

UNIVERSITI PUTRA MALAYSIA

PREVALENCE OF METABOLIC SYNDROME AND ASSOCIATED FACTORS IN YOBE STATE PROVENCE OF NIGERIA

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By

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Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Master of Sciences

February 2014

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DEDICATION

Dedicated to my late father Mallam Audu Likita (May his soul rest in perfect and eternal peace) my living mother Hauwa Audu and my beloved wives Aisha Ibrahim, Bahyura Suleman Tanko, and Aisha Alhaji Umaru and my hany Zubaida Mahmud Yerima.



Abstract of thesis presented to the senate of Universiti Putra Malaysia in fulfilment of the requirement for the award of degree in Master of Science.

PREVALENCE OF METABOLIC SYNDROME AND ASSOCIATED FACTORS IN YOBE STATE PROVENCE OF NIGERIA

By

MUSA AUDU LIKITA

January 2014

Chairman: Prof. Lekhraj Rampal, PhD

Faculty: Medicine and Health Sciences

Metabolic syndrome (MetS) is a clustering of interrelated cardiovascular risk factors of metabolic origin that are associated with the development of cardiovascular diseases and type II diabetes mellitus. The objective of the study was to determine the prevalence of the MetS and associated risk factors among civil servants in Yobe state, Nigeria. A cross sectional study was conducted between September 2012 and January 2013, using a stratified multi stage cluster sampling design. Biomedical (fasting blood glucose and lipid profile), anthropometry, blood pressure and questionnaire based risk factors were assessed. Metabolic syndrome was defined according to the International Diabetes Federation (IDF). Multivariate models were used to study the association between independent risk factors and the prevalence of the MetS. Out of the 500 respondents, 445 agreed to participate in the study giving a response rate of 89%. The prevalence of MetS was 36.4% among Yobe state civil servants and was significantly higher in females (45.9%) as compared to 31.3% in males (p = 0.002). The prevalence of MetS increased significantly with age in both gender, ranging from 19.7% to 48.1% in males and 46.6% to 60.0% in females. The most frequently observed metabolic features were increased waist circumference 51.7% (women 81.5% and men 35.1%), high blood pressure 46.3% (females 49.7% and males 44.4%), elevated fasting blood glucose 48.8% (males 44.4%, and females 40.1%), high triglycerides 48.5% (males 58.3% females 37.5%), whereas low high density lipoproteins cholesterol was observed to be less (13.0 %) frequent (females 15.3%, and males 12.5%). Adjusted odds ratio (OR) showed that gender, age, monthly income, education, tobacco use, alcohol consumption, family history of hypertension, diabetes and obesity and physical inactivity were significantly associated with MetS. The odds of females having MetS were 4.25 times higher compared to males (OR= 4.225; 95% CI 2.441 - 7.315). Respondents aged 50 years and above had more than



two fold increased risk of MetS compared to younger age (OR= 2.23; 95% CI 1.071 - 4.637). Respondents with a family history of hypertension, diabetes and/or obesity were six times at risk of having MetS (OR= 6.228; 95%CI 3.614 - 10.732) compared to those that do not have such family history. Tobacco users were more than four times at high risk of having MetS than those that never used tobacco (OR= 4.563; 95%CI 2.449 - 8.502), P<0.001. Similarly heavy alcohol drinkers were found to have four times odds of having MetS than the non-alcohol drinkers (OR= 4.271; 95%CI 1.994 - 9.144). This study indicated that low level of physical activity is 16 times increased risk of metabolic syndrome (OR=16.23; 95%CI 5.945 - 44.33). This study indicated that the prevalence of the MetS among Yobe state civil servants is high. Longitudinal studies are required to establish true cause of metabolic syndrome in Yobe state. Early identification of MetS and interventions are important strategies in prevention and control of diabetes, cardiovascular diseases in Yobe state.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

PREVALENS SINDROM METABOLIK DAN FAKTOR – FAKTOR YANG BERKAITAN DI WILAYAH YOBE NIGERIA

Oleh

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Januari 2014

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Sindrom metabolik (Mets) adalah kelompok yang saling faktor risiko kardiovaskular asal metabolik yang berkaitan dengan perkembangan penyakit kardiovaskular dan jenis II kencing manis. Tujuan kajian ini ialah untuk menentukan prevalens sindrom metabolik dan hubungan dengan faktor-faktor risiko dikalangan kakitangan kerajaan di negeri Yobe, Nigeria. Kajian keratan rentas telah dijalankan diantara September 2012 hingga Januari 2013, dengan menggunakan kaedah persampelan kluster pelbagai peringkat strata. Bioperubatan (glukos darah puasa dan profil lipid), antropometri, tekanan darah dan borang soal-selidik bagi menilai faktor risiko. Sindrom metabolik didefinisi berdasarkan Persekutuan Diabetes Antarabangsa. Model multivariat telah digunakan untuk mengkaji hubungan diantara faktor risiko tidak bersandar dan prevalens sindrom metabolik. Dari 500 responden, 445 bersetuju untuk menyertai kajian ini menjadikan kadar respon 89%. Prevalens sindrom metabolik adalah 36.4% di kalangan penjawat awam negeri Yobe dan adalah lebih tinggi secara bermakna di kalangan wanita berbanding lelaki (45.9%) berbanding 31.3% (p = 0.002). Prevalens sindrom metabolik meningkat secara bermakna dengan umur bagi kedua-dua semua jantina dengan julat dari 19.7% hingga 48.1% bagi lelaki dan 46.6% hingga 60.0% bagi wanita. Ciri-ciri metabolik yang paling kerap dilihat ialah lilitan pinggang yang lebar 51.7% (81.5% wanita dan 35.1% lelaki), tekanan darah tinggi 46.3% (49.7% wanita dan 44.4% lelaki), peningkatan darah glukos puasa 48.8% (44.4% lelaki, dan 40.1% wanita), tinggi trigliserid 48.5% (58.3% lelaki dan 37.5% wanita), manakala rendah kolesterol lipoprotein berdensiti tinggi (13.0%) paling kurang (15.3% wanita dan 12.5% lelaki) didapati. Nisbah odd (OR) terlaras menunjukkan bahawa jantina, peningkatan usia, pendapatan bulanan, pendidikan, penggunaan tembakau, pengambilan alkohol, sejarah tekanan darah tinggi atau kencing manis dan/atau kegemukan dikalangan ahli keluarga dan tidak aktif fizikal mempunyai hubungan yang bermakna dengan sindrom metabolik. Odd wanita mendapat sindrom metabolik adalah 4.23 kali lebih tinggi berbanding lelaki dengan (OR= 4.23; 95% CI 2.44 - 7.32). Responden yang



berumur 50 tahun dan ke atas mempunyai lebih dua kali ganda peningkatan risiko sindrom metabolik berbanding umur lebih muda (OR= 2.23; 95% CI 1.07-4.64). Responden yang mempunyai sejarah darah tinggi, kencing manis dan/atau kegemukan adalah 6 kali ganda risiko mendapat sindrom metabolik (OR=6.23; 95%CI 3.61 - 10.73) berbanding dengan mereka yang tidak mempunyai sejarah keluarga tersebut. Penggunaan tembakau adalah empat kali ganda berisiko tinggi untuk mendapat sindrom metabolik dari mereka yang tidak pernah menggunakan tembakau (OR=4.56; 95% CI 2.45 - 8.50). Demikian juga, peminum alkohol yang kuat didapati mempunyai empat kali odd mendapat sindrom metabolik dari meraka yang bukan peminum alkohol (OR =4.27; 95% CI 1.99 - 9.14). Kajian ini menunjukkan bahawa tahap rendah aktiviti fizikal adalah 16 kali ganda peningkatan risiko sindrom metabolik OR=16.23; 95% CI (5.94 - 44.33). Kajian ini menunjukkan bahawa prevalens sindrom metabolik di kalangan kakitangan kerajaan Negeri Yobe adalah tinggi. Kajian longitudinal diperlukan bagi menentukan penyebab sebenar sindrom metabolik di Negeri Yobe. Pengenalpastian awal sindrom metabolik dan intervensi adalah strategi penting dalam pencegahan dan kawalan kencing manis, penyakit kardiovaskular di Negeri Yobe.

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CHAPTER 1

INTRODUCTION

This chapter portrays a brief explanation on the background of the study, the objectives, problem definition, research question as well as the significance of the study. It also highlights the hypotheses and the conceptual framework.

1.1 Background

World Health Organization (WHO) predicted that, deaths due to non-communicable disease (NCD) will increase by 17% over the next ten years globally; the greatest increase will be noticed in the African region and the Eastern Mediterranean region amounting to 27% and 25% increase in mortality respectively (Vissers et al., 2013). Western Pacific and South Asian regions will similarly receive the highest relative number of deaths (Rafael Lozano et al., 2012). Approximately, 18 million people died from cardiovascular diseases (CVD) in 2008, accounting for about 30% of all global deaths. Of these deaths, an estimated seven millions were due to coronary heart disease and six millions were due to stroke alone.Of those deaths, an estimated 7.3 million were due to coronary heart disease and 6.2 million attribute to stroke (WHO, 2011).

Action Plans for the Global Strategy for the Prevention and Control of Noncommunicable diseases 2008-2013, reported that, unless necessary steps are taken, the increased in the death toll and other health related problems due to these disease burdens will continue to rise indiscriminately. The annual global healthcare cost of CVD in adults between the ages of 20 to 79 years old is 153 billion dollars (International Diabetes Federation Task Force on Diabetes Health Economics, 2010). Unless proper action has been taken, this value may likely increase to 396 billion dollars by 2025 (Alberti et al., 2007). It is also noted that majority of this increase which is expected to be of the type 2 diabetes mellitus class especially in developing countries. Incidences of diabetes mellitus in most African countries is particularly attributable to increasing ageing of the population and lifestyle changes engendered by rapid urbanization and westernization (Nwegbu and Jaiyesimi, 2012).

Metabolic Syndrome (MetS) is a clustering of interrelated cardiovascular risk factors of metabolic origin that are associated with the development of atherosclerotic cardiovascular diseases and type II diabetes mellitus (Wang et al., 2010). Central abdominal obesity, raised triglycerides, low High Density Lipoprotein (HDL), raised plasma glucose and raised blood pressure, often coexist together and are the important risk factors for the development of cardiovascular disease (Grundy, 2006). Most of the public health challenges due to metabolic diseases manifest after decades of sedentary life style and poor eating habits coupled with low level of physical activities. It affects anyone at any age, but most frequently seen in those who are significantly overweight with most of their excess fat in the abdominal area (Anderssen et al., 2007).

1.2 Problems Statement

With an estimated highest prevalence of 34% in the US and 10–50% in other countries depending on region, MetS poses a major disease burden to our modern society (Ervin, 2009). Africa, the second largest continent which makes up 22% of the world total land mass has estimated population of 642 million people living in 50 different countries enriched with more than 3000 diverse cultural and ethnic background, is equally facing a rapid demographic and epidemiological transition in the world history (Kengne, Amoah, & Mbanya, 2005). Several studies have confirmed the prevalence of the chronic diseases epidemics and that the largest proportion is expected to occur in developing countries largely due to rapid urbanization, westernization of lifestyle, ageing and changes in socioeconomic structure(Motala et al, 2009).

Recent estimates of regional prevalence of CVD in Africa by IDF projected the disease increases from 3.1% in 2007 to 3.5 % in 2025 with corresponding 80% increase in number from 10.4 million to 18.7 million (IDF Diabetes Atlas, 2012). Previous surveillance in some neighbouring African countries revealed a gradual increase in the prevalence of some cardiovascular risk factors as compared to past trend. These countries includes; Benin 3%, Mauritania 3.6%, Cameroon 6.2%, Ghana 3.2%, Niger 4.2%, Chad 3.6%, including Nigeria 2.2% (IDF Diabetes Atlas, 2012).

Nigeria is currently recording an increase in the trend of CVD burden since the past fourth decades (Okafor, 2012). In a regional survey conducted in southern Nigeria 2010, indicate that prevalence of MetS increased from 11% among participants aged less than 29 years to 89% among participants aged 70 years and above (Ogbera, 2010a). The Northern and the Southern part of Nigeria differ in terms of climate, ethnic background, religious belief and lifestyle(Ogah OS et al., 2012). Since the two regions do not share common characteristics, data from the Southern part cannot be inferred on the population from the Northern part of Nigeria. However, little is known on the prevalence and factors associated with MetS in Northern part of Nigeria, hence this study will fill the gap and will be comparable with those studies conducted in the South. More so, if no study is done, then the burden of the disease will continue to be high in the society, complications due to CVD will affect the individual, family and the entire community.

1.2 Significance of the study

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This study determines the prevalence and factors associated with MetS among civil servants in Yobe state. The prevalence is high in other parts of Nigeria, however, there is few published information on MetS in North-Eastern part of Nigeria, or any other Hausa descent, and the prevalence of CVD in Yobe state of Nigeria is unknown. Similarly, World Health Organization report from this region is also limited in number, thus this study conducted will fill the wide gap in this respect. The current study will add to the body of knowledge about the estimated number of people that are at high risk of developing cardiovascular diseases.

Similarly these findings can be used by policy makers, researchers in order to design intervention strategy aimed at reducing the burden of CVD. Likewise the study will provide an opportunity of identifying respondents that are at high risk of CVD so that they will take measures to prevent the increase in burden of the disease at community level. Also this study will be used to compare with other studies conducted in the Southern part of Nigeria to assess the disparity and/or similarity of factors associated with MetS across the regions. The findings are however relevant and do provide the evidence needed to conduct a larger scale study among this population.

1.3 Research questions

The research questions of this study were:

- i. What was the prevalence of metabolic syndrome among civil servants in Yobe State?
- ii. What are the factors that increased risk of MetS among civil servants in Yobe State?

1.5 Objectives

1.5.1 General objective

The general objective of the study was to determine the prevalence of metabolic syndrome and its associated risk factors among civil servants in Yobe State, Nigeria.

1.5.2 Specific objective

The specific objectives of the study were as follows:

- i. To determine the socio-demographic and behavioural factors of respondents by gender
- ii. To determine the prevalence of MetS among civil servants in Yobe state.
- iii. To determine the association between socio-demographic characteristics (age, gender, ethnicity, family monthly income, Education level, family history and knowledge on diabetes, hypertension and obesity) and metabolic syndrome.
- iv. To determine the association between behavioural characteristics (tobacco use, alcohol consumption) and MetS.
- v. To determine the association between physical inactivity and metabolic syndrome.
- vi. To determine the predictors of MetS.

1.6 Research hypotheses

The hypotheses of the study were as follows:

- i. The prevalence of metabolic syndrome among Yobe state civil servants was high
- ii. There is significant association between socio-demographic factors and MetS.
 - Females are at high risk of developing MetS than males
 - Prevalence of MetS is higher among older age than young
 - The risk of MetS is lower among respondents with high level of education
 - High family monthly income increases the risk of MetS
 - Prevalence of MetS significantly differs among different ethnic groups.
 - Family history of the disease increases the risk of MetS
- iii. Behavioural characteristics increase the risk of metabolic syndrome.

- Tobacco consumption increases the risk of Mets
- Alcohol consumption increases the risk of MetS
- iv. Decrease in physical activity increases risk metabolic syndrome

1.7 Conceptual framework

This section provides a theoretical model for understanding the relationship between dependent variable (MetS) and the independent variables that focuses on multifaceted health related problems (Simmons et al., 2010). This model was used to identify direct or indirect contributors and predictors on MetS that was found to be attributable to several underlying factors (Haffner, 2006). Identifying the factors that predict MetS in this concept is necessary in understanding the target plan for intervention strategies of MetS and its consequences. Understanding the conceptual frame work will facilitate decision making regarding the role of each variables in development of metabolic syndrome.

Figure 1.1 shows the conceptual framework of metabolic syndrome. Based on the conceptual frame work, the study assessed several features that could predispose individual respondent towards the development of MetS. They include socio-demographic characteristic which includes age, gender, ethnicity, education level, total monthly family income and knowledge on hypertension, diabetes and obesity. The socio-demographic factors are known to influence the lifestyle of an individual and predispose to then occurrence of MetS (Makkes et al., 2013, Loucks et al., 2007, Rampal et al., 2012, Furgerson et al., 2010).

Behavioural risk factors such as alcohol consumptions, unhealthy diets, tobacco consumption and use of drugs also reported to enhance the development of MetS (WHO, 2013, Grundy et al., 2004, Alkerwi et al 2009). Smokeless tobacco products (chewing tobacco, moist and dry snuff) causes several adverse health related effects like oral-pharyngeal cancer, dental caries, oral lesions, addiction to Nicotine, lung diseases and cardiovascular diseases (Monson, & Beaulieu, 2011). In a large cohort study in United State reported an association between smokeless tobacco and increased risk of cardiovascular diseases (Critchley & Unal, 2003).



It has been documented that genetic factor, family history of hypertension, diabetes and obesity was significantly associated and increases the risk of MetS (Lehtovirta et al., 2000, Yeung et al., 2007). Physical inactivity was strongly independently associated with increased prevalent of MetS (Felix et al., 2011). Regular physical activity has positive effect on numerous cardiovascular risk factors that contributes to the development of MetS, therefore lifestyle intervention mainly through modification of dietary pattern and physical activity are crucial to reduce risk of vascular diseases (Lakka et al., 2007). Previous studies indicated that a rural/urban factor was strongly associated with the risk of MetS (Gyakobo et al., 2012).

Urban dwellers had a significantly higher risk of MetS than rural dwellers, because majority of the rural dwellers are made of predominantly active peasant farmers who pay much attention to traditional dietary pattern than the western dietary pattern. Complex interplay between genetic and environmental factors is belief plays a significant role in pathophysiology of CVD and MetS (Thaman et al., 2013). Genetic factor, Urban and rural factor and dietary pattern, knowledge attitude and practice on the risk factors, drugs and hormones were not highlighted in this theoretical model because they were not included in the study.



Figure 1.1 Conceptual frame work on risk factors associated with MetS

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