

## Original Article



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# Comparison of Lifestyle Patterns and Body Weight Management Practices between Normal Weight and Obese Female University Students (Riyadh – Saudi Arabia)

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## ABSTRACT

**BACKGROUND:** According to a national survey in 2014, the prevalence of overweight and obesity among Saudi women is reaching 33.5%. Instead of adopting healthy lifestyle, this population may adopt some weight management practices (WMP) which might be unhealthy and some could lead to serious health issues. **AIM:** To compare lifestyle patterns and WMP adopted by obese and normal weight Saudi females by assessing the difference in energy and macronutrients intake, dietary habits, level of physical activity and WMP. **METHODS:** Through a cross-sectional study among female students at Princess Nourah Bint Abdulrahman University (PNU) (Riyadh – KSA.), 200 participants were conveniently selected, assigned in two groups: in obese and normal weight (each group have 100 students), based on their BMI, according to the WHO cut-off values. Data collected, through questionnaire and analysis, were analyzed using SPSS program. Chi-square and *t*-test were used to assess the difference between the two groups. **RESULTS:** Unhealthy WMP were high among obese students. Total calorie intake was not different; however, fat intake was higher in obese group ( $p < 0.01$ ). Level of moderate active was higher in normal group than obese group (33% versus 19%, respectively). Food frequency consumption showed that fruit, date, and dressing were higher in obese group compared to normal weight group ( $p$ -value = 0.02, 0.01 and 0.03). **CONCLUSIONS:** Obese PNU female students adopt unhealthy WMP besides their inadequate nutritional intake and unhealthy dietary habits. Increasing awareness about the healthy lifestyle to manage weight is urgently needed.

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## 1. INTRODUCTION

The lifestyle refers to a person's unique pattern of living including dietary habits, how time is being spent and the regularity of physical activity [1]. Healthy lifestyles are defined as adopted styles based on non-smoking, an acceptable body mass index (BMI), a high fruit and

vegetable intake, regular physical activity (PA), as they are associated with reductions in the incidence of certain chronic diseases. The World Health Organization (WHO) has stated that 60% of an individual's health-related quality of life depends on his/her lifestyle [2]. In addition,

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recent studies have shown that healthy lifestyle practices reduce disease occurrence and mortality rates, and socio-demographic dimensions such as sex, age, marital status, economical level, and paid employment correlate with healthy lifestyle [3,4]. During the last few decades, Kingdom of Saudi Arabia (KSA) has undergone rapid socio-cultural changes, due to the accelerating economy in the Arabian Gulf region. This led to major progressive changes in food choices, PA, and eating habits. KSA population is now adopting a “Westernized” lifestyle and is exposed to an advanced nutrition transition. Such “a nutritional transition” has been claimed for the persisting micronutrient deficiencies and the rising rates of overweight and obesity [5]. The last national survey on obesity in the KSA showed a high prevalence of obesity, especially higher in women (33.5%) than in men (24.1%) [6]. In the KSA, some authors documented that 30.6% of female health college students were either overweight or obese [7]. Indeed, college students are highly exposed to unhealthy eating habits leading to body weight gain (BWG) [8]. These students, whatever their BMI is, might adopt different weight management practices (WMP), aiming to maintain or lose weight; however, these practices might not be healthy, has short-term effect, and has no scientific basis.

A study on WMP, among Saudis women, showed that 80.2% of the participants had attempted to lose weight several times and 92.9% regained their previous weight or even more [9]. However, to the best of our knowledge, no study has described or compared the WMP adopted by normal weight and obese university student females in the KSA, although such data can help in promoting healthy practices to reduce weight and maintain the overall well-being.

The primary aim of the current study was to compare lifestyle patterns and body weight management practices (BWMP) adopted by obese and normal weight female students above 18 years old, in Princess Norah University (PNU), Riyadh, KSA. We hypothesized there is a difference in lifestyle patterns and BWMP between obese and normal weight PNU students. Moreover, we aimed to assess energy and macronutrients intake, dietary habits, level of PA, and WMP to study the difference in these parameters between the two groups.

## 2. SUBJECTS AND METHODS

### 2.1. Study design and subjects

The study is a cross-sectional survey based on a convenient sampling, from October to December 2015. The target population consisted of female students at Princess Nourah Bint Abdulrahman University (Riyadh –

KSA), above 18 years old. Participants were assigned to one of the study groups based on their BMI. A total of 100 obese ( $BMI \geq 30 \text{ kg/m}^2$ ) students and 100 normal weight ( $BMI$  ranging from 18.5 – 24.9  $\text{kg/m}^2$ ) students participated in the study. The studied population was classified according the WHO guidelines [10]. To be included, the student should be healthy and not following any diet during the study protocol. If using any kind of medication or having any disease that might affect the body weight such as hypothyroidism, the student will thus be excluded.

### 2.2. Data collection

#### General characteristics of the population

Data were collected through a self-administered questionnaire, including age, monthly income and marital status.

#### Anthropometric measurements

Body weight and height were measured using the scale/stadiometer (Seca 763 Digital Column Scale w/ Stadiometer) during the whole data collection process. Measurements of body weight (kg) to the nearest 0.11 kg were performed on participants wearing light clothing and no shoes. While, height was measured to the nearest 0.5 cm on participants were not wearing shoes. BMI ( $\text{kg/m}^2$ ) was then calculated.

#### Dietary intake assessment

Quantitative data, related to daily energy intake of macronutrients, were performed using the 24-h recall method. We included details of food and beverages intake during the three main meals as well as snacks in between meals of the day prior to the study [11]. Each participant was provided all instructions regarding the measurements of food before the records completion. Daily energy intake (Kcal), and intake of carbohydrates (g), protein (g), and fats (g) were then calculated from the recorded food, using the National Nutrient Database for Standard Reference Release [12]. Grams of carbohydrates and protein were converted to Kcal by multiplying by 4 and fat by 9.

The food frequency questionnaire (FFQ) was used to estimate the qualitative aspect of the dietary intake of the participants. FFQ included food items classified into the common food groups: fruits and vegetables, milk and dairy products, animal protein, legumes, carbohydrates, fats and oils, in addition to fast food and cooking ways such grilling, frying, boiling, etc. Frequency of consumption was determined by the participants of being on daily basis, 5-4 times/week, 2-3 times/week, 1 time/week, twice/month, one time/month, and never.

### Body weight management practices

Data, related to BWMP, were collected by a self-administered questionnaire. This form contained questions on satisfaction about the current body weight, and dietary and non-dietary practices, undertaken by the participant when trying to lose or control her body weight. The questionnaire was tested with regard adequacy and ease of understanding. Some necessary changes were made prior being distributed. Reliability of the questionnaire was tested using the Cronbach's alpha ( $\alpha=0.977$ ) with a 95% confidence interval.

### Level of physical activity

The PA level was assessed by using online General Practice Physical Activity Questionnaire (GPPAQ) program [13]. This tool provides a simple, 4 level physical activity index (PAI) which are: sedentary, low physically active, moderate physically active, and high physically active

### Ethical consideration

Approval, from College of Health and Rehabilitation Sciences Ethical Committee, was obtained before the study was carried out. During data collection, respect for the dignity of participants was prioritized. The voluntary participants were informed about the purpose of the study and their involvement. An informed consent was beforehand given to them. Furthermore, each participant was informed about the confidentiality during the whole study. Upon her approval, each participant was requested to sign the informed consent before taking part of the survey. The study was conducted according to principles of Helsinki Declaration.

### 2.3. Statistical analysis

Results were presented as percentage or mean  $\pm$ SD. The data analysis was performed by descriptive statistic using SPSS program (version 24.0). Independent *t*-test was conducted to assess the difference of means between the two groups. A Chi-square test was performed to compare the percentages in the two groups. The difference was considered as significant when *P*-value < 0.05.

## 3. RESULTS

### 3.1. Participants' characteristics

200 PNU students were conveniently included in this study, aged 18 years and above. The studied population was divided into two groups; obese and normal weight, depending on their BMI (100 students in each group). For normal weight group the mean body weight for height was  $55.04 \pm 6.10$  kg for  $158.70 \pm 5.37$  cm. For obese weight group the mean weight for height was  $86.61 \pm 9.62$  kg for  $159.7 \pm 5.00$  cm. BMI of the normal and the obese groups

was  $21.83 \pm 1.96$  Kg/m<sup>2</sup> and  $34.02 \pm 3.65$  Kg/m<sup>2</sup>, respectively. Most of both groups' participants were single and family income was ranging from 7000 – 30000 SAR/month ( $\approx$  1800-8000 USD/month). (Table 1).

**Table 1:** General characteristics of participants in normal and obese groups

Characteristics	Normal group (N= 100)	Obese group (N= 100)
Age (years old)		
18-21	69 %	59 %
22-24	30 %	33 %
$\leq 25$	1 %	8 %
Weight (kg)		
(Mean $\pm$ SD)	55.04 $\pm$ 6.10	86.61 $\pm$ 9.62
Height (cm)		
(Mean $\pm$ SD)	158.70 $\pm$ 5.37	159.70 $\pm$ 5.00
BMI (kg/m <sup>2</sup> )		
(Mean $\pm$ SD)	21.83 $\pm$ 1.96	34.02 $\pm$ 3.65*
Family income (SAR/Month)		
$\leq 7000$	17 %	10 %
7000 – 15000	42 %	29 %
15000 – 30000	30 %	46 %
$\geq 45000$	11 %	15 %
Marital status		
Single	92 %	91 %
Married	5 %	7 %
Divorced or widow	3 %	2 %

SAR = Saudi Riyals, BMI (kg/m<sup>2</sup>) = Body mass index. BMI categorization is based on the WHO guidelines: Normal: 18.50 - 24.99 kg/m<sup>2</sup>, and obese  $\geq 30.00$  kg/m<sup>2</sup>. Results are shown as Mean  $\pm$  SD or in percentage of the group (n=100 for normal group and n=100 for obese group). \* *P*-value <0.05 using independent *t*-test.

### 3.2. Weight management practices

There was a difference in the satisfaction with the current body weight and in attempts to weight loss between the two groups. In addition, there was a difference in visiting a dietitian to lose or gain weight and in following a specific diet to weight management, being higher among obese group. (*P*-value < 0.0001). We observed a significant difference (*P*-value = 0.013) between the two groups, in planning their diet by themselves (53% in normal versus 70% in obese). There was a considerable recourse to internet for individualized diet programs and in a counting for caloric intake, in obese group (*P*-value < 0.0001) compared to the normal one. However, no differences were found in increase intake of fruit and vegetable (*P*-value = 0.089) and fluids intake (*P*-value = 0.294), for weight management. Concerning body weight loss, there were differences in many practices between the two groups, which were as follows: consuming fewer calories (*P*-value < 0.0001), reducing fat intake (*P*-value = 0.014), reducing carbohydrate intake (*P*-value = 0.003), reducing portion size of their meals (*P*-value = 0.027), fasting for long time (*P*-value = 0.005), take laxatives (*P*-value = 0.022), attempting to throw up (*P*-value = 0.018), and taking diet pills after taking their meals (*P*-value < 0.0001). They were all lower in normal compared to obese group.

In contrast, there was no difference of attempting to avoid sweets and junk food (P-value = 0.089) and in skipping meals (P-value = 0.053) to lose weight. However, for body weight gain, there were no differences in terms of practices between the two studied groups, which were increasing the portion size of their meals (P-value = 0.171), using herbalists (P-value = 0.205) and taking supplements (P-value = 0.071). On the other hand, there was a significant difference in consuming more calories to gain weight (P-value = 0.017) registered among normal weight group (Table 2).

### 3.3. Food frequency consumption

In general, there was no difference between normal and obese weight group in consumption of different categories of food (Figure 1 and Figure 2).

and fast food, in twice per week, was lower among normal group with no differences between the two groups in sweets (P-value = 0.96) and fast food (P-value = 0.94). The consumption of fried food, in twice per week, was higher among normal weight group. There were no differences between the two groups in fried food (P-value = 0.90). The consumption of sugar beverage, in twice per week, was equal in both groups with no difference in sugar beverage intake (P-value = 0.35).

The daily consumption of the two food group categories "dates" and "fruits (except dates)" was lower in normal weight group than obese weight group (P-value = 0.01 and 0.02 respectively). The intake of dressing in twice per week was lower among normal weight group. There was a difference in dressing intake between normal and obese

**Table 2:** Weight management practices between normal and obese groups

Practices	Normal group (N=100)		Obese group (N=100)		P-value
	Yes	No	Yes	No	
Q1. Are you happy with your weight?	50%	50%	8%	92%	< 0.0001
Q2. Do you try to lose weight?	54%	46%	93%	7%	< 0.0001
Q3. Did you follow a specific diet to manage your weight? (vegetarian, low calorie, low carb, low fat diet)	30%	70%	70%	30%	< 0.0001
Q4. Did you visit dietitian before to lose, gain and maintain your weight?	13%	87%	40%	60%	< 0.0001
Q5. Do you plan your diet by yourself?	53%	47%	70%	30%	0.013
Q6. Did you use internet web site for individualized diet program?	18%	82%	57%	43%	< 0.0001
Q7. Did you count your calorie intake?	16%	84%	46%	54%	< 0.0001
Q8. Did you consume a fewer calories to lose weight?	38%	62%	63%	37%	< 0.0001
Q9. Did you reduce fatty food intake to lose weight?	62%	38%	78%	22%	0.014
Q10. Did you reduce carbohydrate intake to lose weight?	35%	65%	56%	44%	0.003
Q11. Did you reduce portion size of your meals to lose weight?	57%	43%	72%	28%	0.027
Q12. Did you try avoiding sweets and junk food to lose weight?	42%	58%	54%	46%	0.089
Q13. Did you increase drinking liquids/water?	63%	37%	70%	30%	0.0294
Q14. Did you increase fruit and vegetables intake?	40%	60%	52%	48%	0.089
Q15. Do you skip meals to lose weight?	72%	28%	59%	41%	0.053
Q16. Do you fast for long time to lose weight?	19%	81%	37%	63%	0.005
Q17. Do you take laxatives to lose weight?	4%	96%	13%	87%	0.022
Q18. Do you try to vomit to lose weight?	5%	95%	15%	85%	0.018
Q19. Did you take diet pills to lose weight?	1%	99%	18%	82%	< 0.0001
Q20. Did you Consume more calories to gain weight?	19%	81%	10%	90%	0.017
Q21. Did you increase portion size of your meals to gain weight?	19%	81%	12%	88%	0.171
Q22. Did you use herbalists for weight gain? (like Fenugreek, Mung Beans)	11%	89%	6%	94%	0.205
Q23. Did you take supplements for weight gain? (Ensure, Ensure plus ...)	15%	85%	7%	93%	0.071

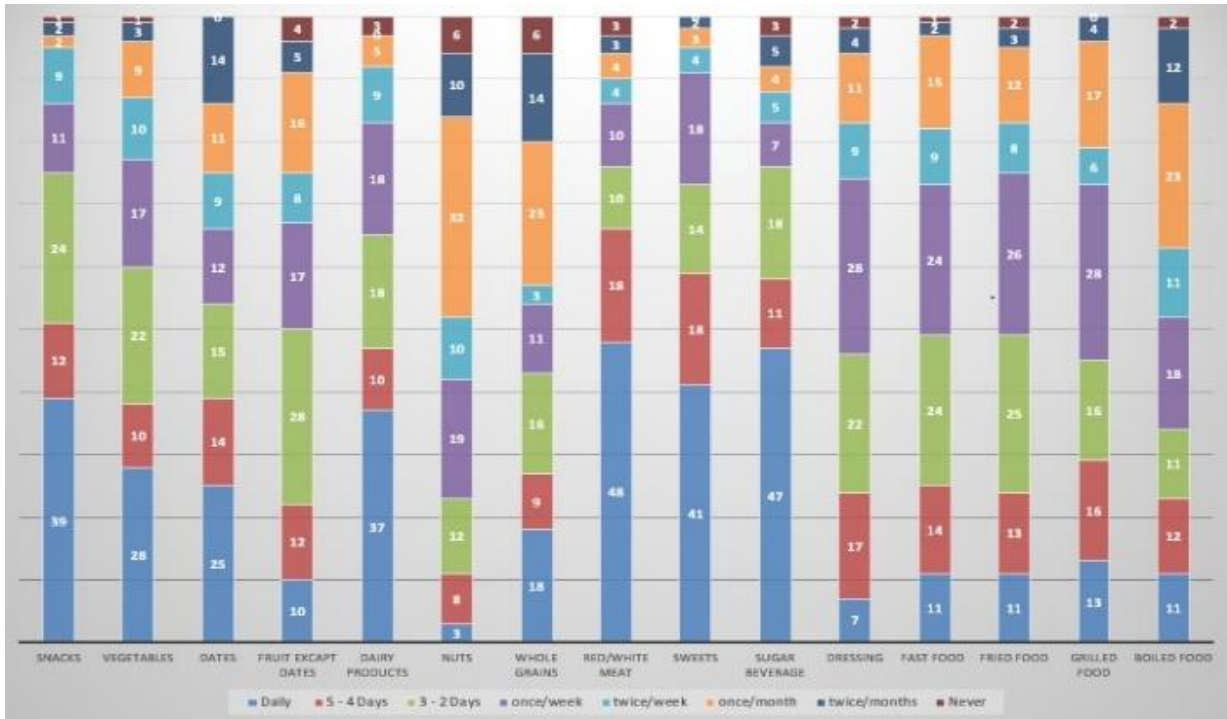
BMI categorization is based on the WHO guidelines: Normal: 18.50 - 24.99 kg/m<sup>2</sup>, and obese ≥30.00 kg/m<sup>2</sup>. Results are shown as percentage of the group (n=100 for normal group and n=100 for obese group). P-value calculated using Chi2 test.

The daily intake of snacks, dairy products, nuts, and grilled food in normal group was lower than obese group (P-value > 0.05). There was no difference in the daily consumption of vegetable, whole grains and boiled food among the two groups. The daily intake of red/white meat was the same in both groups. The consumption of sweets

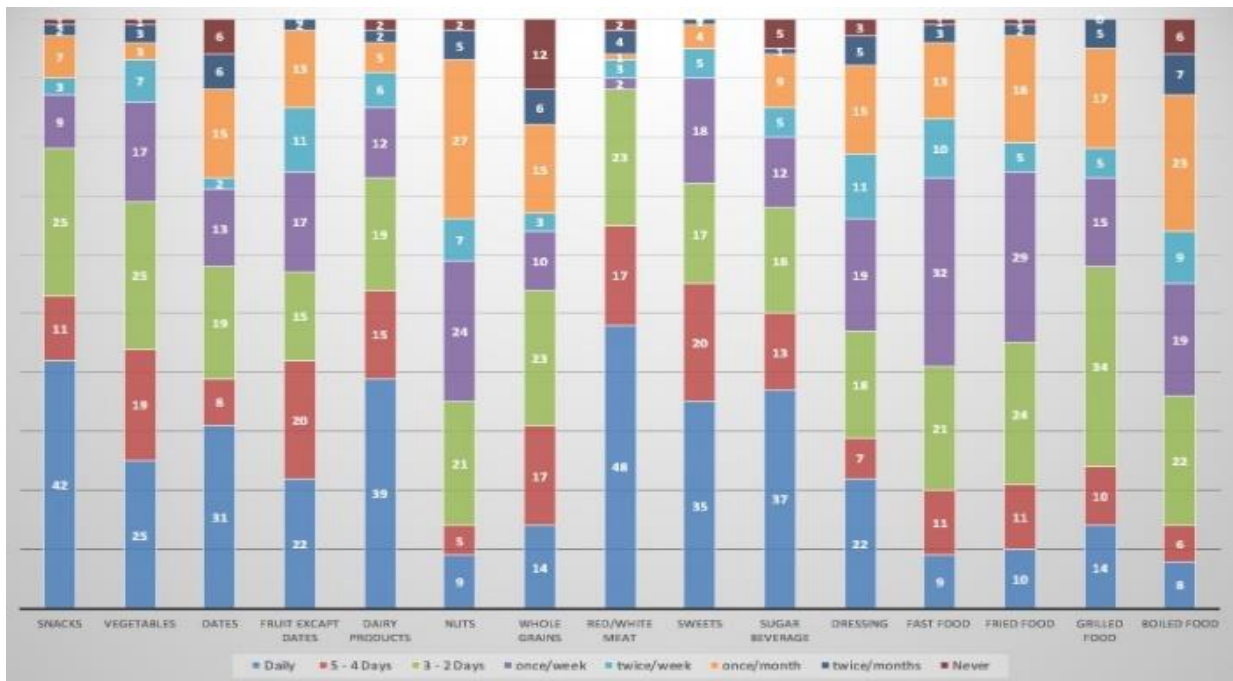
weight group (P-value = 0.03). Figure 1 and 2.

### 3.4. Energy and macronutrients intake

Table 3 shows the difference in calories and macronutrients intake between normal and obese weight groups.



**Figure 1:** Food Frequency Consumption of different category of food in normal group (data are presented in % total answers by the students)



**Figure 2:** Food frequency consumption of different category of food in obese group (data are presented in % total answers by the students)

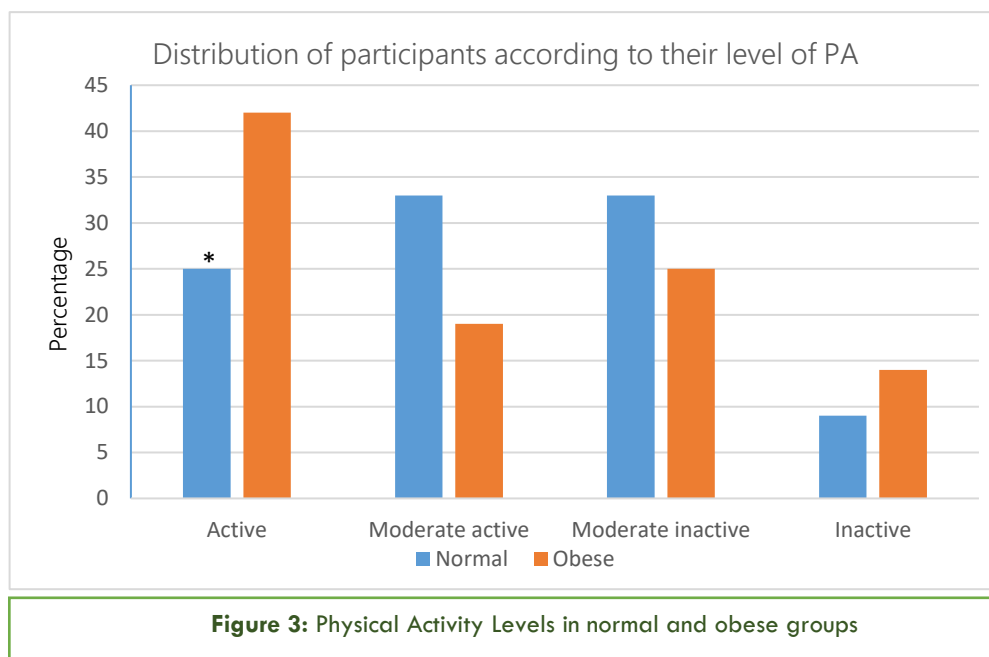


There was no difference in total calories intake between the two groups ( $P$ -value = 0.07) although the mean of calories in normal group was lower than the obese one ( $1287 \pm 318$  versus  $1386 \pm 457$  Kcal/day). However, there were differences in carbohydrates intake ( $P$ -value = 0.001). The mean of carbohydrate and protein intake in normal group was higher than obese group ( $53 \pm 0.08\%$  versus  $49 \pm 0.09\%$  and  $19 \pm 0.06\%$  versus  $14 \pm 0.05\%$  respectively). In contrast, fat intake in normal group was lower than obese group ( $28 \pm 0.06\%$  versus  $36 \pm 0.08\%$ ), ( $P$ -value < 0.0001).

was observed. In addition, normal group was higher than obese group in moderate inactive level (33% - 25%). However, normal group was lower than obese group in inactive level (9% and 14% respectively) nevertheless there was no difference between them in these two levels ( $P$ -value = 0.29).

**Table 3:** Daily energy intake and contribution of the different macronutrients between normal and obese groups

	Normal group (N=100)	Obese group (N=100)	<i>P</i> -value
Total Energy (kcal/d)	1287±318	1386±457	0.07
Carbohydrate (%)	53±0.08	49±0.09	0.001
Fat (%)	28±0.06	36±0.08	< 0.0001
Protein (%)	19±0.06	14±0.05	< 0.0001



**Figure 3:** Physical Activity Levels in normal and obese groups

### 3.5. Physical Activity level

In general, we registered a significant difference between normal and obese groups in PA level. ( $P$ -value = 0.016) (Figure 3). Normal group was lower than obese group in term of being Active (25% versus 42%), ( $P$ -value = 0.03).

Normal group was higher than obese group in moderate active level (33% versus 19%). However, no difference between them upon this level ( $P$ -value = 0.052)

## 4. DISCUSSIONS

Due to the high prevalence of obesity in Saudi Arabia among females reaching up to 33.5% [6], the aim of the present study was to assess the WMP among obese and normal weight among University students at PNU. Such a study attempted to develop an insight analysis of how does this population deal with weight control and lose

and to which extent the adopted practices were safe and healthy. Findings revealed that the majority (92%) of obese students was unhappy with their current weight. Furthermore, previous studies showed that obese people might compare their own body shape to the body images of models that reflects a negative attitude and dissatisfaction about their weight [14]. According to Sides-Moore and Tochkov (2011), unhappiness with body images might lead to eating disorders, low self-esteem, and depression [14]. This might be reflected in developing inappropriate behavior such as attempting different methods to lose or reduce their body weight. Indeed, high proportion (93%) of obese participants, in the present research, stated an attempt to reduce their body weight. However, most of reported practices used to achieve such a goal was unhealthy, aggressive to health and ineffective. For that purpose, frequent practices were used for reducing calorie intake (63%), skipping meals (59%) or fasting for long periods of time (37%). Karelis et al. (2008) reported, in healthy obese people, that attempts to achieve weight loss, through diet restriction, might be actually counterproductive and potentially harmful [15]. The same authors noticed that a 6 months' hypo-caloric diet significantly induced insulin sensitivity deterioration in healthy obese persons [15].

The unbalanced dietary intake and bad food habits, among obese group, constitute another main finding of the current study, since we found significant fat intake compared to normal group. This amount represented 36% of total energy intake, while it should be ranging between 20-30% according to the RDA [16]. This result agrees with a previous study in which authors observed that high consumption of fat and carbohydrate may contribute to obesity in men [17].

On the other hand, daily consumption of fruit, date, and dressing was significantly higher in obese compared to normal group too (22%, 31%, 22% versus 10%, 25%, 7% respectively). It is well known that dates contain a high percentage of carbohydrate (sugar) and calories compared to most fresh fruits [18]. Salad dressing are usually made with processed oil which is rich in fat, sugar, and calories. Studies in Saudi Arabia reported that the increased intake of snacks consumption is often accused for increased prevalence of obesity. As reported by Al-Rethaiaa et al. [5], eating snacks was a common habit among students and its daily consumption was reported in 31.7% of them. In our study, the daily consumption of snacks, in normal weight group, was lower than obese weight group (39% and 42% respectively), although not significant.

Assessment of the level of PA indicated a high level of physical inactivity among both groups; 42% and 39% among normal group and obese group, respectively. Abdulmohsen et al. (2015) reported similar results from a

national survey among women in Saudi Arabia. The same authors found that physically inactive women showed the highest proportion compared to moderate and high active women [19]. In a recent study, carried out by Al-Bakr et al. (2016), no significant association has been found between obesity and the level of PA among Saudi women [20]. Therefore, in the present study, the number of active participants in obese group was significantly higher compared to normal group. A possible explanation would be that some participants of the obese group were engaging in gym and might have physical activities plan. However, such details were not investigated in the current study and constitute then one of the study limitations.

Other limitations of our study should be mentioned. Although its speed and ease of administration, the 24-hour recall method has some limitations and might not represent the long-term dietary habits of investigated participants. We confronted some difficulties in collecting data due to memorization, perception, conceptualization of food portion sizes, and presence of observer, which might explain the low total calorie intake reported in both groups.

## 5. CONCLUSION

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Taken together, the results of the present study suggest that obese group of students in PNU undertake unsafe and unhealthy practices to lose or control their body weight. The dietary intake is inadequate and rich in sugars and fats. Increasing awareness and encouraging students, mainly the obese ones, to change their lifestyle by adopting healthy alternatives to manage their body weight, is highly recommended. A healthy lifestyle relies on balanced diet characterized by consumption of fruits, vegetables, dietary fibers, and limiting saturated fat and simple sugars, with maintaining a regular PA. Thus, a special emphasis on the need for safe and healthy eating strategies and coordinated efforts at all levels (family, university, community, and government) to counter together the obesity among young adult female and ensure optimum health and well-being to them.

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