Prevalence of Obesity and Metabolic Syndrome in Aboriginals in Southeastern Taiwan– A Hospital-based Study

Ya-Chun Hsiao[1], Kuangte Wang[2], and Ming-Jong Bair[3]

[1]Division of Endocrinology and Metabolism, Mackay Memorial Hospital, Hsinchu Branch, Taiwan; [2]Divisioin of Cardiology, [3]Division of Gastroenterology, Department of Internal Medicine, Mackay Memorial Hospital, Taitung Branch, Taiwan

Abstract

The aim of this study is to assess the prevalence of obesity and metabolic syndrome (MetS) in the aboriginal population based in southeastern Taiwan. One thousand two hundred and twenty-six subjects older than 20 years of age (658 male; 568 female) were recruited between May 2007 and April 2008. A simple questionnaire was carried out to take their back ground information and medical history. Biochemistry study including cholesterol, high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), triglyceride (TG), blood pressure (BP), and fasting plasma glucose were tested on each participant. Their weight, height, and waist circumference were also taken. Overweight and obesity were defined as a body mass index (BMI) ≧ 24 and ≧ 27kg/m^2, respectively. Abdominal obesity was defined as waist circumference ≧ 90cm for men and ≧ 80cm for women, respectively. The diagnosis of MetS was based on the Adult Treatment Panels of The Third Report of the National Cholesterol Education Program (NCEP ATPIII) modified for Asians. The prevalence of overweight and obesity were 25.8% and 39.8% for men, and 21.7% and 41.5% for women, respectively. The prevalence of abdominal obesity was 49.7% for men and 77.3% for women (P<0.001). The overall prevalence of MetS was 58.7%, with a higher prevalence (68.5%) in women than men (50.3%) (p<0.001). A crossover point of the prevalence between men and women in the group aged 40-49 was noticed. About two-thirds of the aborigines older than 20 years of age in southeastern Taiwan were either overweight or obese, and more than half of the population had MetS. In comparison to other ethnic groups, young women had a higher prevalence of abdominal obesity, which could lead to a higher prevalence of MetS before menopause and could constitute an emerging public health problem. (J Intern Med Taiwan 2011; 22: 48-56)

Key Words: Obesity, Metabolic syndrome, Aborigines, Southeastern Taiwan

Reprint requests and correspondence：Dr. Ming-Jong Bair
Address：Division of Gastroenterology, Department of Internal Medicine, Mackay Memorial Hospital, Taitung Branch, Taiwan, No. 690, Sec 2, Guang-fu Road, Hsinchu, 30055, Taiwan

Introduction

Metabolic syndrome (MetS) refers to a clustering of metabolic derangements, including abdominal obesity, atherogenic dyslipidemia, raised blood pressure, insulin resistance with or without glucose intolerance, a proinflammatory state, and a prothrombotic state[1,2]. Many reports have shown that these conditions are potential risk factors in developing cardiovascular disease as well as type 2 diabetes[3,4]. Of all the factors, obesity has been shown to be the most important index. An excess of adipose tissue can be a source of proinflammatory cytokines which may be linked to a greater risk for further insulin resistance as well as atherogenesis[5]. According to the World Health Organization (WHO), coronary heart disease, cerebrovascular disease and diabetes are the leading causes of death among high-income countries[6]. In Taiwan, heart diseases were the second leading cause of death in 2007, followed by cerebrovascular disease (CVA), diabetes mellitus and hypertension[7], which are all closely related to MetS. Such figures may suggest that the metabolic syndrome as well as obesity has become an important issue in public health. With no exceptions, the prevalence of MetS appears to have increased in parallel to the prevalence of obesity in Taiwan in the past 20 years, according to the 2007 Taiwan National Nutrition and Health Survey[8].

There are basically three different ethnic populations in Taiwan: Minnan, Hakka and the aborigines. The ancestors of the aborigines were the main ethnic groups living in Taiwan, long before the other two groups migrating to ancient Taiwan. They probably originated in Southeast Asia, populating in Taiwan around 11,000-26,000 years ago and later migrated to the western and central Polynesia, might be as far as New Zealand[10]. It has been proven that genetically they are related to the Austronesians but not Minnan and Hakka[11,12]. In particular, they have their unique cultures, languages, and social organizations which are completely different from the other two ethnic groups. Such differences provide a good opportunity to explore whether genetic predisposition has its role in the prevalence of MetS.

Previous studies have shown that the life expectancy of the aborigines is 10 years less than that of the average of the whole Taiwan population and their standardized mortality ratio of heart disease and strokes is significantly higher[13]. Little is known about the anthropometric status and very few surveys have been done to estimate the prevalence of MetS in relation to these anthropometric status. The aim of our study is to assess the prevalence of obesity and MetS in this particular ethnic group.

Materials and Methods

A hospital based cross-sectional survey was conducted on the aboriginal population at the Mackay Memorial Hospital, Taitung Branch. Between May 2007 and April 2008, each consecutive patient of aboriginal origin and older than 20 years old attending the Endocrine Outpatient Department and the each in-patient admitted to the same department that fulfilled the same recruiting criteria were recruited. Totally one thousand three hundred and seventy six subjects were recruited, but only 1226 subjects (658 male; 568 female) aged from 20 and above were included in this survey. We excluded those who were those of incomplete documentation of their medical records, those who were pregnant, and had severe concomitant medical diseases such as cancer, liver cirrhosis, or pulmonary tuberculosis.

An interview with a simple questionnaire which included age, gender, medications and a detailed medical history was carried out on these 1226 subjects. Besides the questionnaire interview, blood pressure (BP), their height, weight, and waist

circumference (WC) were also measured. BP was measured from the right arm after the participant had rested for 20 minutes in a sitting position. WC was measured at the midline between the lowest costal margin and the superior posterior iliac crest in a horizontal plane. Height and WC were recorded to the nearest 0.1 cm, and body weight to the nearest 0.1 kg. Standard body mass index (BMI) was calculated and the cutoffs were defined according the Department of Health in Taiwan: optimal BMI was defined as 18.5 ≦ BMI < 24 kg/m^2, overweight as 24 ≦ BMI < 27 kg/m^2, and obesity was defined as BMI ≧ 27 kg/m^2. Abdominal obesity was defined as waist circumference ≧ 90 cm in men, and ≧ 80 cm in women[14]. Blood samples were drawn from each participant after 12 hours of overnight fasting to measure their total cholesterol (T-CHOL), HDL-C, TG, and fasting plasma glucose (FPG).

The diagnosis of MetS was based on the presence of three or more of the following components: (1) waist circumference ≧ 90 cm for men and ≧ 80 cm for women; (2) TG ≧ 150 mg/dL or taking drugs for elevated triglycerides; (3) HDL-C<40 mg/dL for men and < 50 for women; (4) systolic BP ≧ 130 mmHg or diastolic BP ≧ 85 mmHg or current use of anti-hypertensive drugs; (5) FPG ≧ 110 mg/dL or use of anti-hyperglycemic drugs. Such criteria were based on the definition suggested by the Adult Treatment Panel III (ATP III) of the National Cholesterol Education Program modified for Asians [2,14].

The statistics were carried out by Student's t-test, Chi-Square test and Fisher's exact test, using Stata version 8.0 (Stata Corporation, Texas, USA).

This study was reviewed and approved by the Institutional Review Board (Ethic Approval Committee) of Taipei MacKay Memorial Hospital, and a signed informed consent was obtained from each participant.

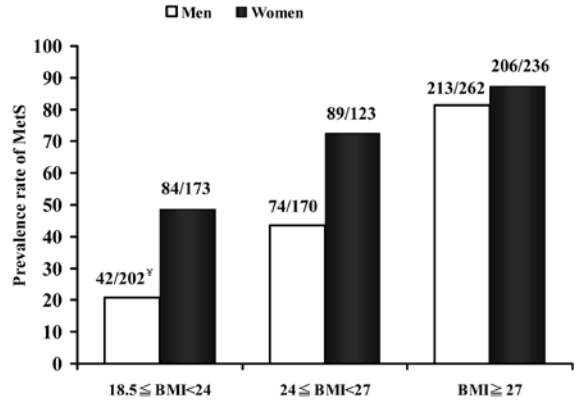
Results

A total of one thousand two hundred and twenty-six subjects were surveyed in this study (male/female: 658/568). Their anthropometric characteristics as well as their biochemistry study results were summarized in Table 1. The results showed that 23.9% of participants were overweight, 40.6% were obese, and only 4.9% were underweight. The prevalence of being overweight was 25.8% in men and 21.7% in women (p=0.087). The prevalence of obesity was 39.8% in men and 41.5% in women (p=0.538), respectively.

The overall prevalence of metabolic syndrome in this study was 58.7% (Table 2). In terms of the five components, the overall prevalence was 69.8% in low HDL-C, 68% in large WC, 64.9% in high BP, 56,5% in hyperglycemia, and 25.0% in hypertriglyceridemia (Table 2).

The impact of obesity on the prevalence of MetS in each gender group was further investigated based on the values of BMI (Figure 1), it showed that in both genders, the higher the BMI was, the higher the prevalence of MetS might be.

In comparisons of the prevalence of MetS in men and women, it showed that the prevalence



¥ No. of subjects with MetS / Total No. of subjects in each categories.

Fig.1 Prevalence of metabolic syndrome (MetS) according to body mass index (BMI) among aboriginal men and women (p<0.05 for all trends).

Table 1. Basic characteristics stratified by gender

	Men (n=658)	Women (n=568)	Total (n=1226)
Age (y/o)*	55.01 ± 16.28	58.46 ± 15.81	56.61 ± 16.15
Age Stratum (No.)			
20-29 (y/o)	44	29	73
30-39 (y/o)	81	59	140
40-49 (y/o)	137	66	203
50-59 (y/o)	117	113	230
60-69 (y/o)	128	138	266
≧ 70 (y/o)	151	163	314
Height (cm)*	164.80 ± 7.13	153.65 ± 7.01	159.63 ± 9.00
Weight (kg)*	70.95 ± 14.38	61.95 ± 13.54	66.78 ± 14.70
BMI (kg/m^2)*	26.06 ± 4.66	26.24 ± 5.49	26.14 ± 5.06
Overweight (%)	25.8	21.7	23.9
Obesity (%)	39.8	41.5	40.6
WC (cm)*	91.05 ± 12.12	89.52 ± 12.49	90.34 ± 12.31
SBP (mmHg)*	132.92 ± 1.26	134.93 ± 21.99	133.85 ± 21.61
DBP (mmHg)*	75.21 ± 12.68	74.35 ± 12.14	74.81 ± 12.43
FPG (mg/dL)*	123.49 ± 43.55	122.56 ± 37.85	123.06 ± 41.00
HDL-C (mg/dL)*	33.69 ± 16.68	36.72 ± 16.58	35.07 ± 16.70
TG (mg/dL)*	136.71 ± 155.66	117.87 ± 90.10	127.95 ± 129.67
Comorbidity (%)			
Hypertension	21.6	30.5	25.6
DM	11.6	14.6	13.0

* Mean±SD, BMI: body mass index, WC: waist circumference, SBP: systolic blood pressure, DBP: diastolic blood pressure, FPG: fasting plasma glucose, HDL-C: high-density lipoprotein cholesterol, TG: triglyceride.

Table 2. The Prevalence of metabolic syndrome and its component abnormalities

	Men	Women	Total	p
Decreased HDL-C (%)	58.7	70.4	69.8	< 0.001
Large WC (%)	49.7	77.3	68.0	< 0.001
High BP (%)	61.4	68.8	64.9	0.007
High FPG (%)	55.8	57.4	56.5	0.568
High TG (%)	26.0	19.5	25.0	0.007
ATPIII-Asia items (%)				
Tree or more	50.3	68.5	58.7	<0.001
Two	24.0	16.4	20.5	
One	17.9	12.0	15.2	
None	7.8	3.2	5.6	

HDL-C: high-density lipoprotein cholesterol, WC: waist circumference, BP: blood pressure, FPG: fasting plasma glucose, TG: triglyceride.

in women was significantly higher than in men (men vs. women: 50.3% vs. 68.5%, p<0.001). In a detailed look into the prevalence in the five components of MetS between men and women, it showed that women had a higher prevalence in having low HDL-C (p<0.001), having large WC (p<0.001), and having high BP (p=0.007). But, the prevalence in having hyper-triglyceridemia was lower than that in men (p=0.007). In terms of the prevalence of having high FPG, there was no difference between men and women (p=0.58).

In the aspects of overweight and obesity, it showed that the prevalence increased with age, which reached a peak in the age group of 40-49 and decreased thereafter in both genders (Figure2A). The prevalence of abdominal obesity was 49.7% for men and 77.3% for women; and had the tendency to increase with age and reach their peak in the group aged 50-59 in both genders (Figure2B). In comparison of the increment in the prevalence of MetS in different age group, it seemed that the prevalence increased more rapidly in women when they became older and reached the peak in their sixties, while the prevalence of MetS in men reached the peak in their fifties and decreased thereafter (p=0.014). We further noticed that there was a crossover between the age of 40-49, when the curves showing the prevalence of MetS in men and women in different age groups were superimposed (Figure 2C).

In finding out the relationship between abdominal obesity, BMI and the prevalence of MetS, we further divided our subjects into 2 groups–with and without abdominal obesity, and the prevalence of MetS was compared based on the BMI value (Figure 3). It showed that the higher the BMI was, the higher the prevalence of MetS was regardless of having abdominal obesity or not. However, when the prevalence was compared based on the existence of abdominal obesity, it showed that subjects with abdominal obesity had significant higher prevalence of MetS even the BMI was the same (p<0.001).

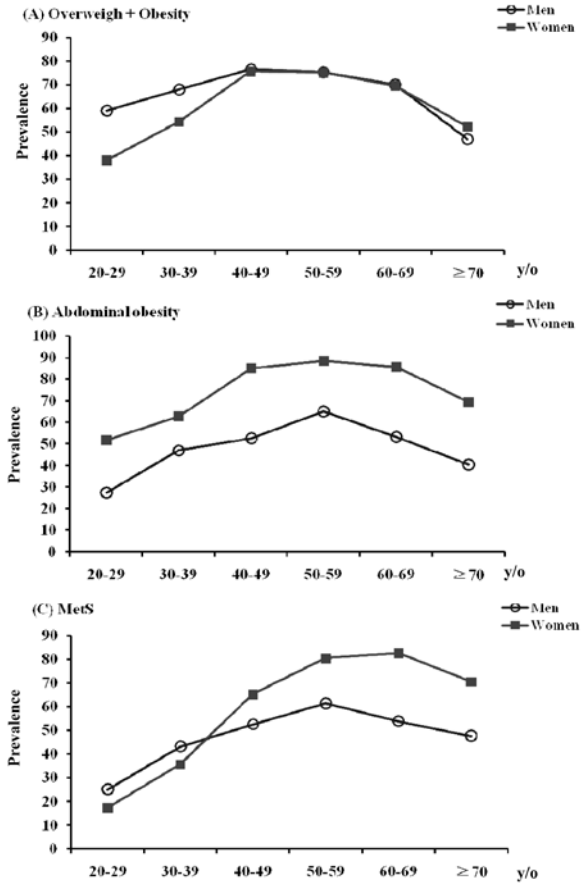
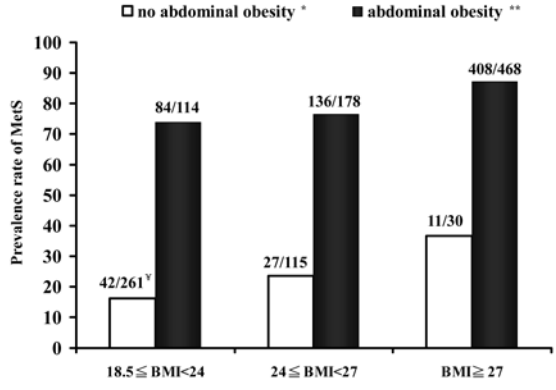


Fig.2 Age and gender-specific prevalence of overweight and obesity(A), abdominal obesity (B)and MetS(C).



* P=0.013 The different prevalence rate of MetS in comparison with 3 groups of BMI among no abdominal obesity subjects ** p<0.001 among abdominal obesity subjects
¥ No. of subjects with MetS / Total No. of subjects in each categories.

Fig.3 Prevalence of MetS categorized by BMI and abdominal obesity.

Discussion

In the last two decades, health professionals have noticed that overweight and obesity are closely related to the development of MetS; at the same time, they have also noticed that many Asian races are more susceptible in developing abdominal obesity even with normal BMI. Genetic predispositions as well as adopting western lifestyles have been considered to contribute to such phenomenon[15]. In a recently published national survey on the prevalence of obesity and MetS in Taiwan, it showed that the prevalence on obesity has significantly increased in men compared with the survey done in the 1993-1996 Taiwan National Nutrition and Health Survey[9] (19.2% vs 10.5%), while the prevalence was relatively stable in women (13.4% vs 13.2%). However, the overall prevalence of obesity has significantly increased from 4.0% to 16.4%. There was no data available on the prevalence of MetS for comparisons in the 1993-1996 Taiwan National Nutrition and Health Survey[9].

Differed from the Taiwan national survey, our study aimed on collecting the epidemiological information related to the MetS from the aborigenals living in Southeastern Taiwan. It is generally considered that the lifestyles in Southeastern Taiwan were less adapted to the modern metropolitan lifestyles such as seen in metropolitans, and the average social-economical state may be lower[13].

In our study, the prevalence of overweight and obesity were 25.8 and 39.8% in men, and 21.7 and 41.5% in women. These figures were higher than that in the 1993-1996 Taiwan National Nutrition and Health Survey[9], which were 22.9 and 10.5% in men and 12.3 and 13.2% in women, respectively. In comparison with the more recent 2001 Taiwan national survey [16], the author stratified the participants by gender and ethnicity. Among the non-aboriginal group, this study showed the prevalence rates of overweight and obesity were 27.3 and 15.4% in men and 19.1 and 10.2% in women. Among the aboriginal group, the prevalence rates of overweight and obesity were 44.2 and 28.8% in men and 24.4 and 31.1% in women. Both in this study and ours, the aborigines were still much higher prevalent for overweight and obesity. In our opinion, such discrepancy could not only be partly explained that our study was a hospital based cross- sectional study rather than a population based national survey, but also different ethnicity, different lifestyles, and different social-economical states may all have contributions to such phenomenon.

Obesity is an important factor in developing MetS and many chronic diseases, such as cardiovascular disease, type 2 diabetes, hypertension, certain types of cancer, and mental problems[17]. Our study showed that the prevalence of MetS was higher in those who had abdominal obesity than those who did not (Figure. 3), which was similar to the result in another 2 studies[18,1]. Furthermore, our analysis showed that in those who did not have abdominal obesity, the risk in developing MetS increases with higher BMI values. This result was similar to another published study in Taiwan[20, 21]. On the other hand, there were individuals who had abdominal obesity but with normal BMI, in this group, they also showed higher prevalence of MetS than those who had normal BMI but without abdominal obesity, and such tendency was also reported in Yeh's study[17]. The pathogenesis of MetS through which obesity interplay with insulin resistance remains to be fully established but many studies had focused on the role of body fat distribution. These metabolically obese, normal weight (MONW) individuals may have high visceral adiposity, high TG and low insulin sensitivity, leading increase prevalence of metabolic syndrome and its associated disorders[22]. Therefore, they concluded that for those with normal BMI but centrally obese individuals, MetS screening may be necessary.

In comparison of a hospital based cross-

sectional survey in a metropolitan city located in the midland of Taiwan, where 99% of habitants were Han- Chinese[23], the prevalence of MetS of men and women was 30% and 22.9%, respectively, which was still lower than that in our study focusing on the Southeastern aboriginal population (men vs women: 50.3% vs 68.5%). In another population-based cross-sectional survey published in 2007[24], which focus on the Han-Chinese population living in a metropolitan city (Taichung) in Taiwan, the overall prevalence of MetS was 37.66% for men and 29.21% for women, and was surprisingly higher than that in the hospital based cross sectional survey in Han population[23] and the 2001 Nation wide survey in Taiwan[8]. Such phenomenon may suggest that for Han-Chinese, adopting metropolitan western lifestyles may be a risk factor in developing MetS. In comparison to our aboriginal population who were supposed to be less adapted to western lifestyle, but with significant higher prevalence of MetS. Based on the fact that it has been reported that different ethnicity may have different prevalence rate in MetS[15], and particularly Asian Americans (such as ethnicities of Chinese, Filipinos, Japanese, and Indians) were more susceptible to developing MetS than Non-Hispanic White Americans. Also Maori, indigenous New Zealanders, were genetically related to our aboriginal population, whose prevalence of metabolic syndrome were twice as likely as others in New Zealand[25]. We speculated that genetic predisposition may have played some important roles.

In our study, women had a significantly higher prevalence of MetS than men (68.5% vs. 50.3%, $p<0.001$), which is similar to that reported in Turkish and Indian populations[26,27], whereas the prevalence of MetS in a non-aboriginal Taiwanese population and a Korean population the prevalence of MetS was higher in men[24,28]. However in the newest survey in Taiwan [20,29-30], it showed that after the age of 50, the prevalence of MetS would be higher in women. Such phenomenon explained that women around the age of 50 are more likely to have estrogen deficiency, which can lead to prominent weight gain and may go on to develop MetS[20]. In our study, we found that the gender crossover occurred at a younger age group, in the age group of 40-49. In addition, women in our study already showed a high prevalence of abdominal obesity (over half of the female participants) at the beginning of their twenties. It seems that aboriginal women are more likely to experience weight gain at a younger age, and may lead to higher prevalence of MetS before menopause in comparison to other ethnic groups. Whether genetic predisposition is in play of such phenomenon needs further investigations.

The prevalence of decreased HDL-C, high BP, and abdominal obesity in women was higher than men in this study. The prevalence of high TG was much lower than that of other MetS components, and was also lower than other population based studies done in Taiwan[29,8]. This study subjects were enrolled from out-patient clinics and hospitalization at the Mackay Memorial Hospital, Taitung Branch. Acute stress and selection bias could skew the data leading to limit the results applied to the general aboriginal population in southeastern Taiwan. So further population-based studies may have to be carried out to clarify what factors could be related to this phenomenon.

Conclusions

Almost two-thirds of adult aborigines in southeastern Taiwan were either overweight or obese, and more than half of them had MetS. Young women were more likely to have abdominal obesity than other ethnic groups in Taiwan. Since obesity has an important impact on developing MetS, this could have contributed to the higher prevalence of MetS seen in middle-aged people in our study

population. More effort should be put into this ethnic group to prevent a further increase in obesity and MetS, as well as other MetS related diseases.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Acknowledgements

The authors wish to thank Dr. Marie Lin for the advice of genetic affinity in Taiwan aborigines.

References

1. Grundy SM, Cleeman JI, Daniels SR, et al. American Heart Association; National Heart,Lung, and Blood Institute. Diagnosis and management of the metabolic syndrome: an American Heart Association/National Heart, Lung and Blood Institute scientific statement. Circulation 2005; 112: 2735-52.
2. Executive summary of the third report of the National Cholesterol Education Program (NCEP) expert panel on detection, evaluation and treatment of high blood cholesterol in adults (Adult Treatment panel III). JAMA 2001; 285: 2486-97.
3. Lakka HM, Laaksonen DE, Lakka TA, et al. The metabolic syndrome and total and cardiovascular disease mortality in middle-aged men. JAMA 2002; 288: 2709-16.
4. Galassi A, Reynolds K, He J. Metabolic syndrome and risk of cardiovascular disease: a meta-analysis. Am J Med 2006; 119: 812-9.
5. Shoelson SE, Lee J, Goldfine AB. Inflammation and insulin resistance. J Clin Invest 2006; 116: 1793-801.
6. Kung HC, Hoyert DL, Xu J, Murphy SL. Deaths: final data for 2005. Natl Vital Stat Rep 2008; 56: 1-120.
7. Department of Health, The Executive Yuan, ROC: Statistics Report, Republic of China: Taiwan Government; 2007.
8. Hwang LC, Bai CH, Chen CJ. Prevalence of obesity and metabolic syndrome in Taiwan. J Formos Med Assoc 2006; 105: 626-35.
9. Lin YC, Yen LL, Chen SY, et al. Prevalence of overweight and obesity and its associated factors: findings from National Nutrition and Health Survey in Taiwan.1993-1996. Prev Med 2003; 37: 233-41.
10. Trejaut JA, Kivisild T, Loo JH, et al. Traces of archaic mitochondrial lineages persist in Austroneisan-speaking Formosan populations. PLoS Biol 2005; 3: 1362-72.
11. Melton T, Peterson R, Redd AJ, et al. Polynesian genetic affinities with Southeast Asian populations as identified by mtDNA analysis. Am J Hum Genet 1995; 57: 403-14.
12. Lee CJ, Lee PC, Tai JJ, et al. Human leukocytes antigens in inhabitants of Taiwan. J Formosan Med Assoc 1990; 89: 526-33.
13. Ko YC, Liu BH, Hsieh SF. Issue on aboriginal health in Taiwan. Kaohsing J Med Sci 1994; 10: 337-51.
14. Tan CE, Ma S, Wai D, et al. Can we apply the National Cholesterol Education Program Adult Treatment Panel definition of the metabolic syndrome to Asians? Diabetes Care 2004; 27: 1182-6.
15. Palaniappan LP, Wong EC, Shin JJ, et al. Asian Americans have greater prevalence of metabolic syndrome despite lower body mass index. Int J Obes (Lond). 2010; Aug 3: [Epub ahead of print]
16. Ho CS, Tsai AC. Prevalence of overweight and obesity and its associated factors in aboriginal Taiwanese: findings from the 2001 National Health Interview Survey in Taiwan. Asia Pac J Clin Nutr 2007; 16: 572-9.
17. Yeh WT, Chang HY, Yeh CJ, et al. Do centrally obese Chinese with normal BMI have increased risk of metabolic disorders? Int J Obes (Lond) 2005; 29: 818-25.
18. Huang KC, Lee LT, Chen CY, et al. All-cause and cardiovascular disease mortality increased with metabolic syndrome. Obesity 2008; 16: 684-9.
19. Lai SW, Ng KC. Overall obesity and abdominal obesity and the risk of metabolic abnormalities. lr J Med Sci 2004; 173: 193-6.
20. Yang FY, Wahlqvist ML, Lee MS. Body mass index (BMI) as a major factor in the incidence of the metabolic syndrome and its constituents in unaffected Taiwanese from 1998 to 2002. Asia Pac J Clin Nutr 2008; 17: 339-51.
21. Tsai Chung-huang. Metabolic syndrome in non-obese Taiwanese: new definition of metabolically obese, normal-weight individual. Chin Med J 2009; 122: 2534-9.
22. Karelis AD, St-Pierre DH, Conus F, et al. Metabolic and body composition factors in subgroups of obesity: what do we know? J Clin Endocrinal Metab 2004; 89: 2569-75.
23. Lin CH, Lai SW, Liu CS. Prevalence of metabolic syndrome in Taiwanese adults: a hospital based study. Saudi Med 2006; 26: 46-8.
24. Lin CC, Liu CS, Lai MM, et al. Metabolic syndrome in a Taiwanese metropolitan adult population. BMC Public Health 2007; 7: 239.
25. Taylor RW, Brooking L, Williams SM, et al. Body mass index and waist circumference cutoffs to define obesity in indigenous New Zealanders. Am J Clin Nutr 2010; 92: 390-7.
26. Gupta R, Deedwania PC, Gupta A, et al. Prevalence of metabolic syndrome in an Indian urban population. Int J Cardiol 2004; 97: 257-61.
27. Miccoli R, Bianchi C, Odoguardi L, et al. Prevalence of the metabolic syndrome among Italian adults according to ATP III definition. Nutr. Meta. Cardiovasc Dis 2005; 15: 250-4.
28. Park HS, Park CY, Yoo HJ. Prevalence of obesity and metabolic syndrome in Korean adults. Obes Rev 2008; 9: 104-7.
29. Hwang LC, Bai CH, Chen CJ, Chien KL. Gender difference on the development of metabolic syndrome: a population-based study in Taiwan. Eur J Epidemiol 2007; 22: 899-906.
30. Su TC, Hwang LC, You SL, et al. Ethnic variation in hypertension prevalence of women in Taiwan. J Hum Hypertens 2009; 23: 160-7.

台灣東南部一區域醫院原住民肥胖與代謝症候群罹病率調查

蕭雅純[1] 王光德[2] 白明忠[3]

[1] 內分泌暨新陳代謝科 馬偕醫院新竹分院
[2] 心臟內科 [3] 肝膽腸胃科 馬偕醫院台東分院

摘 要

本篇研究的目的是調查台灣東南部原住民肥胖及代謝症候群的盛行率。自 2007 年 5 月至 2008 年 4 月共有 1226 位年滿 20 歲以上 (男生 658 人 ; 女生 568 人) 前來馬偕紀念醫院台東分院就診的原住民加入此研究，我們測量其體重、身高、腰圍、並抽血做生化檢查 (包括總膽固醇、低密度膽固醇、高密度膽固醇、三酸甘油脂、空腹血糖)，同時以問卷收集參與者的個人健康相關資料。本篇研究定義體重過重是身體質量指數 (BMI) ≧ 24Kg/m^2 且 <27 Kg/m^2，肥胖是身體質量指數≧ 27Kg/m^2；男性腰圍≧ 90 公分，女性腰圍≧ 80 公分爲腹部肥胖；代謝症候群的診斷則是根據國家膽固醇教育計劃第 3 次成人治療報告 (NCEP ATPIII) 亞洲修正版。研究結果顯示男生的過重和肥胖的盛行率分別爲 25.8% 及 39.8%，女生則爲 21.7% 及 41.5%；77.3% 的女性有腹部肥胖高於男性的 49.7% (p<0.001)。而我們也發現全部原住民中代謝症候群盛行率爲 58.7%，其中女生 (68.5%) 高於男性 (50.3%, p<0.001)，同時從 40-49 歲年齡群開始女生代謝症候群盛行率便高於男生。總而言之，在台灣東南部 20 歲以上的原住民中約有 2/3 體重過重或肥胖，過半數的人有代謝症候群。與其他族群相比之下，年輕原住民女性有較高的腹部肥胖盛行率，這也可能使她們在停經前就有較高比例的人罹患代謝症候群，進一步導致嚴重的健康問題。