Gender Difference in Underweight, Overweight and Obesity among First-Year Students of Suranaree University of Technology in 2015

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Background: *Overweight and obesity are significant health problems in Thailand. Lifestyle habits of Thai society and food consumption have changed and are leading to the development of cardiovascular conditions.*
Objective: *To identify the prevalence of underweight, overweight, and obesity among first year university students and to explore the difference between males and females.*
Material and Method: *A cross sectional study was conducted among first year students of Suranaree University of Technology (SUT) for routine health check-up on May, 2015. All participants' weight and height were measured by trained health personnel. The body mass index (BMI) was calculated and classified as underweight (less than 18.50 kg/m^2), overweight (23.00 to less than 25.00 kg/m^2), and obesity class I and II (25.00 to less than 30.00 and more than or equal to 30.00 kg/m^2) based on the Regional Office for the Western Pacific (WPRO) criteria for adult Asian populations. Z-test was applied for proportion differences between males and females and odds ratio was computed to estimate a magnitude of association.*
Results: *Three thousand two hundred seventy nine students were recruited (males 43.40%, females 56.60%). The mean age was 18.22 years. (SD = 0.49). Prevalence of underweight, overweight, and obesity class I and II were 20.68%, 11.07%, 11.10%, and 6.50% respectively. The proportion of underweight in females (23.98%) was higher than males (16.37%) with statistical significance (p<0.001). Conversely, the overweight and obesity class I in males (13.56% and 12.65%) were higher than females (9.16% and 9.91%) with statistical significance (p<0.001 and p = 0.013 respectively). After adjusting for age, males were 1.48 times of getting overweight (adjusted OR = 1.48, 95% CI = 1.18-1.86) and 1.28 times of getting obesity class I (adjusted OR = 1.28, 95% CI = 1.02-1.61) when comparing with females.*
Conclusion: *In conclusion, the overweight and obesity class I is a problem in young male adults. A high prevalence of underweight in females was also clearly observed. Therefore, health promotion programs should be specifically geared for university students on this campus with consideration given to targeting gender differences.*

Keywords: *Gender, Overweight, Obesity, University students*

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Overweight and obesity are significant health problems worldwide. In 2014, WHO global estimates more than 1.9 billion adults aged 18 years and older were overweight. Of these over 600 million were obese[1]. The WHO has recently set overweight and obesity as key indicators for global action on non-communicable diseases[2,3]. For Asian countries, prevalence of overweight and obesity have been increasing[4] as people have changed in lifestyle, reduced physical activities and consumed high caloric foods. The data from the national health examination survey for Thailand highlighted that the prevalence of obesity increased approximately by 60% between 1991 and 2004[5] and increasing trends of mean BMI in all subgroups both males and females between 1991 and 2009[6]. The survey also reported that the distribution of overweight and obesity varied by gender and educational level. The rates of increase in mean of BMI were highest among males with secondary educational level of 1.0 kg/m^2 per decade and among females with primary educational

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level of the same rate. Those with university educational level had the lowest rate of increase in BMI (0.7 kg/m^2) per decade[6]. Patterns of overweight and obesity have varied by gender and few studies have conducted among specific age group[7,10-12]. Thus, this study is aimed to identify the prevalence of underweight, overweight, and obesity among students of Suranaree University of Technology (SUT) and to explore the differences between male and female students in order to raise an awareness of the consequence of overweight and obesity.

Material and Method

Study design and subjects

A cross-sectional study was conducted among first-year students of Suranaree University of Technology (SUT) for routine health check-up on May, 2015. Inclusion criteria were all first-year students who registered for health check-up on May, 2015 and exclusion for those who were not weight or height measured or missing data. All first-year students (n = 3,970) agreed to provide their personal information. This study was approved by the human research ethic committee of Suranaree University of Technology (EC-59-04).

Data collection and anthropometric measurement

Variables comprised gender, age, height, weight and calculated body mass index. All participants' weight and height were measured by trained nurses and health personnel of SUT hospital using standard measurement tools. Weight was measured while students wore light cloths and height was measured at straight standing without shoes. The body mass index (BMI) for each student was calculated using the standard equation: weight (kg)/height (m)^2 and classified according to the Regional Office for the Western Pacific (WPRO) criteria for adult Asian populations[8] as underweight (BMI less than 18.50 kg/m^2), overweight (BMI 23.00 to less than 25.00 kg/m^2), obesity class I (BMI 25.00 to less than 30.00 kg/m^2) and obesity class II (BMI more than or equal to 30.00 kg/m^2).

Data analysis

Data were recorded in excel software and analyzed by using IBM SPSS Statistics for Windows. Continuous variables: age, weight, height and BMI were calculated as mean value $\pm$ standard deviation (SD). Categorical variables: gender, age and BMI categories were calculated as percentage. Z-test was used to test for proportion difference of BMI separately with underweight, overweight and obesity between males and females. Odds ratio with 95% confidence interval was reported for the association of BMI categories with gender using binary logistic regression to control for age. Statistical significance test was considered at 2 sides with p-value <0.05.

Results

Three thousand two hundred seventy nine first year university students were eligible, 1,423 (43.40%) were males and 1,856 (56.60%) were females. The mean age of the students was 18.22 (SD 0.49) year. Most students were 18-year-old. The mean values (SD) of weight, height and BMI were 58.22 (13.99) kg, 162.96 (8.15) cm, and 21.83 (4.52) kg/m^2 respectively as shown in Table 1. Overall prevalence of underweight, overweight, obesity class I and II based on WPRO criteria for Asian populations were 20.68%, 11.07%,

Table 1. General characteristics of first year students of Suranaree University of Technology, 2015

General characteristics	Male	Female	Total
Gender, n (%)	1,423 (43.40)	1,856 (56.60)	3,279 (100.00)
Mean age (SD)	18.24 (0.49)	18.21 (0.49)	18.22 (0.49)
Age by category, n (%)			
17 year	25 (1.76)	52 (2.80)	77 (2.35)
18 year	1,044 (73.37)	1,378 (74.25)	2,422 (73.86)
19 year	338 (23.75)	413 (22.25)	751 (22.90)
20 year	15 (1.05)	11 (0.59)	26 (0.79)
21 year	1 (0.07)	2 (0.11)	3 (0.09)
Mean weight (SD)	64.22 (14.05)	53.62 (12.08)	58.22 (13.99)
Mean height (SD)	169.70 (5.86)	157.79 (5.42)	162.96 (8.15)
Mean BMI (SD)	22.25 (4.48)	21.50 (4.52)	21.83 (4.52)

Table 2. Prevalence of underweight, overweight and obesity of first-year students of Suranaree University of Technology, 2015 by gender

BMI categories	Male, n (%)	Female, n (%)	Total, n (%)
Underweight	233 (16.37)	445 (23.98)	678 (20.68)
Normal weight	720 (50.60)	941 (50.70)	1,661 (50.66)
Overweight	193 (13.56)	170 (9.16)	363 (11.07)
Obese: class I	180 (12.65)	184 (9.91)	364 (11.10)
Obese: class II	97 (6.82)	116 (6.25)	213 (6.50)

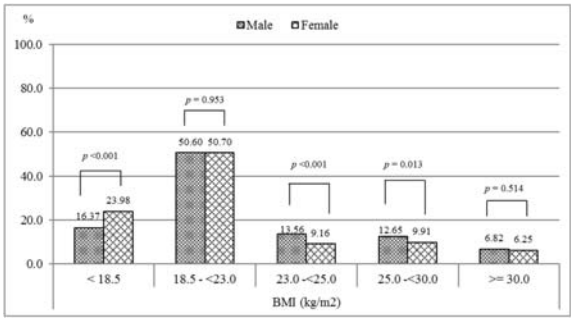

Fig. 1 Distribution of body mass index in first-year university students by gender.

11.10%, and 6.50% respectively (Table 2). The proportion of underweight in females (23.98%) was obviously higher than males (16.37%) with statistical significance (p<0.001). Conversely, the proportion of overweight and obesity class I in males (13.56% and 12.65% respectively) were higher than in females (9.16% and 9.91% respectively) with statistical significance as shown in Fig. 1. For the obesity class II, even though higher proportion was found among males (6.82%) than females (6.25%), its difference was not statistically significant. In addition, males were 1.48 times of getting overweight (adjusted OR = 1.48, 95% CI = 1.18 to 1.86) and 1.28 times of getting obesity class I (adjusted OR = 1.28, 95% CI = 1.02 to 1.61) than females when comparing to normal weight as shown in Table 3. However, age was not associated with the BMI categories.

Discussion

In the present study, a large population of university students recruited from all regions of Thailand were assessed for the body mass index (BMI). Mean BMI was 21.83 (SD 4.52) kg/m^2. The mean BMI of both males and females in this study were similar to the study that was conducted among clinical students in a Malaysian medical school in 2008[10]. According to the Regional Office for the Western Pacific (WPRO) criteria of BMI categories for adult Asian populations[8], the result revealed that the overall prevalence of underweight, overweight and obesity class I and II of university students were 20.68%, 11.07%, 11.10%, and 6.50% respectively. This finding was different from the previous studies that were conducted among medical students in Malaysia and adult Thai population[11,13]. The prevalence of overweight and obesity class I of this study were relatively lower in both males and females. The prevalence of underweight was obviously higher especially among females, at 23.98%. Furthermore, a stratification analysis by gender was found that males had higher overweight and obesity than females, conversely females had higher underweight than males. It might be because female students who have more attention for their physical and body figure and try to restrict caloric food consumptions than that of males. This finding, difference by gender, was relevant to previous studies in Thai and Asian population[5-7,9-12]. The main limitation of this study was a lack of a dietary history on types and quantities of food consumptions, physical activities and socioeconomic background. Further study should be conducted to determine why males are significantly associated with overweight and obesity while females are more underweight.

Conclusion

Overweight and obesity were more prevalent in male than female university students and a high prevalence of underweight in female students was also observed. Therefore, health promotion programs such as healthy life-style modification and good environment support should be specifically geared for university students on this SUT campus with consideration given to targeting gender differences as well.

What is already known on this topic?

The overweight and obesity still are health

Table 3. The association of gender and age with BMI categories

Factors	Adjusted OR*			
	Underweight	Overweight	Obesity Class I	Obesity Class II
Gender				
Female (ref)	-	-	-	-
Male	0.68 (0.56-0.82)	1.48 (1.18-1.86)	1.28 (1.02-1.61)	1.08 (0.81-1.44)
Age by category				
17 year (ref)	-	-	-	-
18 year	1.27 (0.69-2.36)	0.89 (0.44-1.80)	0.84 (0.43-1.66)	5.31 (0.72-38.86)
19 year	1.19 (0.63-2.25)	0.78 (0.37-1.63)	0.64 (0.31-1.30)	5.43 (0.73-40.34)
20 year	2.10 (0.74-5.94)	0.29 (0.03-2.45)	0.51 (0.10-2.59)	NA
21 year	NA	NA	NA	20.47 (0.91-460.96)

* Adjusted for gender and age, NA: not applicable

problems in all age group of both males and females. The distribution is varied by gender and educational level in general population. Males are higher overweight and obesity than females. Females are higher underweight than males.

What this study adds?

This study was conducted with a large specific age group, university students. The finding supports that 1) overweight and obesity are also health problems in young Thai population, and 2) males are more prevalent in overweight and obesity than females. The interesting observation from this study is the high prevalence of underweight in female university students.

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Potential conflicts of interest

None.

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ความแตกต่างของภาวะน้ำหนักตัวต่ำกว่าเกณฑ์ เกินเกณฑ์ และอ้วน ในกลุ่มนักศึกษาชายและหญิงชั้นปีที่ 1 มหาวิทยาลัยเทคโนโลยีสุรนารี ปีการศึกษา 2558

พักตร์วิมล ศุภลักษณศึกษากร, วรัญญา สินจริยานนท์, ระพีพรรณ พิมพ์สราญ

ภูมิหลัง: *ภาวะน้ำหนักเกินและอ้วน เป็นปัญหาสำคัญทางสาธารณสุขและมีแนวโน้มเพิ่มขึ้นด้วยพฤติกรรมการบริโภคอาหารและรูปแบบการใช้ชีวิตที่เปลี่ยนแปลงไปจากอดีตในทุกกลุ่มอายุ ส่งผลกระทบให้มีโอกาสเสี่ยงต่อการเกิดโรคหัวใจและหลอดเลือด โรคความดันโลหิตสูง และเบาหวาน*

วัตถุประสงค์: *เพื่อศึกษาความชุกและความแตกต่างของภาวะน้ำหนักตัวต่ำกว่าเกณฑ์ เกินเกณฑ์ และอ้วน ในนักศึกษาชั้นปีที่ 1 ปีการศึกษา 2558 มหาวิทยาลัยเทคโนโลยีสุรนารี*

วัสดุและวิธีการ: *ศึกษาภาคตัดขวางช่วงเดือนพฤษภาคม พ.ศ. 2558 ในกลุ่มนักศึกษาชั้นปีที่ 1 ปีการศึกษา 2558 สอบถามข้อมูลทั่วไป ชั่งน้ำหนักและวัดส่วนสูง โดยบุคลากรสาธารณสุขที่ได้รับการอบรมให้มีมาตรฐานเดียวกัน นำข้อมูลน้ำหนักและส่วนสูงมาคำนวณค่าดัชนีมวลกาย จัดกลุ่มเป็นน้ำหนักตัวต่ำกว่าเกณฑ์ (<18.50 กิโลกรัม/เมตร^2) เกินเกณฑ์ (23.00 -<25.00 กิโลกรัม/เมตร^2) อ้วนระยะที่ 1 (25.00-<30.00 กิโลกรัม/เมตร^2) และอ้วนระยะที่ 2 (≥30.00 กิโลกรัม/เมตร^2) ตามนิยามขององค์การอนามัยโลกสำหรับประชากรเอเชีย วิเคราะห์ข้อมูลโดยใช้สถิติเชิงพรรณนา ได้แก่ ร้อยละ ค่าเฉลี่ย สถิติเชิงอนุมาน คือ Z-test, binary logistic regression และ odds ratio กับ 95% confidence interval*

ผลการศึกษา: *นักศึกษาชั้นปีที่ 1 จำนวน 3,279 คน ได้รับการตรวจสุขภาพทั่วไป ชั่งน้ำหนักและวัดส่วนสูง เพศชาย 43.40% เพศหญิง 56.60% อายุเฉลี่ย 18.22 ปี (SD 0.49) จากการคำนวณดัชนีมวลกายพบภาวะน้ำหนักตัว ต่ำกว่าเกณฑ์ เกินเกณฑ์ และอ้วนระยะที่ 1 และ 2 เท่ากับ 20.68%, 11.07%, 11.10% และ 6.50% ตามลำดับ นักศึกษาหญิงมีน้ำหนักตัวต่ำกว่าเกณฑ์ (23.98%) มากกว่านักศึกษาชาย (16.37%) อย่างมีนัยสำคัญทางสถิติ (p<0.001) ในทางกลับกันนักศึกษาชายมีน้ำหนักตัวเกินเกณฑ์และอ้วนระยะที่ 1 (13.56% และ 12.65%) สูงกว่านักศึกษาหญิง (9.16% และ 9.91%) อย่างมีนัยสำคัญทางสถิติ (p<0.001 และ p = 0.013 ตามลำดับ) นอกจากนี้เพศชายมีโอกาสเกิดภาวะน้ำหนักตัวเกินเกณฑ์เป็น 1.48 เท่าด้วยค่า AOR = 1.48 (95% CI = 1.18-1.86) และอ้วนระยะที่ 1 เป็น 1.28 เท่าด้วยค่า AOR = 1.28 (95% CI = 1.02-1.61) เมื่อเปรียบเทียบกับเพศหญิง*

สรุป: *ภาวะน้ำหนักตัวเกินเกณฑ์และภาวะอ้วนยังเป็นปัญหาในนักศึกษาชาย ในขณะที่น้ำหนักตัวต่ำกว่าเกณฑ์กลับพบมากในเพศหญิง ดังนั้นการดำเนินมาตรการสร้างเสริมสุขภาพสำหรับกลุ่มนักศึกษาในมหาวิทยาลัย ควรกำหนดมาตรการที่มีความจำเพาะกับกลุ่มเป้าหมายในวัยนี้ โดยพิจารณาถึงความแตกต่างที่พบระหว่างเพศชายและเพศหญิง*