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PREVALENCE OF METABOLIC SYNDROME AMONG DELTA UNIVERSITY FOR SCIENCE AND TECHNOLOGY (DUST) STUDENTS

Diabetology

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ABSTRACT

Background: Metabolic syndrome (MetS) is clinical condition associated with multiple complications. Corresponding with the increased obesity epidemic in young people, increased rates of MetS among this population was reported.
Aim of work: to document the prevalence of MetS among Delta University for Science and Technology (DUST) students.
Methods: 300 students were examined for prevalence of MetS. For the diagnosis of MetS, we adopted the Harmonized Joint Scientific Statement (HJSS) on metabolic syndrome recommendations.
Results: The present study included 300 students. They comprised 118 male (39.3 %) and 182 female (60.7 %) with an age of 19.1 ± 0.8 years. MetS was diagnosed in only 3 students (1.0 %). Individual MS criteria included central obesity (48.0 %), increased serum triglycerides (3.7 %), reduced HDL (11.3 %), hypertension (5.0 %) and hyperglycemia (0.3 %). Only 1 criterion of MetS diagnosis was reported in 48.0 % of students while 2 criteria were reported in 8.7 % of students and 3 criteria were reported in 1 % of students. Comparison between males and females revealed significantly higher frequency of central obesity in females (33.1 % versus 57.7 %, p< 0.001). In comparison, males had significantly higher frequency of increased serum triglycerides (7.6 % versus 1.1 %, p=0.003).
Conclusions: The prevalence of MetS is 1.0 %. Central obesity was the most common criterion. Females had significantly higher rate of central obesity and MetS criteria.

KEYWORDS

Metabolic syndrome, central obesity, university students.

INTRODUCTION

Metabolic syndrome (MetS) is a clinical condition that clusters abdominal obesity, dyslipidemia, hyperglycemia and hypertension. The average prevalence of MetS in the adult populations is about 31.0 %. The syndrome is linked to increased odds of cardiovascular disease and all-cause mortality ***(Engin, 2017).***

Recent reports recognized alarmingly increased prevalence of MetS among younger people ***(Fu and Prasad, 2015).*** The increased prevalence of MetS in the younger populations is related to the changed life style favoring lower physical activity and certain dietary preferences ***(Machado-Rodrigues et al., 2015).***

Even in the younger age, MetS is associated with many morbidities including altered liver functions ***(Dimitrijevic-Sreckovic et al., 2013)***, non-alcoholic fatty liver disease ***(Silveira et al., 2013)***, diabetes mellitus ***(Weinstock et al., 2015)***, obstructive sleep apnea ***(Qu et al., 2015)***, dyslipidemia ***(Bermúdez-Cardona and Velásquez-Rodríguez, 2016)*** and impaired bone health ***(da Silva et al., 2017).***

Early identification of MetS in youngsters is of paramount significance. It's crucial to determine the related risk factors and clinical patterns to help appropriate planning for management and prevention ***(Agirbasli et al., 2016).*** There are limited published data on the prevalence of MetS among young adult in Egypt (Mahrous et al., 2018). So, the aim of the current study was to assess the prevalence of MetS among DUST students and identify potential risk factors that can be used for the prevention and management of MetS in young adults.

SUBJECTS AND METHODS

Subjects

The present study is a cross-sectional study. It was conducted at Delta University for Science and Technology (DUST), Gamasa, Egypt. The study protocol was approved by the local ethical committee in accordance with the Helsinki Declaration on clinical research involving human subjects. All participants gave informed consent before being included in the study. Three hundred students attending the hospital for routine check-ups were recruited. The eligible participants were selected from two faculties of the university using multistage random sample. The list of all names of faculties was obtained from DUST administration Office. The selected faculties were Faculty of Dentistry and oral medicine, Faculty of Physical Therapy.

Exclusion criteria

Exclusion criteria were patients with known cardiovascular disease or metabolic or genetic conditions associated with body weight changes. All students were subjected to careful history taking, thorough clinical examination. All subjects were weighed shoeless with light clothes using a standard scale. Hight was assessed using a standard stadiometer. Waist circumference was measured using a tape measure at the top of the iliac crest at the end of exhalation. Systolic and diastolic blood pressures were measured by means of mercurial sphygmomanometers.

Investigations

- five ml venous blood sample was collected from each participant by expert nurse after 12 h of fasting into a sterile tube with clot activator for the measurement of serum lipids and glucose. Blood samples were immediately placed in an icebox for a period not exceeding 3 h. Blood samples were centrifuged and analyzed immediately after separation for blood glucose. Analyses for fasting blood lipids, including triglycerides (TG), HDL-C, and total cholesterol, and fasting blood glucose were carried out by enzymatic colorimetric test, using spectrophotometer (Jenway, Keison International Ltd., Chelmsford, UK).

Assessment of MetS

For the diagnosis of MetS, we adopted the Harmonized Joint Scientific Statement (HJSS) on metabolic syndrome recommendations. MetS criteria included increased blood pressure >130/85 mmHg, elevated FBS >100 mg/dL, obesity: waist circumference: >94 cm (male) >80 cm (female) or body mass index >30 kg/m^2, dyslipidemia: triglycerides ≥ 150 mg/dL and high-density lipoprotein cholesterol (HDL-C ≤ 40 mg/dL (male), 50 mg/dL (female). MetS was diagnosed in the presence of any three criteria ***(Alberti et al., 2009).***

Statistical analysis

Data were represented as mean ± SD or number and percent. Statistical analysis was computed using SPSS 25 (IBM, USA). Comparisons were achieved using Fisher exact test or chi-square test as appropriate. P value less than 0.05 was considered statistically significant.

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RESULTS

The present study included 300 students. They comprised 118 males (39.3 %) and 182 females (60.7 %) with an age of 19.1 ± 0.8 years. MetS was diagnosed in only 3 students (1.0 %). Individual MS criteria included central obesity (48.0 %), increased serum triglycerides (3.7 %), reduced HDL (11.3 %), hypertension (5.0 %) and hyperglycemia (0.3 %). Only 1 criterion of MetS diagnosis was reported in 48.0 % of students while 2 criteria were reported in 8.7 % of students and 3 criteria were reported in 1 % of students (Table1).

Table-1 Prevalence of metabolic syndrome and its components in the studied subjects

Metabolic syndrome n (%)	3 (1.0)
Metabolic syndrome criteria n (%)	
Central obesity	144 (48.0)
Increased serum triglycerides	11 (3.7)
Reduced HDL	34 (11.3)
Hypertension	15 (5.0)
Hyperglycemia	1 (0.3)
Number of metabolic syndrome criteria	
1 criterion	144 (48.0)
2 criteria	26 (8.7)
3 criteria	3 (1.0)

HDL: high density lipoprotein.

Comparison between males and females revealed significantly higher frequency of central obesity in females (33.1 % versus 57.7 %, p< 0.001). In comparison, males had significantly higher frequency of increased serumtriglycerides (7.6 % versus 1.1 %, p=0.003) (Table-2).

Table-2 Comparison between males and females regarding metabolic syndrome criteria (n=300)

	Males n=118	**Females n=182**	**P value**
Metabolic syndrome n (%)	1 (0.9)	2 (1.1)	0.83
Metabolic syndrome individual criteria n (%)			
Central obesity	39 (33.1)	105 (57.7)	< 0.001
Increased serum triglycerides	9 (7.6)	2 (1.1)	0.003
Reduced HDL	12 (10.2)	22 (12.1)	0.61
Hypertension	4 (3.4)	11 (6.0)	0.3
Hyperglycemia	1 (0.9)	-	0.21
Number of metabolic syndrome criteria n (%)			
1 criterion	44 (37.3)	63 (34.6)	0.01
2 criteria	9 (7.6)	100 (55.0)	
3 criteria	1 (0.9)	2 (1.1)	

HDL: high density lipoprotein

Comparison between students with central obesity and students without revealed higher – albeit insignificant – frequency of MetS in students with central obesity (Table-3)

Table-3 Comparison between students with central obesity and students without regarding metabolic syndrome criteria

	Central obesity n=144	**No central obesity n=156**	**P value**
Metabolic syndrome n (%)	3 (2.1)	-	0.07
Metabolic syndrome individual criteria n (%)			
Increased serum triglycerides	7 (4.9)	4 (2.6)	0.29
Reduced HDL	16 (11.1)	18 (11.5)	0.91
Hypertension	7 (4.9)	8 (5.1)	0.92
Hyperglycemia	-	1 (0.6)	0.34
Number of metabolic syndrome criteria n (%)			
1 criterion	117 (81.3)	27 (17.3)	< 0.001
2 criteria	24 (16.7)	2 (1.3)	
3 criteria	3 (2.1)	-	

HDL: high density lipoprotein.

DISCUSSION

In the present study, the prevalence of MetS was 1.0 %. This figure is close to that reported by the study of ***Yahia et al., (2017)*** where MetS wasn't prevalent among 462 students, aged 18-25 years using the National Cholesterol Education Program's Adult Treatment Panel III guidelines. In comparison, the prevalence of MetS was 3.7 % among 402 university students in the study of ***González Deschamps et al., (2007)***, 4.6 % among 8226 freshmen students in the study of ***Yen et al., (2008)***, 8.1 % among 1,096 freshmen students in the study of ***Lin et al., (2009)*** and 7.6 % in the study of ***Ruano Nieto et al., (2015)***. Astonishingly, the prevalence of MetS among university studies using Joint Interim Statement (JIS) criteria was 20.5% ***(Barbosa et al., 2016).***

Mahrous et al., (2018) found that the overall MetS prevalence among Menoufia University students was 16.7% which was in line with Al-Isa *et al.* (2010), who estimated the prevalence of MetS in 431 Kuwaiti adolescents aged 10–19 years and found that the prevalence of MetS was 14.8% using IDF criteria. Moreover, this was in concordance with Mattsson *et al*. (2007) who collected their data from 2182 healthy young adults in Finland, and the prevalence of MetS was 13.0% using the NCEP criteria and 14.9% using the IDF criteria. The rates found in the present study were higher than those of Al Dhaheri *et al*.[2016] who revealed a MetS prevalence of 6.8% among 555 Emirati female college students aged 17–25 years. In addition, Sabir *et al (2016)* found that the prevalence of MetS among 1012 Sudanese university student aged 16–25 years was 8.4% using IDF criteria and 7.5% using NCEP ATP-III criteria.

Noteworthy, the variable results of different studies don't necessarily reflect true differences. ***Feliciano-Alfonso et al., (2010)*** study showed that prevalence of the MS varied markedly according to the definition employed: 9.2% using REGODCI (Research Group on Diabetes and Chronic Illnesses) criteria, 2% using IDF (International Diabetes Federation) criteria, and 2.4% using AHA (American Heart Association) criteria. In the current study, 48.0 % of the studied subjects had at least one MetS criterion while 2 criteria were identified in 8.7 % of the included students. In the study of ***Fernandes and Lofgren (2011)*** on 189 college students, prevalence of 1 or 2 MetS criteria was 28.0% and 7.4%, respectively where MetS was diagnosed in 3.7 % of subjects. In another study, MetS was diagnosed in 6.8% of 207 college students aged 18 to 24 years according to the National Cholesterol Education Program Adult Treatment Panel III guidelines. The authors also found that 42.5% and 13.0% of students had 1 and 2 MetS components, respectively ***(Dalleck and Kjelland, 2012).*** In a third study where MetS was diagnosed in 1.7 % of 702 Brazilian college students, 30.4% of students manifested at least one and 12.4% at least two individual components ***(de Freitas et al., 2013).***

In our study, central obesity is the most commonly reported MetS criterion. In contrast, the most frequent criterion in the studies of ***González Deschamps et al., (2007)*** and ***Yahia et al., (2017)*** was low HDL-cholesterol (28.9% and 22.0% respectively). A cross-sectional study was conducted during the academic year 2016/2017 at Menoufia University on 455 university students aged 18–25 years demonstrated that the overall prevalence of MetS was more frequent among female students. The most prevalent MetS components were increased waist circumference (41.8%) followed by high triglyceride levels (40.2%) and reduced high-density lipoprotein-cholesterol levels (36.3%). The predisposing factors for having MetS included the following: being female, older than 20 years, obese, physically inactive, high levels of stress, and a positive family history of hypertension and diabetes (Mahrous et al., 2018)

Comparison between males and females revealed significantly higher rate of central obesity in females as compared to males. This finding accords with results reported by the study of ***Ruano Nieto et al., (2015)*** where increased waist circumferences was more frequently reported in females (33.67% vs. 9.55%). Moreover, in our study, females had significantly higher rate of subjects with 2 MetS criteria in contradiction with the conclusions of ***Morrell et al., (2012)*** where males with two MetS criteria was significantly more frequent than females.

In conclusion, the prevalence of MetS in the present study is low. However, almost half of the studied student have at least on MetS criterion. In our series, central obesity particularly in females is the core component of MetS criteria. Considering the young age range of the study participants (18-20 years), follow up of those students is recommended.

Conflict of interest

Authors declared that there is no conflict of interest

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