Association of weight misperception with weight loss attitudes, behaviors and psychological distress in Saudi adult population.

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Abstract

Misperception of body weight has become common in the global world and may affect motivation to lose weight particularly in overweight and obese subjects, leads to psychological distress. With the growing prevalence of obesity in Saudi Arabia, there is an urgent need of exploring the determination of serious epidemic. We investigate the prevalence of weight misperception with weight loss attitudes, behaviors' and psychological distress in Saudi medical students. A cross-sectional study was conducted in primary care clinic at King Saud University Medical City during 2015-2016. In this study, 446 subjects were enrolled with an age range of 18-60 years of both genders. Data was collected by well-designed questionnaire and with International Physical Activity Questionnaire (IPAQ) and Kessler 10 scale (K10) for psychological assessment. The prevalence of misperception was 63.9%. Weight underestimation was present mostly in the female, young aged, married, high monthly family income and obese. There was a significant correlation between misperception and BMI (p ≤ 0.001). No association was observed in psychological distress, and weight misperception (p=0.258), and the effect of chronic diseases was a significant predictor of IPAQ (p ≤ 0.001). Misperception of body weight is common among Saudis. Although most of our studied population wants to lose weight, they had sedentary life style and imbalance diet. Understanding the cultural context of obesity in Saudi community and targeting misperception may facilitate the advice of healthy lifestyle behaviors and improve the effectiveness of obesity interventions.

Introduction

Weight misperception can ensue when the person's perceived weight differ through the status of initial weight [1]. The growth of medical complication risks prone on account of Body Mass Index (BMI) and abdominal obesity. Overall, 85%, 50% Type 2 Diabetes Mellitus patients are overweight and obese. The adult prevalence of obesity was estimated to be 63.6% in Saudi Arabia; females (71%) were more prone than males in obesity (56%) [2]. Overweight and obesity prevalence was confirmed as 23% and 9% in school children [3]. Obesity is significantly associated with increase the risk of more than 20 chronic diseases such as Type 2 Diabetes Mellitus, Coronary heart disease, heart disease, blood pressure, stroke, abnormal body fats, metabolic syndrome, cancer, osteoarthritis, sleep apnea, obesity hypoventilation syndrome, gout, reproductive problems in female, gall stones, gall bladder, gestational diabetes, congenital heart and kidney diseases. T2DM prevalence was majorly prone in Saudi adult population due to obesity risk factor [4-6]. Underestimation of body weight in overweight and obese population might lead to

decreased motivation to lose weight [5,6]. Individuals have confirmed more misperceive themselves due to the physical activity [7]. Misperception status for the genuine body may be an important factor to understand weight control-related behaviors [8]. Earlier studies confirm parents' fail to identify their offspring's overweight due to their weight, child's gender, younger age and many other factors [9]. Results of Al-Qauhiz [10] studies confirm misperception rate was found 54.2% in overweight and 17.4% of obese female students in Riyadh provenance. So, we aim to investigate the prevalence of weight misperception with weight loss attitudes, behaviors' and psychological distress in Saudi medical students.

Methodology

Study design and setting

A quantitative observational cross-sectional study was conducted at primary care clinics in King Saud University Medical City (King Khalid university hospital) which is one of the leading teaching hospitals in Riyadh, Saudi Arabia. Data

was collected in November 2015 March 2016. This study has Institutional Review Board (IRB) approval from the research ethical committee of College of Medicine, King Saud University.

Study population

The population included Saudi adult (aged 18 to 60 years) of both genders. Pregnant, lactating women, psychiatric patients and those on psychiatric medications were excluded from the study. Sampling method was consecutive non-randomize technique. Based on Duncan et al. [11] study sample size was calculated using one-way proportion equation (N=(Z2α) (P (1-P)/D2) and collected 446 samples as estimated with 95% confidence level and 5% precision.

Data collection

Well-design questionnaire was prepared by the research team using International scales to measure psychological distress and physical activity. Outcome variables are weight misperception, behaviors, attitudes for losing weight, psychological distress, dietary inquiry and physical activity. Age, gender, marital status, the level of education and monthly family income are documented as demographic variable data and order to avoid duplication of collected data; we set the participant medical file number as a unique identifier. The unpublished pilot study had conducted to know the estimation time to fill questionnaire and average estimated time for completion of the questionnaire was 10-15 minutes.

Anthropometric measurements

Qualified nurses have measured anthropometric measurements through height in centimeters and weight in kilograms. Height and weight were measured without shoes and with light clothes through stadiometer and electronic scales [12,13]. Body Mass Index (BMI) was calculated using weight in kilograms divided by squared height in meters. Body status classified according to BMI into 4 categories: underweight (BMI $\leq$ 18.5 kg/m^2), normal (BMI between 18.5–24.9 kg/m^2), overweight (BMI 25–29.9 kg/m^2), obesity (BMI $\geq$ 30 kg/m^2) [14].

Measurement of weight

The status of weight perception and misperception was calculated with figure risk scale [15]. This scale consists of seven body sizes accounted for gender's (males and females) physical appearance graded from 1-9. Picture of bodies' interpretation was: 1, 2 categorized as underweight; 3-5 denoted normal weight; 6, 7 represents as overweight and 8, 9 were confirmed as obese. The participants were asked to choose the body that looks close to them. Misperception was considered when there is disagreement between the calculated BMI and the selected body that looks like them.

The participants have answered several quires regarding weight loss attitudes and behaviors such as laxative, herbs and fasting for a long time which was unhealthy weight loss behaviors [16,17].

Measurement of psychological distress

Kessler et al. [18] 10 Scale (K10) was used to evaluate psychological distress in the selected participants. Validated Arabic version was used due to its simplicity in measuring general distress, designed for quality frequency and severity of anxiety related symptoms experienced in the four weeks before screening. The similar scale has been reported earlier in Saudi studies [19,20], consists of ten different questions, and each of them was scored on Likert scale ranging from 1-5 (none of the time all of the time). The lowest possible score was 10, and the highest possible score was 50. Lower K10 scores indicate a lower level of psychological distress while higher scores indicate a greater level of psychological distress.

Diet and physical activities

Participants questionnaire consists of variable questions for spotting their eating and drinking habits, an Arabic form "International Physical Activity Questionnaire" (IPAQ) was used [21] to measures the intensity and frequency of physical activity during last seven days in adult population ranging from 15-69 years. The important factor of this questionnaire was to obtain data used for comparing internationally on health-related physical activity. Another phase in the questionnaire consists of knowledge regarding BMI which links up with diet and physical activity.

Statistical analysis

Statistical Package for Social Sciences (SPSS) version 21 was used for data entry and analysis. We assessed the prevalence (data frequency and percentage) of misperception, BMI groups, Wight loss behaviors and attitudes, dietary intake and physical activity among our studied sample. No missing values or duplicated cases are recorded. Descriptive analyses (Chi-Square test) were used to examine associations between Misperception and (actual BMI, psychological distress, weight loss behaviors and attitudes). P<0.05 is considered as statistical significance level. We tested for interactions between groups of misperception with all the socio-demographic variables (age, sex, marital status, education level and monthly family income) and chronic diseases.

Results

Characteristics of study population

A total of 446 Saudi adults were enrolled in this study. The mean age was about 37 years. Socio-demographic characteristics were shown in (Table 1). Prevalence of misperception was 63.9%. Men and women who misperceive themselves were (51.8% and 74%) respectively with (p<0.001). Weight misperception was associated with socio-demographic factors as sex, age, marital status, occupation, educational level and monthly family income. The 40-49 years of age groups have more misperception than the other age group (p $\leq$ 0.001). As per educational levels, university graduates have additional realistic perceptions (p $\leq$ 0.001)

compared to others. Participants with monthly income more than 10,000 SR were more likely to have misperception (p<0.05). There was no significant relationship between misperception and chronic diseases (p>0.05).

Table 1. Association between self-perception and socio-demographic characteristics of studied sample Saudi Adult, Riyadh (2016) (n=446).

Variables	Self-perception			Total	
	Under estimation	Acceptable	Over estimation		
Sex freq. (within sex (%))					≤ 0.001*
Male	101 (49.8)	98 (48.3)	4 (2)	203 (100)	
Female	176 (72.4)	63 (25.9)	4 (1.6)	243 (100)	
Age freq. (within age (%))					≤ 0.001*
18-29 years	84 (47.5)	88 (49.7)	5 (2.8)	177 (100)	
30-39 years	55 (67.1)	27 (32.9)	0 (0)	82 (100)	
40-49 years	69 (80.2)	16 (18.6)	1 (1.2)	86 (100)	
50-60 years	69 (68.3)	30 (29.7)	2 (2)	101 (100)	
Marital status freq. (within marital status (%))					≤ 0.001*
Single	77 (46.1)	86 (51.5)	4 (2.4)	167 (100)	
Married	178 (71.5)	67 (26.9)	4 (1.6)	249 (100)	
Divorced	9 (64.3)	5 (35.7)	0 (0)	14 (100)	
Widowed	13 (81.3)	3 (18.8)	0 (0)	16 (100)	
Education level freq. (within education level (%))					≤ 0.001*
Can't read or write	9 (90)	1 (10)	0 (0)	10 (100)	
Read only	8 (80)	2 (20)	0 (0)	10 (100)	
Primary education	17 (70.8)	7 (29.2)	0 (0)	24 (100)	
Intermediate education	29 (82.9)	6 (17.1)	0 (0)	35 (100)	
High school education	65 (69.9)	24 (25.8)	4 (4.3)	93 (100)	
Diploma	26 (70.3)	11 (29.7)	0 (0)	37 (100)	
University education	101 (49.3)	100 (48.8)	4 (2)	205 (100)	
Post graduate education	22 (68.8)	10 (31.3)	0 (0)	32 (100)	
Occupation freq. (within occupation (%))					≤ 0.001*
Unemployed	16 (51.6)	15 (48.4)	0 (0)	31 (100)	
Housewife	94 (79.7)	21 (17.8)	3 (2.5)	118 (100)	
Student	39 (42.4)	50 (54.3)	3 (3.3)	92 (100)	
Governmental employee	80 (60.6)	51 (38.6)	1 (0.8)	132 (100)	
Private employee	25 (64.1)	13 (33.3)	1 (2.6)	39 (100)	
Military employee	11 (73.3)	4 (26.7)	0 (0)	15 (100)	
Retired	12 (63.2)	7 (36.8)	0 (0)	19 (100)	
Monthly family income freq. (within monthly family income (%))					≤ 0.001*
Less than 3000 SR	24 (68.6)	7 (20)	4 (11.4)	35 (100)	
3001-5000 SR	48 (67.6)	22 (31)	1 (1.4)	71 (100)	
5001-10000 SR	74 (60.7)	47 (38.5)	1 (0.8)	122 (100)	

More than 10000 SR	131 (60.1)	85 (39)	2 (0.9)	218 (100)	
Chronic diseases freq. (within chronic disease (%))					0.053
Yes	88 (55.3)	69 (43.4)	2 (1.3)	159 (100)	
No	189 (65.9)	92 (32.1)	6 (2.1)	287 (100)	

*Statistically significant (p<0.05).

Association between misperception and BMI

The prevalence of underweight, normal, overweight and obese were (3.8 %, 24.9%, 27.4%, 43.9%) respectively. There was a significant association between misperception and BMI (p ≤ 0.001).

The BMI of obese people who underestimate themselves was statistically significant (81.1%; p ≤ 0.001) (Table 2). The participants with high BMI had the complex misperception (p ≤ 0.001).

Table 2. *Association between misperception and BMI in Saudi Adult, Riyadh (2016) (n=446).*

Variables	Self-perception			Total	P -value
	Under estimation	Acceptable	Over estimation		
BMI					≤ 0.001*
<18.5	0 (0)	13 (76.5)	4 (23.5)	17 (100)	
18.5-24.9	23 (20.7)	85 (76.6)	3 (2.7)	111 (100)	
25-29.9	95 (77.9)	26 (21.3)	1 (0.8)	122 (100)	
≥ 30	159 (81.1)	37 (18.9)	0 (0)	196 (100)	
Total	277 (62.1)	161 (36.1)	8 (1.8)	446 (100)	

*Statistically significant (p<0.05).

Table 3. *Association between misperception and Weight lose behaviors and attitudes among Saudi adults, Riyadh (2016) (n=446).*

Variables	Self-perception			Total	P -value
	Under estimation	Acceptable	Over estimation		
Want to lose weight freq. (within Want to lose weight (%))					≤ 0.001*
Yes	221 (70.8)	88 (28.2)	3 (1)	312 (100)	
No	56 (41.8)	73 (54.5)	5 (3.7)	134 (100)	
Think he/she need surgery to lose weight freq. (within need surgery to lose weight (%))					0.602
Yes	29 (61.7)	18 (38.3)	0 (0)	47 (100)	
No	248 (62.2)	143 (35.8)	8 (2)	399 (100)	
Been on diet to lose weight freq. (within been on diet to lose weight (%))					≤ 0.001*
Yes	141 (71.2)	56 (28.3)	1 (0.5)	198 (100)	
No	136 (54.8)	105 (42.3)	7 (2.8)	248 (100)	
Done exercise to lose weight freq. (within Done exercise to lose weight (%))					≤ 0.001*
Yes	189 (70.0)	79 (29.3)	2 (0.7)	270 (100)	
No	88 (50.0)	82 (46.6)	6 (3.4)	176 (100)	

*Statistically significant (p<0.05).

Table 4. *Association between Misperception and unhealthy Weight lose behaviors of Saudi Adult, Riyadh (2016) (n=446).*

Association of weight misperception with weight loss attitudes, behaviors and psychological distress in Saudi adult population

Variables	Self-perception			Total	P-value
	Under estimation	Acceptable	Over estimation		
Using herbs freq. (within using herbs (%))					0.049[*]
Yes	58 (74.4)	19 (24.4)	1 (1.3)	78 (100)	
No	219 (59.5)	142 (38.6)	7 (1.9)	368 (100)	
Using laxatives freq. (within using laxatives (%))					0.432
Yes	13 (76.5)	4 (23.5)	0 (0)	17 (100)	
No	264 (61.5)	157 (36.6)	8 (1.9)	429 (100)	
Using supplements without prescription freq. (within using supplements without prescription (%))					0.39
Yes	11 (64.7)	5 (29.4)	1 (5.9)	17 (100)	
No	266 (62.0)	156 (36.4)	7 (1.6)	429 (100)	
Fasting for 24 h or more freq. (within Fasting for 24 h or more (%))					0.392
Yes	37 (68.5)	17 (31.5)	0 (0)	54 (100)	
No	240 (61.2)	144 (36.7)	8 (2.0)	392 (100)	
Starting smoking or smoking more cigarettes freq. (within starting smoking or smoking more cigarettes (%))					0.858
Yes	10 (62.5)	6 (37.5)	0 (0)	16 (100)	
No	267 (62.1)	155 (36.0)	8 (1.9)	430 (100)	
Using prescribed diet pills Freq. (within using prescribed diet pills (%))					0.89
Yes	6 (60.0)	4 (40.0)	0 (0)	10 (100)	
No	271 (62.2)	157 (36.0)	8 (1.8)	436 (100)	
Induce vomiting after eating freq. (within induce vomiting after eating (%))					0.427
Yes	6 (85.7)	1 (14.3)	0 (0)	7 (100)	
No	271 (61.7)	160 (36.4)	8 (1.8)	439 (100)	
Do nothing to lose weight freq. (within Do nothing to lose weight (%))					0.043[*]
Yes	170 (58.2)	115 (39.4)	7 (2.4)	292 (100)	

Table 5. Association between misperception and K10 score in Saudi Adult, Riyadh (2016) (n=446).

Variables	Self-perception			Total	P -value
	Under estimation	Acceptable	Over estimation		
K 10 score					
Low level of psychological distress	92 (59)	59 (37.8)	(3.2) 5	156 (100)	0.258
Moderate level of psychological distress	109 (68.1)	49 (30.6)	2 (1.3)	160 (100)	
High level of psychological distress	51 (55.4)	40 (43.5)	1 (1.1)	92 (100)	
Very high level of psychological distress	25 (65.8)	13 (34.2)	0 (0)	38 (100)	
Total	277 (62.1)	161 (36.1)	8 (1.8)	446 (100)	

[*]Statistically significant (p<0.05).

Table 6. Diet inquiry in Saudi Adult, Riyadh (2016) (n=446).

Variables				N (%)	
No. of meals per day		Less than 2 meals		82 (18.4)	
		2-3 big meals	331 (74.2)		
		5-6 small meals	33 (7.4)		

Variables		N (%)	Variables		N (%)
Breakfast-per week	Daily	238 (53.4)	Junk food-per week	Daily	31 (7.0)
	4-6 times	54 (12.1)		4-6 times	73 (16.4)
	1-3 times	116 (26.0)		1-3 times	169 (37.9)
	Never	38 (8.5)		Never	173 (38.8)
Lunch-per week	Daily	279 (62.6)	sweets-per week	Daily	75 (16.8)
	4-6 times	52 (11.7)		4-6 times	70 (15.7)
	1-3 times	85 (19.1)		1-3 times	212 (47.5)
	Never	30 (6.7)		Never	89 (20.0)
Dinner-per week	Daily	233 (52.2)	Fizzy Drinks-per week	Daily	57 (12.8)
	4-6 times	84 (18.8)		4-6 times	31 (7.0)
	1-3 times	95 (21.3)		1-3 times	142 (31.8)
	Never	34 (7.6)		Never	216 (48.4)
Snack-per week	Daily	147 (33.0)	Fresh Juices-per week	Daily	61 (13.7)
	4-6 times	60 (13.5)		4-6 times	82 (18.4)
	1-3 times	140 (31.4)		1-3 times	233 (52.2)
	Never	99 (22.2)		Never	70 (15.7)
Vegetables-per week	Daily	154 (34.5)	Coffee-per week	Daily	300 (67.3)
	4-6 times	72 (16.1)		4-6 times	47 (10.5)
	1-3 times	189 (42.4)		1-3 times	63 (14.1)
	Never	31 (7.0)		Never	36 (8.1)
Fruits-per week	Daily	106 (23.8)	Tea-per week	Daily	258 (57.8)
	4-6 times	70 (15.7)		4-6 times	48 (10.8)
	1-3 times	230 (51.6)		1-3 times	90 (20.2)
	Never	40 (9.0)		Never	50 (11.2)
Traditional food-per week	Daily	80 (17.9)	Dairy Products-per week	Daily	163 (36.5)
	4-6 times	80 (17.9)		4-6 times	70 (15.7)
	1-3 times	216 (48.4)		1-3 times	153 (34.3)
	Never	70 (15.7)		Never	60 (13.5)

Association between weight misperception, weight loss attitudes and behaviors

Approximately, 70% of our subjects were keen to lose weight. Results of weight misperception were highly motivated for weight loss (p ≤ 0.001) and data were tabulated in Table 3. However, misperception was not significantly associated in people to requisite surgery for losing weight (p=0.602). Only (11%) of studied population assumes the surgery required for weight loss. The statistical association appeared between misperception and weight loss behaviors (p ≤ 0.001). Maximum subjects underestimated themselves when opted exercise to lose weight (70%; p ≤ 0.001). Other behaviors were not significantly associated excluding usage of herbs for losing weight (75.7%; p=0.049). Lowest percentage existed who induces vomiting after eating (1.6%; p=0.427) (Table 4).

Association between weight misperception and psychological distress

Although higher levels of psychological distress have an inverse relationship with misperception (56.5%), There was no significant association was found between Misperception and K10 scale as shown in Table 5 (p=0.258).

Dietary intake and physical activity inquiry

In our study, 67.3% of participants consume a cup of coffee, and 7.7% consume junk food on a daily basis (Table 6). Frequently, 27% of them drink a water of 6 cups/day. The percentage of IPAQ scale was; low active (61.7%), moderately active (29.1%) and highly active (9.2%). IPAQ score varies significantly with age and gender (p=0.004) (Table 7).

Table 7. Association between IPAQ and sex and age groups of Saudi Adults, Riyadh (2016) (n=446).

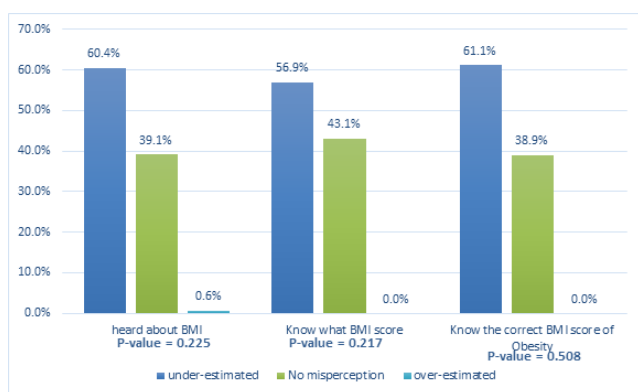| Variables	IPAQ			Total	P-value
	Low	Moderate	High		
Sex freq. (within sex (%))					0.004*
Male	113 (55.7)	62 (30.5)	28 (13.8)	203 (100)	
Female	162 (66.7)	68 (28.0)	13 (5.3)	243 (100)	
Age groups freq. (within age groups (%))					0.004*
18-29	101 (57.1)	48 (27.1)	28 (15.8)	177 (100)	
30-39	50 (61.0)	25 (30.5)	7 (8.5)	82 (100)	
40-49	54 (62.8)	27 (31.4)	5 (5.8)	86 (100)	
50-60	70 (69.3)	30 (29.7)	1 (1.0)	101 (100)	

Figure 1. Misperception of Body Weight and BMI Knowledge among Saudi Adults, Riyadh (2016). Percentages within the rows (BMI knowledge). Statistically significant (p<0.05).

Association between misperception and BMI knowledge

As shown in Figure 1, BMI knowledge was not a significant predictor on Weight misperception. The participants who perceived about BMI were (37.9%; p=0.225) and who alleged about the known of BMI scores were (16.1%; p=0.217).

However, 4.0% of participants were able to accurately perceive their weight.

The effect of chronic diseases on misperception, K10 and IPAQ scores

The relationship between weight misperception with or without chronic diseases was not statistically significant (p=0.068). Also, the number of chronic diseases with K10 was not statistically significant (p=0.503). The effect of morbid diseases was a significant predictor of IPAQ scores (p ≤ 0.001).

Discussion

The current study was aimed to investigate the prevalence of weight misperception with weight loss attitudes, behaviors' and psychological distress in Saudi medical students. As per the records, there are no studies documented in Saudi population, and this could be the initial study carried with medical students in the Saudi population. The results of our current study confirm significant association within misperception and BMI (p<0.0001) and no association with psychological stress (p=0.25). Many studies have been implemented relation between BMI cum depression and finds both positive and negative modes. However, still, connection founds to be unclear [1,22-29]. Limited knowledge has been documented regarding BMI (37.9%), and 16% has no information about BMI. A British study has concluded obese individuals have adequate knowledge about BMI and they could recognize the difference between normal, overweight and obesity [10,30]. Misperception on human body's weight is a known existence and various results documented from global populations [11,30-32] and our study was by the prior studies. Weight perception could be more influential in regulating weight control behaviour and in our study women were more accurate towards weight perception than men and our results were supported by Gibbs et al. [33] study [5,31-33], but Byeon [23] studies conclude underestimated male and overestimated female students were at greater risk of developing depression in Korean middle school children's. Al-Quwaidhi et al. [34] study warn the prevalence of obesity in Saudi Arabia will be prone from 12%-41% and confirms women will have high prevalence rate than men to increase the weight. Age is an additional determination for weight misperception, and earlier reports confirm perception of overweight status is more prevalent among people with low socioeconomic status, and women [5,29,35-37]. Our results showed that women are more likely to misperceive their body weight, i.e., 74%. Lee et al. [8] studies confirm randomly half of the Korean adolescents have misperception towards their weight. Additionally, we documented people with higher monthly income are more likely to have a misperception, supported by the earlier study [24] and could be attributed mainly to dietary habits and sedentary lifestyle. Misperception on human body weight is known the existence and various results documented from global studies [11,30-32] and our study was by the prior studies. We assume sociocultural influences such as social weight comparisons play a major role in prevalent

disagreement between self-assessments and actual weight in Saudi Arabia where some people still consider overweight is attractive and is a beauty mark for ladies and have their norms, so in our population comparing themselves to this norm. This is consistent with the social comparison hypothesis proposed as an explanation for this attitude by Johnson et al. [38].

Earlier and current reports showed the positive evidence in cross-sectional data [31,38,39]. Despite all efforts and attempts made to raise awareness of healthy weight by overweight people, still fail to realize that their weight could be major concern trying to understand the cultural context of this issue and figure it out in Saudi community will make it more likely to the population to interact with the calls for weight control and feel it a personally relevant. Targeting misperception may facilitate the advice of healthy lifestyle behaviors and improve the effectiveness of obesity interventions. Major participants interested for losing weight training through diet or physical exercise to lose weight. However, the majority of the sample had low physical activity scores those with chronic diseases [40]. The earlier study demonstrates subjects with no chronic illnesses have higher scores of physical activities. In fact, individuals between with and without performance with physical activity were misperceived their weight limitedly [7]. This should have considered when developing health promotion programs. Weight loss behaviors and attitudes found strongly related to misperception [29,41]. Overall, people who underestimated to lose their body weight instantly assume surgery for weight loss. Among them, quick method to lose the weight was fasting for 24 h which was consistent with other studies [41], but inconsistent studies report smoking as the most frequent method to lose weight [16].

The strength of our study was carried with a valid psychometric scale to screen for psychological distress [42] and physical activity scale [29] which was used to measure the person physical activity for adult and BMI was computed by male and female nurses to each participant through college file number. The current study limitations were (i) no connection between variables may be opting the cross-sectional study, (ii) sample collection was carried out at primary care clinics which are a single center single city (iii) recruited low sample numbers. Our study concludes weight misperception was found in obese subjects in the Saudi population. However, we could not find a relation between physiological stress and misperception. Lower physical activity was observed in chronic diseases, and our study recommends implementing training sessions for realizing weight gain, interprets to discontinue the obese.

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Competing Interests

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Authors' Contributions

References

1. Sonneville KR, Thurston IB, Milliren CE, Gooding HC. Weight misperception among young adults with overweight/obesity associated with disordered eating behaviors. Int J Eat Disord 2016; 49: 937-946.

2. Ahmed HG, Ginawi IA, Elasbali AM, Ashankyty IM, Al-Hazimi AM. Prevalence of obesity in Hail region, KSA: in a comprehensive survey. J Obes 2014; 2014: 961861.

3. Al-Mohaimeed AA. Parents perception of childrens obesity, in Al-Qassim, Saudi Arabia. J Family Commun Medi 2016; 23: 179-183.

4. Bahijri SM, Ahmed M, Al-Shali K, Bokhari S, Alhozali A, Borai A. The relationship of management modality in Saudi patients with type 2 diabetes to components of metabolic syndrome, gamma glutamyl transferase and highly sensitive C-reactive protein. Therap Sdv Chr Dis 2016; 7: 246-254.

5. Kuchler F, Variyam JN. Mistakes were made: misperception as a barrier to reducing overweight. Int J Metabol Disord Int Assoc Obes 2003; 27: 856-861.

6. Ruiz-Prieto I, Carbonero-Carreno R, Jauregui-Lobera I. Weight misperception and physical fitness perception in relation to the physical activity level, dietary behaviour and psychosocial well-being. Nutricion Hospitalaria 2014; 31: 203-216.

7. Murillo R, Ali SA, Carmack C, Doss D. Activity and weight misperception among overweight and obese US adults. Am J Health Behav 2016; 40: 12-20.

8. Lee KM, Seo MS, Shim JY, Lee YJ. Body weight status misperception and its association with weight control behaviors, depressive mood and psychological distress in nulliparous normal-weight young women. Ann Human Biol 2015; 42: 528-532.

9. Chavez CKL, Rodriguez de IJ, Santos GJ, Segovia AJG, Altamirano MDC, Matias BVM. Altered perception of the nutritional status of pre-schoolers by their parents: A risk

factor for overweight and obesity. Archivos Argentinos de Pediatria 2016; 114: 237-142.

10. Al Qauhiz NM. Obesity among Saudi female university students: Dietary habits and health behaviors. J Egypt Publ Health Assoc 2010; 85: 45-59.

11. Duncan DT, Wolin KY, Scharoun-Lee M, Ding EL, Warner ET, Bennett GG. Does perception equal reality? Weight misperception in relation to weight-related attitudes and behaviors among overweight and obese US adults. Int J Behav Nutr Phys Activ 2011; 8: 20.

12. Alharbi KK, Hussain T, Alharbi FK, Tabassum SN. Apolipoprotein C3 gene variants and risk of developing type 2 diabetes in Saudi subjects. Metab Syndr Relat Disord 2015; 13: 298-303.

13. Alharbi KK, Khan IA, Munshi A, Alharbi FK, Al-Sheikh Y, Alnbaheen MS. Association of the genetic variants of insulin receptor substrate 1 (IRS-1) with type 2 diabetes mellitus in a Saudi population. Endocrine 2014; 47: 472-477.

14. Khan IA, Vattam KK, Jahan P, Hasan Q, Rao P. Importance of glucokinase -258G/A polymorphism in Asian Indians with post-transplant and type 2 diabetes mellitus. Intract Rare Dis Res 2016; 5: 25-30.

15. Stunkard AJ, Sorensen T, Schulsinger F. Use of the Danish adoption register for the study of obesity and thinness. Res Publ Assoc Res Nerv Mental Dis 1983; 60: 115.

16. Berenson AB, Pohlmeier AM, Laz TH, Rahman M, McGrath CJ. Nutritional and weight management behaviors in low-income women trying to conceive. Obstet Gynecol 2014; 124: 579-584.

17. Laz TH, Rahman M, Pohlmeier AM, Berenson AB. Level of nutrition knowledge and its association with weight loss behaviors among low-income reproductive-age women. J Commun Health 2015; 40: 542-548.

18. Kessler RC, Barker PR, Colpe LJ, Epstein JF, Gfroerer JC, Hiripi E. Screening for serious mental illness in the general population. Arch Gen Psych 2003; 60: 184-189.

19. Zunitan M, Dehaim M. Prevalence of stress in junior doctors during their internship training: a cross-sectional study of three Saudi medical college hospitals. Neuropsych Dis Treat 2014; 10: 1879-1886.

20. Abdulghani HM, AlKanhal AA, Mahmoud ES, Ponnamperuma GG, Alfaris EA. Stress and its effects on medical students: a cross-sectional study at a college of medicine in Saudi Arabia. J Health Popul Nutr 2011; 516-522.

21. Lee PH, Macfarlane DJ, Lam T, Stewart SM. Validity of the international physical activity questionnaire short form (IPAQ-SF): A systematic review. Int J Behav Nutr Phys Activ 2011; 8: 1.

22. Atlantis E, Ball K. Association between weight perception and psychological distress. Int J Obes. 2008; 32: 715-721.

23. Byeon H. Association between weight misperception patterns and depressive symptoms in Korean young adolescents: National cross-sectional study. PloS One 2015; 10: e0131322.

24. Jones M, Grilo CM, Masheb RM, White MA. Psychological and behavioural correlates of excess weight: misperception of obese status among persons with Class II obesity. Int J Eating Disord 2010; 43: 628-632.

25. Ladwig KH, Marten MB, Lowel H, Doring A, Koenig W. Influence of depressive mood on the association of CRP and obesity in 3205 middle aged healthy men. Brain Behav Immun 2003; 17: 268-275.

26. Luppino FS, de Wit LM, Bouvy PF, Stijnen T, Cuijpers P, Penninx BW. Overweight, obesity, and depression: a systematic review and meta-analysis of longitudinal studies. Arch Gen Psych 2010; 67: 220-229.

27. Pi-Sunyer X. The medical risks of obesity. Postgrad Med 2009; 121: 21-33.

28. Roberts RE, Deleger S, Strawbridge WJ, Kaplan GA. Prospective association between obesity and depression: evidence from the Alameda county study. Int J Obes 2003; 27: 514-521.

29. Roohafza H, Kabir A, Sadeghi M, Shokouh P, Aalaei-Andabili SH, Mehrabi Y. Effect of psychological distress on weight concern and weight control behaviors. Arch Iran Med 2014; 17: 608-612.

30. Johnson F, Beeken RJ, Croker H, Wardle J. Do weight perceptions among obese adults in Great Britain match clinical definitions? Analysis of cross-sectional surveys from 2007 and 2012. BMJ Open 2014; 4: e005561.

31. Burke MA, Heiland FW, Nadler CM. From overweight to about right: evidence of a generational shift in body weight norms. Obesity 2010; 18: 1226-1234.

32. Jayawardena R, Punchihewa P, Ranathunga I, Lokunarangoda N, Pathirana AK. Body weight perception among Sri Lankan cardiac patients. BMC Obes 2016; 3: 32.

33. Gibbs HD, Pacheco C, Yeh HW, Daley C, Greiner KA, Choi WS. Accuracy of weight perception among American Indian tribal college students. Am J Prevent Med 2016.

34. Al-Quwaidhi AJ, Pearce MS, Critchley JA, Sobngwi E, OFlaherty M. Trends and future projections of the prevalence of adult obesity in Saudi Arabia, 1992-2022. East Mediter Health J 2014; 20: 589-595.

35. Gaskin JL, Pulver AJ, Branch K, Kabore A, James T. Perception or reality of body weight: which matters to the depressive symptoms. J Affect Disord 2013; 150: 350-355.

36. Jauregui-Lobera I, Bolanos-Rios P, Santiago-Fernandez MJ, Garrido-Casals O, Sanchez E. Perception of weight and psychological variables in a sample of Spanish adolescents. Diabetes, metabolic syndrome and obesity: targets and therapy. 2011; 4: 245-251.

37. Salcedo V, Gutierrez-Fisac JL, Guallar-Castillon P, Rodriguez-Artalejo F. Trends in overweight and misperceived overweight in Spain from 1987 to 2007. Int J Obes 2010; 34: 1759-1765.

38. Johnson F, Cooke L, Croker H, Wardle J. Changing perceptions of weight in Great Britain: comparison of two population surveys. BMJ 2008; 337: a494.

39. Maximova K, McGrath JJ, Barnett T, OLoughlin J, Paradis G, Lambert M. Do you see what I see? Weight status

misperception and exposure to obesity among children and adolescents. Int J Obes 2008; 32: 1008-1015.

40. Jones SA, Wen F, Herring AH, Evenson KR. Correlates of US adult physical activity and sedentary behaviuor patterns. J Sci Med Sport 2016.

41. Kim M, Lee H. Overestimation of own body weights in female university students: associations with lifestyles, weight control behaviors and depression. Nutr Res Pract 2010; 4: 499-506.

42. Furukawa TA, Kessler RC, Slade T, Andrews G. The performance of the K6 and K10 screening scales for psychological distress in the Australian National Survey of Mental Health and Well-Being. Psychol Med 2003; 33: 357-362.

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