Anthropometric profile, physical activity and Dietary habits among female university students.

*Mervat M. Arrab[1, 3] Nanees A. Ismail[2, 3], Meshiel Alalyani[3]

[1]Community health nursing, Faculty of Nursing, Menoufia University, Egypt
[2]Community medicine department, Faculty of Medicine, Ain Shams University, *Egypt*

[3]*Public Health department, College of Applied Medical Sciences,* King Khalid University, Kingdome of Saudi Arabia
Corresponding Author: Mervat M. Arrab

Abstract: *This paper explores the anthropometric profile (height, weight, body mass index, body fat percentage, waist hip ratio, waist circumference and visceral fat) and dietary habits among female university students of college of Applied medical Sciences. Data collected from (N=162) girl students in 2016. We found that 34.5 % of students had high body fat percent and 26.2 % had very high body fat percent which revealed that WC is a good indicator of abdominal obesity. 16.7 % of students never ate meat and there was significant positive correlation between frequency of eating meat and BMI. There is significant positive correlation between body fat and a body mass index, visceral fat level, waist circumference, hip circumference and WHR. There is no significant relationship between The BMI categories and the Physical activity among students. 16.1 % of the students show a moderate and high risk for developing cardio-metabolic disorders. Health education program about food consumption, dietary habits and physical activity among college students for effective prevention and management of obesity in adulthood.*
Keywords: *Body Mass Index, Waist Circumference, Percent Body Fat, Waist Hip Ratio, Physical activity and dietary habits.*

I. Introduction

Overweight and obesity considered one of the major public health problems (WHO, 2014a), and it is estimate that 1.9 billion people (39% of the global population) older than 18 are overweight, out of which 600,000,000 (13% of the total global population) are obese (Ogden et al., 2014). Overweight and obesity were reported in all age groups worldwide, including college students, while many researchers have pointed out that the critical period for weight gain are the freshman years (Rašeta et al., 2016).

In the Kingdom of Saudi Arabia (KSA), modern studies concealed increasing consumption of animal products and refined foods in the diet at the cost of vegetables and fruits. These dietary changes were alarm for increasing occurrence of both overweight and obesity observed among Saudi children, adolescence & adults in the earlier few decades (Al-Rethaiaa et al., 2010).

College age is very critical in young people's health due to a tendency to gain weight & adopt poor dietary & physical exercise habits (Vadeboncoeur et al., 2015). Weight gain contribute to a risk of being overweight and obese later in life. Factors causing obesity are multi-factorial in origin. These factors may include biological and non-biological factors such as hereditary, age, sex, education, socio- economic level, physical activity, eating habits and psychological factors (Suleiman et al., 2009).

Abdominal obesity has recently been considered an established cardio metabolic risk factor (Erem et al., 2004). General and abdominal obesity are associated with non communicable chronic diseases such as type 2 diabetes, cardiovascular, cerebrovascular diseases, digestive disorders, and cancer. On the other hand, obesity is a major independent risk factor for the development of hypertension, type 2 diabetes, and dyslipidemia (Erem et al., 2004). Weight and body-composition change are critical during college age this explained by students experience a certain number of intermediary changes when they transfer from secondary school to the college environment (Rašeta et al., 2016). Strategies needed to combat weight gain in college students (Majors, 2015).

The most important anthropometric profile which highly associated with health assessment are subcutaneous fat in different areas, Body mass index, Waist to hip ratio, Waist circumference and percentage of body fat (Ghane et al., 2014). Waist circumference is appropriate for quantifying body fat in university female, it can used instead of bio impedance analyzer to screen young adult female and find those who are at risk due to increased body fat or central fat distribution (Šporin, 2014).

Maintaining an appropriate body weight and waist circumference significantly contributes to health promotion and disease prevention. Regular physical activity and healthy eating behavior are the most important protective factors (Šporin, 2014).

II. Aim of the Study

The aim of the present study was to assess anthropometric profile (BMI, Waist Circumference, hip Circumference, Body Fat Percentage , Visceral fat level, waist hip ratio) Assess overweight and obesity among female students. To describe dietary habits and physical activities among female students. And to study the relation between dietary habits, physical activity and body mass index among students of college of Applied medical Sciences for girls in Khamis Mushyat at King Khalid University (KKU).

III. Subjects And Methods

3.1. Study design:
A cross-sectional descriptive design used in this study.

3.2. Sample:
All students of college of Applied medical Sciences for girls Khamis Mushyat who agreed to participate.

3.3. Inclusion criteria:
The students girls aged 18 - 24 years had participated in the study.

3.4. Tools:
Tools used for data collection designed by the researcher based on information from literature review and being revised by subject area experts. validity; determined by Experts. Reliability assessed twice by applying the tools on 10 students who excluded from the study sample (pilot study). The reliability tool tested by test re-test reliability (0.78).

Data collected by **Tool I** self-administered questionnaire which consisting of four parts, part 1consists of (Scio-demographic data , medical history of students and their family). part 2 it compromised of 34 questions which measure some aspects of student's lifestyle as (physical activity and dietary habits) e.g Practice Sports, Eating breakfast, Number of meals/day, beverages of Snacking and fast food per week.

Tool II Anthropometric profile. All measurement taken twice by trained researcher. Standing Height recorded to the nearest 0.5 cm. Body weight, body fat percent and visceral fat level recorded by using the bioelectrical impedance method (BIA) by a Digital Weight scale (**Omron HBF 510 Body Composition Monitor**),. BMI calculated as Kg/m^2. According to BMI $(kg)/(m)^2$ the adults divided into 4 groups, underweight (<18.5), normal ($18.5<25$), overweight ($25<30$), obese is (≥ 30). Waist circumference measured at the midway point between the iliac crest and the lower rib at the end of a normal expiration and under the clothes by using a flexible and inelastic measuring tape (Pereira et al., 2015).

A cut-off point of 80 cm for WC used for identifying individual with moderate health risk and a critical value of 88 cm or more for individual with high risk for cardio metabolic disorders linked to central obesity distribution type (Rotar, 2008).

Waist-to-hip ratio (WHR) was calculated using the waist circumference and hip circumference measures; WHR values classified according to the WHO recommendations (2008) considered   females<0.75 excellent, 0.75–0.79 good, 0.80–0.86 average and >0.86 at risk. body fat percent (PFB) is the amount of body fat mass on regards to the total body fat expressed as a percent, it was considered low ($<21.0\%$), normal (21.0-32.9%), high (33.0-38.9%) and very high ($\geq 39.0\%$). visceral fat (fat surrounding internal organs level classified into, normal (1-9), high (10-14) and very high (15-30) (Gallagher et al., 2000).

3.5. Procedure:
Oral consent about participating in the study was collected from female students, researcher give explanation about purpose of the study to all students, Data collection took about 4 months (from September 2016 to December 2016). The researcher met the female students two times per week to fill the questionnaire. Analysis of the findings carried out by using SPSS software package version 20. Assess the statistical significance of the association between BMI ,percent of body fat, Visceral fat level and other variables, $p \leq 0.05$ was considered statistically significant by Chi-squared test.

IV. Results

Anthropometric and body composition characteristics of students are presented in **table 1** shows that the mean of body mass index was 22.94 ± 4.95 and the mean body fat was 3.86 ± 1.63, the mean of waist circumference was 70.82 ± 12.58, the mean of hip circumference was 96.81 ± 12.09 and the mean of WHR was $0.73\pm.13$ among study sample.

the present study revealed that slightly more than one-third of students 34.5 % of students had high body fat percent and 26.2 % had very high body fat percent.

The mean age of students was 20.25 ± 1.4 years.

Figure 1: Figure 1(A) describe body mass index which revealed that 66.07% of students had normal body mass index, obesity was 8.93% , over weight was 14.29%, and underweight was 10.71% among study sample . Figure 1(**B**) shows the percent body fat slightly above one-third 34.5% of students were high body fat percent and 26.2% were very high body fat percent. Figure 1(**C, E**) revealed that nearly all students had normal Visceral fat level & Waist hip ratio. Figure 1(**D**) shows that 83.9 % of students were less or = 80 WC which have no risk of cardio-metabolic disorders, 11.3% were moderate risk and 4.8% were high risk for cardio-metabolic disorders.

There is significant positive correlation between percent body fat and a body mass index presented in **Figure 2.**

Table 2 Shows that there is significant positive correlation between body fat and a body mass index , visceral fat level , waist circumference, hip circumference and WHR.

Table 3-4 shows the Food consumption and habits among study group that 46.4 % of students daily eating breakfast but there is no significant relationship between The BMI categories and eating breakfast ($p < 0.05$). 40.5% of students ate Fruits from 2-3 times per week but there is no significant relationship between The BMI categories and Fruits and Vegetable. It is worth mentioning that 16.7 % of students never ate meat and there was significant positive correlation between frequency of eating meat and BMI categories ($p = 0 .022$). Nearly one-third of students 30.4 % ate Foods high in fat from 2-3 times per week, and 33.3 % ate Fast food once per week but there is no significant relationship between The BMI categories and frequency of consuming fast food and foods high in fat among students.

Table 5 demonstrates that there is no significant relationship between The BMI categories and the Physical activity among students. 72.6 % of students watched TV one or less than hour, about one-third of students 31.6% used computer more than 3 hours per day, nearly half of students 47.6% have no time to practice physical activity.

Table 1: Anthropometric profile (mean ± SD) of students.

	Minimum	Maximum	Mean	Std. Deviation
Height (cm)	144.00	169.00	157.05	5.48
Weight (kg)	36.60	125.00	56.18	13.09
percent Body fat (PBF)	8.10	60.00	34.57	9.50
Visceral fat level (VFL)	1.00	11.00	3.86	1.63
Body mass index (BMI)	16.20	44.50	22.94	4.95
Waist circumference(WC)	41.00	151.00	70.82	12.58
Hip circumference(HC)	45.00	160.00	96.81	12.09
Waist hip ratio (WHR)	.43	1.86	.73	.13

Figure 1: Anthropometric profile (A,B,C,D,E,F).

(A)

(B)

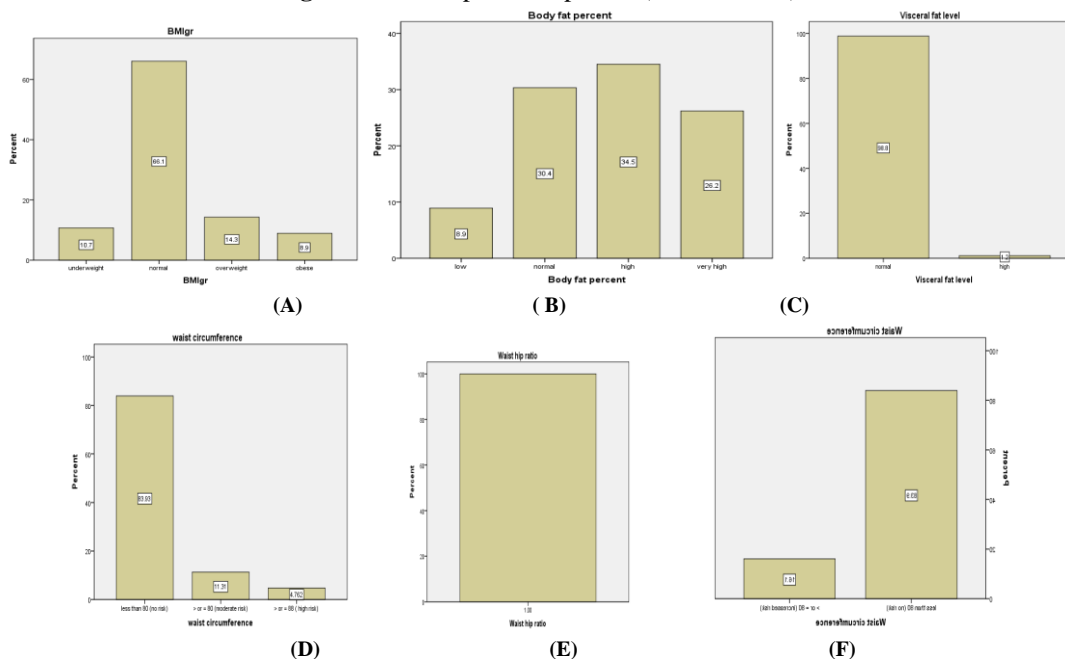(C)

(D)

(E)

(F)

Table 2: Correlations between body fat and a body mass index , visceral fat level , waist

		Body fat	Visceral fat level	Body mass index	Waist circumference	Hip circumference	WHR
Body fat percent	Pearson Correlation	1	.855[**]	.833[**]	.487[**]	.493[**]	.167[*]

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Correlations between body fat and body mass index , visceral fat level , waist
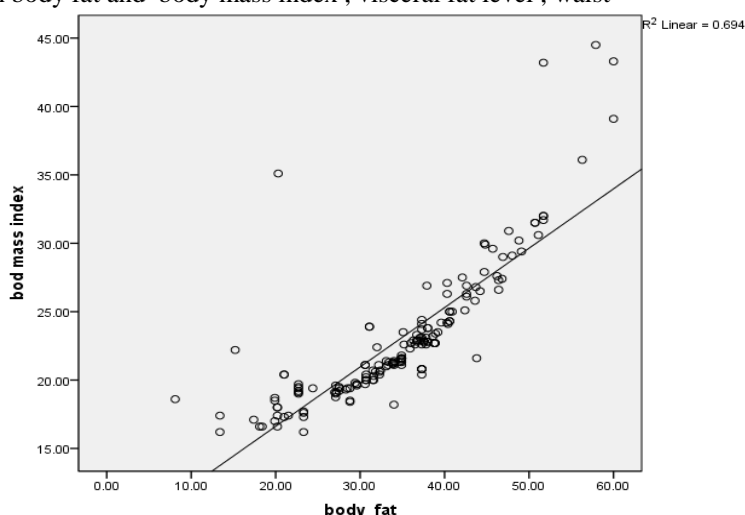

Figure 2. Correlation between body fat and body mass index.
r=.833[**]

Table 3: Food consumption among study group (N=162)

Food consumption habits (N=162)	Daily %	2-3/week %	once/week %	less than once/week %	Never %
Breakfast	46.4	41.7	7.1	3.0	1.8
Vegetable	26.2	39.9	16.1	11.9	6.0
Fruits	13.7	40.5	20.8	21.4	3.6
Meat	10.1	32.1	16.7	24.4	16.7
Chicken	32.7	45.8	11.9	5.4	4.2
Fish	1.8	13.1	21.4	49.4	14.3
Legumes	11.9	31.0	23.2	23.2	10.1
Milk products	43.5	32.7	10.1	8.3	5.4
Prepared foods	13.7	31.5	24.4	25.0	5.4
Foods high in fat	11.3	30.4	23.8	26.8	7.7
Foods high in sugar	24.4	39.9	19.0	13.1	3.6
Fast food	9.5	26.8	33.3	28.0	2.4
Low fat or free fat food	12.5	23.8	19.6	22.0	22.0

Table 4: Relationship between meat consumption habits and BMI group among study group (N=162)

Food consumption habits (N 162)	underweight	normal	overweight	obese	X2	P
Meat					23.729[a]	.022
Daily	2(11.8%)	11(64.7%)	4(23.5%)	0(.0%)		
2-3/week	3(5.6%)	39(72.2%)	2(3.7%)	10(18.5%)		
once/week	2(7.1%)	19(67.9%)	4(14.3%)	3(10.7%)		
less than once/week	6(14.6%)	28(68.3%)	7(68.3%)	0(.0%)		
Never	5(17.9%)	14(50.0%)	7(25.0%)	2(7.1%)		

Table 5: Relationship between physical activity and BMI group among study group

Physical activity (N 162)	Underweight No (%)	Normal No (%)	Overweight No (%)	Obese No (%)	X2	P
Exercise					7.785[a]	.254
Yes	6(13.3%)	30(66.7%)	6(13.3%)	3(6.7%)		
No	6(20.7%)	14(48.3%)	6(20.7%)	3(10.3%)		
Sometimes	6(6.4%)	67(71.3%)	12(12.8%)	9(9.6%)		
practice exercise / week	6(20.7%)	14(48.3%)	6(20.7%)	3(10.3%)	22.115[a]	.105
Never	3(7.9%)	24(63.2%)	10(26.3%)	1(2.6%)		
1	3(11.1%)	19(70.4%)	2(7.4%)	3(11.1%)		
2	0(.0%)	22(78.6%)	4(14.3%)	2(7.1%)		
3	1(6.3%)	11(68.8%)	1(6.3%)	3(18.8%)		
4	5(16.7%)	21(70.0%)	1(3.3%)	3(10.0%)		
5 or more						
Duration of exercise every time.	5(12.5%)	30(75.0%)	1(2.5%)	4(10.0%)	12.601[a]	.182
Less 30 min	6(6.9%)	59(67.8%)	14(16.1%)	8(9.2%)		
30-60min	1(9.1%)	7(63.6%)	3(27.3%)	0(.0%)		
More 60 min						
Barrier of exercise					21.246[a]	.129
No barrier	6(12.0%)	33(66.0%)	6(12.0%)	5(10.0%)		
Not of my interest	5(17.9%)	16(57.1%)	5(17.9%)	2(7.1%)		
No place	1(7.1%)	11(78.6%)	0(.0%)	2(14.3%)		
No time available	2(3.1%)	44(67.7%)	13(20.0%)	6(9.2%)		
Not allowed for me	0(.0%)	1(100.0%)	0(.0%)	0(.0%)		
I am thin	4(40.0%)	6(60.0%)	0(.0%)	0(.0%)		

V. Discussion

The present study shows that body mass index, waist circumference ratio, body fat percentage, physical activity and dietary habits among female university students. The results show generally the mean of body mass index was 22.94±4.95 and the mean body fat was 3.86±1.63, the mean of waist circumference was 70.82±12.58, the mean of hip circumference was 96.81±12.09 and the mean of WHR was .73±.13 among study sample. Our results In congruence with, Mohammadn & Saberi (2016) in Iran Who mentioned that Their mean body height was 160.55 ± 5.93 cm and mean body mass 58.5 ± 9.94 kg. Mean Percent body fat was 31.51 ± 5.66, mean waist circumference was 0.7355 ± 0.082 and Waist-Hip Ratio mean was 0.81± 0.054.

The present study demonstrated that nearly about two-thirds was the normal body weight (66.07%). under weight students represented (10.71%) and overweight students were (14.29%), while who categorized as obese were (8.93%). This result is in agreement Abd El Hakeem1 et al., (2015) which showed that prevalence of overweight students was 16% and 9.6% of students were categorized as obese. And Huang et al,. (2017) in University of Kansas USA Who revealed that (21.6% overweight, 4.9 % obese). In the same line, Rašeta1 et al,. (2016) revealed that normal weight was 62.10%, underweight 17.60%, overweight 14.10 % and obesity 5.20 % among Banja Luka college students.

This is prove that female university students were more likely to maintain or lose weight Majors, (2015) while among Chinese the rate decreased to 2.9% with a percentage of obesity as low as 0.4 Sakamaki et al., (2005) The difference might be due to different environment and cultures.

According to the current study findings, waist circumference was 70.82±12.58 The findings are in congruence with Sachithananthan & Gad, (2016) in KSA. The present study shows that 11.3% were moderate risk and 4.8% were high risk for cardio-metabolic disorders, this finding is similar with Slovenian female students 4% of examined participants show a critically higher value for WC (>80 cm) and a moderate risk for developing cardio metabolic disorders. No female students included in the study showed a high cardio metabolic risk Šporin, (2014). Although the present study shows Waist circumference was within the cutoff point of less than 88 cm for women, showing absence of central obesity. According to the present study findings, Waist hip ratio of all students were in normal, These findings are in congruence with Šporin, (2014) who it is not possible to estimate total body fatness of young adult female from WHR.

Our study finding demonstrated that there is significant positive correlation between body fat and a body mass index, visceral fat level, waist circumference, hip circumference and WHR. Which is congruent with Rašeta1 et al., 2016) who found correlation between BF% and WHR (r = .90, p < .01).

Physical activity and dietary behaviors adopted during college may influence overweight and obesity in adulthood Kaur et al., (2012). So the study finding revealed that 53.6 % of students did not regularly eating breakfast but there is no significant relationship between The BMI categories and eating breakfast (p > 0.05). 40.5 % of students ate Fruits from 2-3 times per week but there is no significant relationship between The BMI categories and Fruits and Vegetable. It is worth mentioning that 16.7 % of students never ate meat and there was significant positive correlation between frequency of eating meat and BMI categories (p > 0 .022). Nearly one-

third of students 30.4 % ate Foods high in fat form 2-3 times per week, and 33.3 % ate fast food once per week but there is no significant relationship between The BMI categories and frequency of consuming fast food and foods high in fat among students,. This is in agreement with (Majors, 2015) mentioned that factors contribute to weight gain or maintenance among college students are different. Weight gain may be related to those who consume breakfast less often than others, decrease in moderate physical activity, and change from high school to college can impact students greatly in their dietary habits.

According to the current study findings, there is no significant relationship between The BMI categories and the Physical activity among students. 72.6 % of students watched TV one or less than hour, about one-third of students 31.6% used computer more than 3 hours per day, and nearly half of students 47.6 % have no time to practice physical activity.

The findings are in congruence with Sachithananthan & Gad, (2016) who reported correlations by Chi square drawn between BMI (Body Mass Index) and physical activity were not significant. The findings are in no congruence with Kaur et al., (2012) among Adult Indian Women who mentioned that diet and physical activity had strong relationship with anthropometric and body composition parameters in women as the age progressed. This is may explained by different cultures and environment. 16.1 % of the students show a moderate and high risk for developing cardio-metabolic disorders and should be involved in therapeutic protocols; weight loss and physical activity intervention.

VI. Conclusion

Slightly less than one-quarter of students were overweight and obese and about two-thirds of students had high body fat percent. The waist circumference students showed that they are at high risk for cardio-metabolic disorders. There was no significant relation between BMI and (dietary habits and physical activity) except for frequency of eating meat.

We recommended provision of health education program about food consumption, dietary habits and physical activity among college students for effective prevention and management of obesity in adulthood. Further studies needed to check the relationship of BMI, Waist circumference, and Percent body fat with other metabolic abnormalities for health promotion and early prevention of health risks related to overweight and obesity.

ABBREVIATIONS
BMI: Body mass index
PBF: Percent body fat
WC: Waist circumference
WHR :Waist Hip Ratio
BIA: Bioelectric impedance analyst

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Reference

[1]   World Health Organization. Obesity and overweight (Factsheet) 2014a. Retrieved from: (http://www.who.int/ mediacentre/factsheets/fs311/en).
[2]   Ogden CL, Carroll MD, Kit BK, & Flegal KM.. Prevalence of obesity and trends in body mass index among US children and adolescents, 1999-2010. Journal of the American Medical Association. 2014; 307(5): 483–490.
[3]   Rašeta N, Đurić S, Zeljković N, Simović S, Vujnić M. Interrelations between body mass index, percentage of body fat, and waist-to-hip ratio among different groups of students at the university of Banja Luka. Physical Education and Sport. 2016; 14(3): 331 - 345.
[4]   Al-Rethaiaa, AS, A Fahmy,AE & Al-Shwaiyat, NM. Obesity and eating habits among college students in Saudi Arabia: a cross sectional study. Nutrition Journal. 2010; 9:39.
[5]   Vadeboncoeur, C, Townsend N, & Foster C. A metaanalysis of weight gain in first year university students: is freshman 15 a myth? . BMC Obesity. 2015; 2 (22): 1–9.
[6]   Suleiman AA, Alboqai OK, Yasein N, El-Qudah JM, Bataineh MF, and ObeidatBA. Prevalence of and Factors Associated with Overweight and Obesity among Jordon University Students. Journal of Biologi-cal Sciences. 2009; 9 (7): 738-745.
[7]   Erem C, Arslan C, HacihasanogluA, et al,. Prevalence of Obesity and Associated Risk Factors in a Turkish Population (Trabzon City, Turkey). Obesity research. 2004 ; 12 (7) :1117-1127.
[8]   Majors MR. Dietary habits and knowledge of College age students. master Thesis. the University of Kentucky. Dietetics and Human Nutrition. 2015; Paper 30. (http://uknowledge.uky.edu/foodsci_etds/30)
[9]   Ghane M, Aghayari A, Mazreno AB. Body Fat Percentage in Active and Inactive Students Using Anthropometric Parameters. International Journal of Pediatrics. 2014; 2 (12): 391-398.
[10]   Šporin DZ. Waist circumference is appropriate for quantifying body fat in university female students. Anthropological notebooks. Slovene Anthropological Society. 2014; 20 (2): 145–153.
[11]   Pereira PF, Serrano HM, Carvalho GH, Ribeiro S, Peluzio M, Franceschini S and Priore S. Measurements of body fat distribution: assessment of collinearity with body mass, adiposity and height in female adolescents. Rev Paul Pediatr 2015; 33(1):63–71

[12] Rotar P D. Presnovni sindrom [Metabolic syndrome]. Novo mesto, Krka 2008 ; d.d., : 1–12.
[13] Gallagher D, Heymsfield S, Heo M, Jebb S, Murgatroyd P, and Sakamoto Y. Healthy percentage body fat ranges: an approach for developing guidelines based on body mass index. . Am J Clin Nutr 2000;72:694–701.
[14] Mohammadi E, Saberi A. The relationship between body composition, anthropometry, and physical fitness in female university students. Trends in sport sciences.2016; 3(23): 155-158.
[15] Abd El Hakeem1 B, Abu-Melha S, Gad N, Alsheri M. Association between Dietary Habits and Body Mass Index to Female Students College Sciences and Arts Campus 1 at Khamis Mushayt King Khalid University. Food and Nutrition Sciences. 2015; 6: 1316-1323.
[16] Huang TK, Harris KJ, Lee RE Nazir N, Born W & Kaur H. Assessing Overweight, Obesity, Diet, and Physical Activity in College Students. Journal of American College Health. 2017 ; 52(2): 83-86 (http://www.tandfonline.com/loi/vach20).
[17] Sakamaki R, Toyama K, Amamoto R, Liu CJ,and Shinfuku N. Nutritional Knowledge Food Habits and Health Attitude of Chinese University Student. Across Sectional Study. Nutrition Journal. 2005; 4(4) (http://dx.doi.org/10.1186/1475-2891-4-4).
[18] Sachithananthan V & Gad N. A study on the frequency of food consumption and its relationship to BMI in school children and adolescents in Abha city, KSA. Current research in nutrition and food science. 2016; 4(3), 203-208.
[19] Kaur G, BainsK, Kaur H. Body Composition, Dietary Intake and Physical Activity Level of Sedentary Adult Indian Women. Food and Nutrition Sciences.2012; 3:1577-1585 (http://dx.doi.org/10.4236/fns.2012.311206).