficacy of orlistat in the treatment of obesity with improvement of associated dyslipidemia[21]. 26.9% of participants who used medications were using prescribed drugs by dietitians or specialist, while 73% were taking non prescribed medications (Pharmacist, family and friends or internet) (table 4).

Table 4. Association between (BMI) and usage of weight loss medications

	Total	**Extreme obese No(%)**	**Obese No(%)**	**Overweight No(%)**	**Normal No(%)**	**Underweight No(%)**
236	10(83.3)	25(83.8)	57(83.8)	126(94)	18(100)	No medication used
9	1(8.3)	1(3.3)	4(5.8)	3(2.2)	0	Xenical (Orlistat)
2	0	0	1(1.4)	1(0.7)	0	Chitosan
1	0	0	0	1(0.7)	0	Hi-chrome(Chromium)
4	1(8.3)	0	2(2.9)	1(0.7)	0	Do not know the name
1	0	0	1(1.4)	0	0	More than one medication
9	0	4(13.3)	3(4.4)	2(1.4)	0	Others
262	12	30	68	134	18	Total

Only 66 (25%) of study participants took herbs to lose weight, the prevalence of usage of weight loss herbs was similar in both obese and extreme obese participants (40% and 41.6% respectively), lower with normal weight participants (19.4%) and lowest with underweight group 5.5%. Green tea was the most used herb 37\66 (56%) among participants, while 3\66 (4.5%) used senna and only one participant used sage alone. Moreover, 19\66 (28.7%) were using mixture of herbs and 6\66 (9%) used other herbs. 1.5% of participants who used herbs to lose weight were taking it by specialist prescription, while 54.5% were taking non prescribed herbs

(3% from herbalist and 51.5% from family and friends) (table 5). Since green tea was the mostly used herb among the participants in the current study, a study tested green tea on mice that compared obese versus lean mice found that significant decrease in body weight of both groups [22] on the other hand, sage may be effective and safe in the treatment of hyperlipidemia with no adverse effects[23]. Although senna was used to lose weight in our population, it was mainly indicated and used as a laxative and anti-inflammatory in most studies [24].

Table 5. Association between (BMI) and usage of weight loss herbs

	Total	Extreme obese No(%)	Obese No(%)	Overweight No(%)	Normal No(%)	Underweight No(%)
196	7(58.3)	18(60)	46(67.6)	108(80.5)	17(94.4)	No Herb used
1	0	0	0	1(0.7)	0	Sage
3	0	0	1(1.4)	2(1.4)	0	Senna
37	2(16.6)	1(3.3)	16(23.5)	17(12.6)	1(5.5)	Green tea
6	0	4(13.3)	0	2(1.4)	0	Other
19	3(25)	7(23.3)	5(7.3)	4(2.9)	0	More than one
262	12	30	68	134	18	Total

The majority of the participants did not do and bariatric surgery 258 (98.5%), only five participants did it (1.5%), two participants made gastric band, one participant did gastric bypass and one participant did more than one surgery.

The limitation of the present study was that, the relatively small sample size and that it was done only in one city in Saudi Arabia (Jeddah). Moreover, we were unable to measure the anthropometrics measures for all participants; instead it was self-reported for most participants. Finally, obesity was just measured by only IBW rather than measuring waist circumference and body fat percentage.

CONCLUSION

In conclusion, the current study revealed alarming increase in the prevalence of overweight and obesity among study participants, with relation to age, level of income and educational level. It is recommended that further studies with larger sample size to be done to focus on more socioeconomic factors and to use other measures of obesity. Moreover, the present study has been shown that the Saudi population needs more education about their weight status and how to evaluate it, and more education about how physical activity is beneficial for them. It is also recommended to have more governmental programs to help in losing weight and to cut off the huge numbers of fast food restaurants.

REFERENCES

1. Ogden C, Carroll M, Kit B and Flegal K. Prevalence of Obesity in the United States,

2009–2010, NCHS Data Brief2012;82:1-8.

2. Finucane M, Stevens G, Cowan M, Danaei G, Lin J, Paciorek C, Singh G, Gutierrez H, Lu Y, Bahalim A, Farzadfar F, Riley L and Ezzati M., National, regional, and global trends in body-mass index since 1980: systematic analysis of health examination surveys and epidemiological studies with 960 country-years and 9·1 million participants, Lancet 2011;377(9765): 557 – 567.
3. Habib S. Body mass index and body fat percentage in assessment of obesity prevalence in saudi adults, Biome d Environ Sci2013; 26(2):94-99.
4. Peter J and Billington C. Obesity, Pharmacotherapy A Pathophysiologic Approach, By Dipiro J, Talbert R, Yee G, MatzkeG,Wells B and Posey L(edrs),7th edition, McGrow-Hill, united States, 2008,chapter148.
5. Barlow SE. Expert Committee: Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report. Pediatrics 2007, 120 (4):S164–S192.
6. Monteiro CA, Moura EC, Conde WL, Popkin BM. Socioeconomic status and obesity in adult populations of developing countries: a review. Bull World Health Organ 2004; 82 (12): 940-6.
7. Mendez MA, Monteiro CA, Popkin BM. Overweight exceeds underweight among women in most developing countries. Am J ClinNutr 2005;81(3):714–21.
8. Martorell R, Khan LK, Hughes ML, Grummer-Strawn LM. Obesity in women from developing countries.Eur J ClinNutr 2000;54(3):247–52.
9. Ioannides-Demos L, Piccenna L, and McNeil J. Review Article Pharmacotherapies for Obesity: Past, Current, and Future Therapies, Journal of Obesity,2011:1-18
10. Tsigos C. Hainer V. Basdevant A. Finer N. Fried M. Mathus-Vliegen E. Micic D. Maislos M. Roman G. Schutz Y. Toplak H. Zahorska-Markiewicz B. Management of obesity in adults: European clinical practice guideline. Obesity Facts 2008;1:106-116.
11. Ogden C, Carroll M, Kit Band Flegal K. Prevalence of obesity among adults: United States, 2011-2012, NCHS Data Brief2013;131:1-8.
12. 12.MowafiM ,Khadr Z , Kawachi I , Subramanian S ,Hill A and Bennett G. Socioeconomic status and obesity in Cairo, Egypt: A heavy burden for all, J Epidemiol Glob Health. 2014;4(1):13-21.
13. Jin M, Chen B, Mao Y, Zhu Y, Yu Y, Wu1 Y, Zhang M, Zhu S and Chen K. Prevalence of Overweight and Obesity and Their Associations with Socioeconomic Status in a Rural

Han Chinese Adult Population, PLOS ONE 2013;(11):1-9.

14. .Gezawa I, Puepet F, Mubi B, Uloko A, Bakki B, Talle M and Haliru I. Prevalence of overweight and obesity in Maiduguri, North-Eastern Nigeria, 2013;22(3):171-174.
15. 15.Maddah M and Solhpour A. Obesity in relation to gender, educational levels and living area in adult population in Rasht, northern Iran, Elsevier Ireland 2009:310-311
16. Charles L and Christopher J. Age, socioeconomic status and obesity growth, Journal of Health Economics *28* (2009) 635–648
17. Astrup A. Redefining type 2 diabetes: 'Diabeity' or Obesity dependent diabetes mellitus. Obesity reviews 2000;1:57-59.
18. Mark AL, Correia M, Morgan DA, Shaffer RA, Haynes WG. Obesity-induced hypertension: new concept from the emerging biology of obesity. Hypertension 1999;33:537-541.
19. .Baretić M. Obesity drug therapy, Minerva Endocrinol.2013 ;38(3):245-54.
20. Hampp C, Kang E and Borders-Hemphill V. Use of prescription antiobesity drugs in the United States, Pharmacotherapy, The Journal of Human Pharmacology and Drug Therapy2013 ; 33(12):1299-307.
21. McDuffie J, Calis K, Uwaifo G, et al. Three-month tolerability of orlistat in adolescents with obesity-related comorbid conditions. Obes Res 2002;10(7):642–650.
22. Bruno R, Dugan C, Smyth J, DiNatale D and Koo S. Green tea extract protects leptin-deficient, spontaneously obese mice from hepatic steatosis and injury. J Nutr 2008; 138: 323-331
23. Kianbakht S1, Abasi B, Perham M, HashemDabaghian F.Antihyperlipidemic effects of Salvia officinalis L. leaf extract in patients with hyperlipidemia: a randomized double-blind placebo-controlled clinical trial.Phytother Res. 2011;25(12):1849-53.
24. Guarize L, Costa J, Dutra L, Mendes R, Lima I and Scio E, Anti-inflammatory, laxative and intestinal motility effects of sennamacranthera leaves, Nat Prod Res. 2012;26(4):331-43.