Published in final edited form as:

Appl Nurs Res. 2013 November ; 26(4): 192–197. doi:10.1016/j.apnr.2013.06.005.

Prevalence of Metabolic Syndrome among Filipino-Americans: A Cross-Sectional Study

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Introduction

Filipino-Americans are the second largest Asian subgroup and the fastest growing Asian immigrant population in the United States (U.S. Census, 2010). As such, it is imperative to evaluate their health status. A growing body of evidence reveals Filipino-Americans have multiple risk factors for coronary heart disease (CHD), including hypertension (HTN), type 2 diabetes (T2D), dyslipidemia, and central adiposity, all of which are also components of metabolic syndrome. Metabolic syndrome is a clustering of factors that greatly increase the risk of CHD development and other cardiovascular disorders (National Cholesterol Education Program/Adult Treatment Panel III; Wu, Liu, & Ho, 2010). Despite the high risks of this particular ethnic subgroup, research focusing on Filipino-Americans' cardiac health is limited. This is the case even though reports indicate CHD is the cause of death of more than half of this population (American Heart Association, 2011; U.S. Census, 2010). The purposes of this study were to: a) examine the prevalence of metabolic syndrome among Filipino-Americans between the ages of 35–75 years old living in Clark County, Nevada; b) compare the rate of metabolic syndrome between Filipino men and women in Clark County, Nevada; and c) examine the prevalence of central adiposity among Filipino-Americans living in Clark County, Nevada based on actual waist circumference measurement.

Background

Metabolic syndrome, its components, and criteria for diagnosis

Individuals with metabolic syndrome run twice the risk of developing CHD over the next 5 to 10 years compared to those without the syndrome (Grundy, Brewer, Cleeman, Smith, & Lenfant, 2004). Also known as insulin resistance syndrome, dysmetabolic syndrome, and

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Conflict of interest: The authors have no conflict of interest to disclose.

syndrome X, metabolic syndrome has been a point of interest by many researchers due to its growing prevalence in the United States (U.S.) and worldwide (Alberti et al., 2009; Olde, Alpert, & Dalusung-Angosta, in press). According to Ervin (2009), approximately 34% of U.S. adults carry the diagnosis of metabolic syndrome.

Alberti et al. (2009) and Grundy et al. (2005) indicate several components associated with metabolic syndrome that relate to CHD. These are: a) dyslipidemia, b) hyperglycemia, c) elevated blood pressure, and d) central adiposity. Each one of these health factors plays a major role in the pathogenesis of CHD. Table 1 presents the criteria for a clinical diagnosis of metabolic syndrome set forth by the third report of the National Cholesterol Education Program/Adult Treatment Panel (NCEP ATP III). In metabolic syndrome, dyslipidemia manifests clinically by elevated serum triglycerides (TG) of ≥ 150 mg/dL for both women and men, decreased high-density lipoprotein (HDL) of < 40 mg/dL in men or < 50 mg/dL in women (Grundy et al., 2005; Grundy, 2008). Insulin resistance manifests clinically by a fasting glucose (FG) of ≥ 100 mg/dL or the presence of T2D (Grundy et al., 2005; Grundy, 2008; NCEP ATP III). In metabolic syndrome, hypertension (HTN) presents clinically with a blood pressure of $\geq 130/85$ mm Hg or on those individuals taking hypertensive agent(s) (Grundy et al., 2005; Grundy, 2008; NCEP ATP III).

Another important component of metabolic syndrome is central adiposity. Also known as abdominal obesity, central adiposity manifests clinically as increased waist circumference (WC). A consensus of experts from major organizations has set guidelines for determining a diagnosis of central adiposity (Alberti et al., 2009). These guidelines are specific to populations because certain ethnic groups, such as Asians, have less skeletal muscle mass and pelvic skeleton dimensions, affecting waist and hip circumferences (Misra et al., 2006). As presented in Table 1, the thresholds for WC measurement for Asians based on the NCEP ATP III criteria are lower than non-Asians, but Alberti et al. (2009) proposed that for a diagnosis of central adiposity for Asians, WC cut points should be based on the International Diabetes Federation (IDF), ≥ 80 cm for women and ≥ 90 cm for men (IDF, 2005).

Filipino-Americans immigration history and their health status

Filipino-Americans are citizens of the U.S. either by birth or naturalization (Dela Cruz, McBride, Compas, Calixto, & Van Derveer, 2002). Filipinos' migration to the U.S. began in the 1800s and is linked to the following: a) to secure higher education, b) to reunite with family, or c) to obtain employment, including service to the U.S. military (Dela Cruz et al., 2002).

The total population of Filipino-Americans living in the U.S. has increased from 1,908,125 in 2000 to 2,649,973 in 2010, a 38.9 % increase within 10 years (U.S. Census, 2010). The states that have the largest percentage of Filipinos are California and Hawaii; Nevada is ranked seventh. Nevertheless, due to economic conditions and high costs of living in California and Hawaii, many Filipinos move to Nevada—especially Las Vegas—for employment (Las Vegas News 8 Report, 2011). In fact, Nevada had the highest growth of Filipinos between the years of 2000 and 2010 (142% increase), outnumbering California and Hawaii (National Federation of Filipino American Associations, 2011; U.S. Census, 2010).

Studies indicate many Filipino-Americans suffer from chronic illnesses, particularly T2D, HTN, and dyslipidemia (Araneta et al., 2006; Dalusung-Angosta, 2010; Dela Cruz & Galang, 2008; Gentilucci et al., 2008; Grandinetti, Chang, Theriault, & More, 2005; Health Forum, 2003; Kim, Park, Grandinetti, Holck, & Waslien, 2008; Langerberg, Araneta, Bergstrom, Marmot, & Barrett-Connor, 2007; Soria et al., 2009). Experts also indicate that central adiposity is a common health problem among this group (Araneta & Barrett-Connor, 2005, 2007; Ye, Rust, Baltrus, & Daniels, 2009). Central adiposity has been linked to the development of T2D and to the syndrome itself (Grundy et al., 2005; Reaven, 2003).

Methods

Design

A descriptive correlational, cross-sectional design was utilized in the conduct of this study. The Institutional Review Board approval was secured from the University of Nevada, Las Vegas' Office of Research Integrity for Human Subjects prior to the commencement of any research activities.

Sample and Setting

This study included a convenience sample of 300 Filipino-Americans between the ages of 35–75 years old. Data were collected in the fall of 2011 (September–December) in Clark County, Nevada. The inclusion criteria were as follows: a) Filipino-Americans residing in Nevada and b) no history of heart problems. The exclusion criteria were: a) history of myocardial infarction (MI), b) history of memory and/or neurological impairments, or c) other health conditions that would limit talking or writing.

Data Collection Procedures

Relevant information to the study was collected from participants in two different restaurants. Data collection occurred mostly on weekdays and sometimes on weekends, during lunch times. Flyers were used to attract potential research participants. Participants were approached as they entered the restaurants. Most Filipino-Americans who were approached agreed to participate, with only a few who refused to join due to time constraint. The research plan, purpose of the study, and consenting process were thoroughly discussed with the participants.

A research assistant (RA), who was a second generation Filipino nursing student in the baccalaureate program at the University of Nevada, Las Vegas School of Nursing (UNLV SON), assisted with data collection and data entry. The RA was fluent in English and *Tagalog* (Philippine national language). She was trained by the Principal Investigator (PI) on data entry and data collection procedures, including WC measurement following the 2008 WHO guideline for measuring WC. A private area in each restaurant was provided to the participants for completion of forms and for obtaining WC. Each participant was given \$5.00 as an incentive for participating in the study after completing the survey and WC measurement.

Instruments

A researcher-developed questionnaire was used to collect demographic information (i.e. age, place of birth, city they live in, gender, ethnicity, marital and employment status, income and education status, living arrangements, and health insurance status). The questionnaire included items related to the self-reported presence of major CHD risk factors (HTN, diabetes, dyslipidemia) and overweight, lack of exercise, and smoking status. Participants were considered overweight if their body mass index (BMI) score was between 25.0 and 29.9. The National Heart, Lung, and Blood Institute (NHLBI) guideline was used to determine their BMI score (NHLBI, 2012) and weight risk (CDC, 2012). The BMI was calculated based on the participants' self-reported height and weight.

After survey completion, the participant's WC was measured by one person following the 2008 WHO and 2005 IDF guidelines. According to WHO guidelines, prior to the measurement of the waist each participant was asked to stand straight with arms at the sides in a relaxed position (WHO, 2008). To decrease error in measurement, a non-stretchable measuring tape (Gulick II Tape Measure) was used. The WC was measured to the nearest centimeter (cm) between the lower margin of the participant's last palpable rib and at the top of the iliac crest (WHO, 2008). The 2005 IDF guidelines were used for determining the presence of central adiposity. Men were considered to be abdominally obese if their WC was 90 cm; for women, abdominal obesity was determined if WC was 80 cm (Alberti et al., 2009; Grundy et al., 2005). The time frame to complete the questionnaire and WC measurement was approximately 5–7 minutes.

With respect to metabolic syndrome, individuals were deemed to have the syndrome if they met at least three of the five cardiometabolic risk factors listed in Table 1. The American Heart Association (AHA) and the NHLBI recommend the NCEP ATP III for the diagnosis of metabolic syndrome (Alberti et al., 2009; Grundy et al., 2005).

Data Analysis

Prior to running the analysis, data were screened for univariate outliers and tested for requisite assumptions, including univariate normality, multicollinearity, linearity, and singularity. All assumptions were met and no outliers were detected in the data. Descriptive statistics in the form of frequencies and percentages described the sample. Next, a logistic linear regression analysis was conducted to ascertain whether demographic characteristics of the participants adequately predicted metabolic syndrome. Metabolic syndrome was recoded so that participants who met at least three of the criteria were coded as 1 (presence of metabolic syndrome) and all others were coded as 0 (absence of metabolic syndrome). All analyses were conducted using the IBM SPSS Statistics Version 19.

Results

Participants' ages ranged from 35–75 years ($M = 50.80$, $SD = 10.01$) and their length of residency in the U.S. ranged from 1–75 years ($M = 24.08$, $SD = 11.99$). Table 2 presents the demographic characteristics of the sample and Table 3 contains data regarding the presence of CHD risk factors, including central adiposity. The prevalence of CHD risk factors by

gender as well as the prevalence of central adiposity is presented in Table 4. Interestingly, males and females were closely aligned with respect to CHD risk factors, with the exception of abdominal obesity and HTN. *Pearson's* χ^2 statistics were requested to determine whether the prevalence of these two risk factors were statistically significantly different between males and females. The results were not statistically significant in terms of HTN, $p = .65$. However, the results for abdominal obesity were statistically significant, *Pearson's* χ^2 (1, $N = 300$) = 3.84, $p < .05$, indicating that the difference in prevalence of abdominal obesity between males and females is significantly different, with females demonstrating a higher prevalence.

Overall, 55 (18.3%) of the participants met the threshold for metabolic syndrome. Within these, 31 males (21.1%) and 24 females (15.7%) met the established criteria for the syndrome. Table 5 presents the prevalence of metabolic syndrome by gender. This suggests metabolic syndrome may be more prevalent among males than females, although this difference was not statistically significant, *Pearson's* χ^2 (1, $N = 55$) = 1.35, $p = .20$.

In the logistic regression model, annual income, education, employment, and marital status were entered as categorical predictors and age was entered as continuous. Metabolic syndrome, coded as 1 = Yes and 0 = No, served as the criterion. Results demonstrated that the model with these predictors was a significant improvement from the baseline—fully saturated model explaining all the variance, χ^2 (9, $N = 300$) = 36.20, $p < .0005$, *Nagelkerke's Pseudo R*² = .19. However, only age [$Exp(b) = 1.08$; $CI_{95\%} = 1.04, 1.13$] and marital status [$Exp(b) = .16$; $CI_{95\%} = .08, .68$] were significant predictors of the syndrome. With respect to age, being older increased the likelihood of metabolic syndrome by approximately 8%. In terms of marital status, being single significantly increased the likelihood of metabolic syndrome. The results of the classification table, which is another index of the magnitude of the effect, indicates that the overall percentage of correctly classified cases—cases correctly classified as either meeting metabolic syndrome criteria or not meeting the criteria—was 83.7%. When compared to the 50% of cases that would be correctly classified by chance alone, the percentage of correctly classified cases suggests the classification results are valid and represent an improvement over chance classification.

Discussion

The present study demonstrated that metabolic syndrome is common among Filipino-Americans living in Clark County, Nevada. Many have multiple cardiometabolic risk factors—criteria for a clinical diagnosis of metabolic syndrome.

Findings from this study corroborate the results of the Kohala Health Research study by Grandinetti et al. (2005). They found that the rate of metabolic syndrome was higher in Filipino-Americans when compared to Caucasians and other Asian groups. As outlined previously, the present study utilized the IDF parameter for determining central adiposity among this group to get a better estimate of the prevalence of metabolic syndrome, findings similar to Punzalan, Sy, and Ty-Willing's (2004) study and the Diabetes Epidemiology Collaborative Analysis of Diagnostic Criteria in Asia (DECODA) study. Both studies

revealed an increased prevalence of the syndrome when WC criterion adjusted for Asians was used (Punzalan et al., 2004, DECODA Study Group, 2007).

Factors that may be responsible for the prevalence of metabolic syndrome among Filipino-Americans in this study could be diet, lifestyle, and genetic influences. Grandinetti et al. (2005) reported the transition from traditional to Western diet may play a role in the development of the syndrome. Individuals who adopt a Westernized diet have more health problems, including central adiposity, than those who do not (Yim et al., 2010). Serafica (2011) reported that many Filipinos who move to the U.S. adopt a Westernized diet. In his study, Filipinos consumed more fats and sugar than fruits and vegetables in their diet. Those who consumed more fats and sugar were obese and had increased WC (Serafica, 2011). According to Dela Cruz and Galang (2008), Filipino-Americans consume more meat and poultry because they are more accessible. In addition to exposure to Western diet, cooking practices is a concern. Cooking styles such as the deep frying of poultry, meats, and fish and the use of cooking ingredients which contain high amounts of sodium may lead to the development of HTN and dyslipidemia (Dela Cruz & Galang, 2008; McCance, Huether, Brashers, & Rote, 2010), both which are components of the metabolic syndrome. Many Filipinos like to dine out as part of the family tradition (Dela Cruz & Galang, 2008). Several Filipino restaurants are now offering *all-you-can-eat* type buffets which include dishes that have high salt and fat contents. This can be a major detriment to the health of Filipino-Americans.

Sedentary lifestyle is linked to the development of the syndrome. In this study, almost half of the sample reported they did not participate in regular exercise. This finding is consistent with the literature. According to Choi, Chow, Chung, and Wong (2011) Filipino-Americans who migrate to the U.S. become less physically active. Most of their time is spent on sedentary activities such as sitting or watching television (Ceria-Ulep et al., 2013; Dela Cruz & Galang, 2008).

Other factors that may contribute to the development of metabolic syndrome among Filipino-Americans in this study could be genetic influences. Low levels of adiponectin have been seen in individuals with obesity, central adiposity, insulin resistance, and T2D (Aprahamian & Sam, 2011; Araneta & Barrett-O'Connor, 2007; Fantuzzi, 2008; Kim et al., 2011), and high levels of leptin have been linked to obesity (McCance et al., 2010). Studies related to the associations of adiponectin and leptin should be the focus of future research, especially when examining metabolic syndrome in Filipino-Americans.

The present study also examined the predictors of metabolic syndrome in this group. Age and marital status were the significant predictors of the syndrome. This study found a significant rise in the prevalence of metabolic syndrome with advancing age, especially beyond the mean age of 50, a finding consistent with the DECODA study. They found that the prevalence of the syndrome did increase with age, reaching the peak between 45 and 64 years of age (DECODA Study Group, 2007). Park, Oh, Cho, Choi, and Kim (2004) also reported a similar finding. They found that metabolic syndrome increased during the middle years of life and beyond, especially in women over 50 years of age.

This study also revealed that marital status was a predictor of the syndrome. Those who were never married had an increased likelihood of metabolic syndrome. Possible explanations could be lack of family responsibilities and social isolation. Many Filipinos who migrate to the U.S. leave behind their loved ones in the Philippines. With lack of family responsibilities, many may eat out more often or consume more fast foods. Many may feel socially isolated. Molloy and colleagues reported that unmarried states have been shown to have increased mortality risks compared to married states (Molloy, Stamatakis, Randall, & Hamer, 2009). This is implicated by unhealthy behaviors related to social isolation and psychological distress. In their study, cardiovascular mortality risks for unmarried men and women were higher than those who were married. Unmarried individuals were more likely to smoke, have HTN and diabetes, and were more likely to exhibit psychological distress compared to those who were married (Molloy et al., 2009).

Limitations

The present study has some limitations that should be acknowledged. The sample size is small and the setting is limited. Additionally, this is a self-report study. It is unknown if dyslipidemia reported by participants in this study included abnormal HDL, an important criterion of the metabolic syndrome. However, an important strength of this study is that central adiposity was analyzed by actual WC measurement of the sample using the IDF criteria adjusted for Asian populations for diagnosing central adiposity.

Conclusion and recommendations for future research

Based on the results of the present study, Filipino-Americans are at risk of CHD and other cardiovascular-related diseases due to the rising prevalence of metabolic syndrome. With this growing problem of metabolic syndrome, intensive lifestyle modification and treatment are recommended to help decrease the prevalence of metabolic syndrome in this group and improve the overall health outcomes of Filipino-Americans. The following recommendations are suggested for future research: a) examine CHD risk factors using serum markers and actual blood pressure readings, b) compare CHD risk factors between first and second generation Filipino Americans, c) compare CHD risk factors between Asian Americans and other ethnic groups using larger samples and across the U.S., and d) replicate this study in more than one setting.

Acknowledgments

The author would like to acknowledge the following for their assistance: Dr. Nancy Menzel, Mr. Jeff Kurrus, Ms. Mary Calalang, and the owners of *Kusina Ni Lorraine* and *Nanay Gloria* restaurants.

Grant Support: This project was supported by grants from the National Center for Research Resources (5P20RR016464-11) and the National Institute of General Medical Sciences (8 P20 GM103440-11).

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Table 1**Criteria for Clinical Diagnosis of Metabolic Syndrome Based on NCEP ATP III**

Measure (any 3 of 5 constitute diagnosis of metabolic syndrome)	Categorical Cut-points
Elevated waist circumference [†]	
Non-Asians	102 cm in men 88 cm in women
Asians ^{††}	90 cm in men 88 cm in women
Elevated triglycerides	150 mg/dL (1.7 mmol/L) or On drug treatment for elevated triglycerides [‡]
Reduced HDL-C	< 40 mg/dL (1.03 mmol/L) in men < 50 mg/dL (1.3 mmol/L) in women or On drug treatment for reduced HDL-C [‡]
Elevated blood pressure	130 mm Hg systolic blood pressure or 85 mm Hg diastolic blood pressure or On antihypertensive drug treatment in a patient with a history of hypertension
Elevated fasting glucose	100 mg/dL or On drug treatment for elevated glucose

Note. Adapted from Alberti et al. (2009).

[†] Ethnic specific.

^{††} The International Diabetes Federation (IDF) waist circumference cut points for Asians, except for Japanese, (90 cm [35 inches] in men and 80 cm [31 inches] in women) are recommended for Asians for abdominal obesity diagnosis.

[‡] Fibrates and nicotinic acid are the most commonly used drugs for elevated TG and reduced HDL-C. Patients taking one of these drugs are presumed to have high TG and low HDL.

Table 2

Demographic Characteristics of the Sample

Variable	<i>n</i> (%)
Gender	
Male	147 (49.0)
Female	153 (51.0)
Place of Birth	
Philippines	284 (94.7)
United States	16 (5.3)
Marital Status	
Married	237 (79.0)
Divorced/ Separated	27 (9.0)
Widowed	17 (5.7)
Never Married	19 (6.3)
Language Spoken at Home	
English	34 (11.4)
Filipino	28 (9.4)
English & Filipino	238 (79.2)
Employment Status	
Employed	213 (71.0)
Unemployed	45 (15.0)
Retired	42 (14.0)
Educational Level	
Grade school and/or some high school	11 (3.7)
High school and/or some college	139 (46.3)
College graduate and/or some post-graduate	150 (50.0)
Annual Income	
< \$20,000	34 (11.3)
\$20,000–\$29,999	36 (12.0)
\$30,000–\$39,999	85 (28.3)
\$40,000–\$49,999	56 (18.7)
\$50,000–\$59,999	32 (10.7)
\$60,000–\$69,999	13 (4.3)
> \$70,000	44 (14.7)
Residence	
Own Home	192 (64.0)
Rent	97 (32.3)
Other	11 (3.7)
Living Arrangement	
Alone	18 (6.0)
Spouse/Children	102 (34.0)
Relative	20 (6.7)

Variable	n (%)
Grown Children	69 (23.0)
Friend	8 (2.7)
Spouse Only	83 (27.7)
Health Insurance	
Medicaid Only	0 (0.0)
Medicare Only	22 (7.3)
Medicaid and Medicare	1 (0.4)
Medicaid and Private Insurance	16 (5.3)
Private Health Insurance Only	207 (69)
None	54 (18)

N=300

Table 3

Coronary Heart Disease (CHD) Risk Factors of Filipino-Americans

Variable	<i>n</i> (%)
Hypertension	143 (47.7)
Diabetes Mellitus	
Type 1	8 (2.7)
Type 2	35 (11.7)
Dyslipidemia	83 (27.7)
Overweight	110 (36.7)
Smoking	35 (11.7)
Lack of Exercise	144 (48.0)
Abdominal Obesity ^a	242 (80.6)

^a Actual WC measurement based on 2005 guideline for clinical definition of abdominal obesity. *N* = 300

Table 4

Prevalence of CHD Risk Factors and Central Adiposity by Gender

Variables	Males^a		Females^b	
	Total	%	Total	%
Abdominal Obesity ^c				
Not Obese	35	23.8	23	15.3
Obese	112	76.2	130	84.9
Hypertension				
No	79	53.7	78	51.0
Yes	68	46.3	75	49.0
Dyslipidemia				
No	104	70.7	113	73.9
Yes	43	29.3	40	26.1
Diabetes (Type 2)				
No	129	87.8	136	88.9
Yes	18	12.2	17	11.1

^a
n = 147^b
n = 153^c Actual WC measurement based on 2005 IDF guideline for clinical diagnosis of central adiposity

Table 5

Prevalence of Metabolic Syndrome by Gender

Metabolic Syndrome	Males ^a		Females ^b	
	Total	%	Total	%
Criteria				
3	26	17.7	17	11.1
4	5	3.4	7	4.6
Total	31	21.1	24	15.7

Note. The overall total of participants with metabolic syndrome was 55 (18.3%) for the present sample. In order to be diagnosed with metabolic syndrome per the NCEPATP III recommendations, participants must meet 3 of the criteria (Alberti et al., 2009). Percentages are a proportion of males and females respectively. Statistics (*Pearson's* χ^2) were requested to compare differences in the prevalence of metabolic syndrome between males and females. The difference between males and females on prevalence of metabolic syndrome was not statistically significant ($p = .20$).

^a
 $n = 147$

^b
 $n = 153$