UNIVERSITI SAINS MALAYSIA

METABOLIC SYNDROME STUDY AMONG MALAY NATIONAL SERVICE TRAINEES IN KELANTAN

BY:

DR NAJIB MAJDI BIN YAACOB

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LIST OF ABBREVIATIONS

WHO	World Health Organization
IDF	International Diabetes Federation
NCEP ATP III	US National Cholesterol Education Program Adult Treatment Panel III
WC	Waist circumference
WHtR	Waist to hip ratio
BMI	Body mass index
SBP	Systolic blood pressure
DBP	Diastolic blood pressure
TG	Triglycerides
HDL-C	High density lipoprotein
LDL-C	Low density lipoprotein
CRP	C-reactive Protein
FPG	Fasting plasma glucose
IGT	Impaired glucose tolerance

ABSTRACT

INTRODUCTION: Metabolic syndrome is a constellation of risk factors which increases the risk for diabetes and cardiovascular diseases consisting of obesity, hypertension, hypertriglyceridemia, low level of high density lipoprotein cholesterol and hyperglycemia. As the prevalence of obesity increases, the prevalence of metabolic syndrome is also increasing at an alarming trend in numerous populations. C-reactive protein and adiponectin are two important biochemical markers which is said to have association with the development of metabolic syndrome, however the exact mechanism is not yet well understood.

OBJECTIVES: The objectives of this study were to describe the prevalence of metabolic syndrome among National Service trainees in Kelantan and determine the association between components of metabolic syndrome (BMI, WC, WHtR, SBP, DBP, TG, HDL-C, fasting blood glucose and fasting insulin), C-reactive protein and adiponectin levels.

METHODOLOGY: A cross-sectional study was conducted in 2009 involving 156 National Service trainees in Kelantan. As no single 'gold standard' criteria is available to diagnose metabolic syndrome in Asian adolescents, we describe the prevalence using four different criteria namely the International Diabetes Federation definition of metabolic syndrome for children and adolescents, the modified NCEP ATP III criteria for Asians, the criteria used previously in Indian adolescents

population (Vikram *et al.*, 2006) and criteria previously used in Korean adolescents population (Kim *et al.*, 2007). Association between components of metabolic syndrome with C-reactive protein and adiponectin was studied using simple and multiple linear regression and correlation between adiponectin and C-reactive protein was studied using Pearson Correlation.

RESULTS: The prevalence of metabolic syndrome among National Service trainees in Kelantan is 1.28% when IDF criteria and NCEP ATP III criteria was used and 0.64% when criteria by Vikram *et al.* and Kim *et al.* was used. There is significant positive linear association between C-reactive protein levels and Body Mass Index in overall, both male and female adolescents. Significant negative linear association was observed between adiponectin levels, Body Mass Index and waist to hip ratio in overall subjects. When analysis was divided according to gender, there is a significant negative association between adiponectin and Body Mass Index while in female there is a significant positive linear association between adiponectin and high density lipoprotein cholesterol. No significant correlation was found between C-reactive protein and adiponectin levels.

CONCLUSIONS: We conclude that the prevalence of metabolic syndrome among National Service trainees in Kelantan is low compared to other study population, however in view of ethnicity-related characteristics, the cut-off points used might not be suitable for our study population. Adiponectin and C-reactive protein was proven to have significant association with several components of metabolic syndrome.

Further study need to be conducted to better understand the exact mechanism of metabolic syndrome especially among Malaysian adolescents.

ABSTRAK

PENGENALAN: Sindrom metabolik merupakan sakumpulan factor risiko yang meningkatkan risiko penyakit diabetes dan juga penyakit berkaitan kardiovaskular. Sindrom in terdiri daripada kegemukan, tekanan darah tinggi, paras kolesterol "high density lipoprotein" yang rendah dan juga hiperglisemia. Oleh kerana terdapat hubungan rapat dengan kegemukan, prevalen sindrom metabolic juga turut meningkat dengan kadar yang membimbangkan. Protin C-reaktif dan adiponectin merupakan dua penanda biokimia yuang penting dalam penyakit ini, namun mekanisma yang sebenarnya masih menjadi persoalan ramai penyelidik.

OBJEKTIF: Objektif kajian ini ialah untuk menerangkan prevalen sindom metabolic di kalangan peserta Program Latihan Khidmat Negara di Kelantan , dan juga kaitan antara paras protin C-reaktif, adiponectin dan komponen-komponen sindrom metabolik.

KAEDAH KAJIAN: Kajian ini merupakan satu kajian keratan rentas yang dijalankan pada tahun 2009 melibatkan seramai 156 remaja Melayu Malaysia yang mengikuti Program Latihan Khidmat Negara di Kelantan. Prevalen sindrom metabolic dihuraikan menggunakan empat criteria berbeza iaitu kriteria daripada International Diabetes Federation untuk kanak-kanak dan remaja, kriteria yang diubahsuai dari NCEP ATP III untuk populasi Asia, criteria yang telah digunakan dalam populasi remaja India (Vikram *et al.*, 2006) dan juga kriteria yang telah digunakan dalam populasi remaja Korea (Kim *et al.*, 2007). Kaitan antara

komponen-komponen sindrom metabolic dengan paras protin C-reaktif dan adiponectin di kaji menggunakan 'Simple' dan 'Multiple Linear Regression', ujian 'Pearson Correlation' digunakan untuk mengkaji hubungan antara paras protin C-reaktif dan juga paras adiponectin.

KEPUTUSAN KAJIAN: Prevalen sindrom metabolic di kalangan remaja Melayu Malaysia ialah 1.28% menggunakan kriteria IDF dan juga ATP III dan 0.64% menggunakan kriteria oleh Vikram *et al.* dan Kim *et al.*. Terdapat kaitan positif antara paras protein C-reaktif dengan index jisim badan, samada analisis dijalankan pada keseluruhan dan juga apabila analisis dibahagikan mengikut jantina. Kaitan positif juga dapat dilihat antara adiponectin dengan index jisim badan dan juga nisbah ukuran pinggang dan pinggul semasa analisis dijalankan pada keseluruhan subjek. Di kalangan remaja lelaki, kaitan dapat dilihat antara adiponectin dengan index jisim badan sahaja, manakala di kalangan remaja perempuan, kaitan dapat dilihat antara adiponectin dengan paras kolesterol 'high density lipoprotein' sahaja. Tiada hubungan yang signifikan diantara paras protein C-reaktif dan paras adiponectin.

KESIMPULAN: Prevalen sindrom metabolik di kalangan peserta Program Latihan Khidmat Negara di Kelantan adalah rendah berbanding kajian lain dalam populasi berbeza, namun ianya mungkin disebabkan perbezaan antara etnik dimana paras yang digukanan untuk diagnosa sindrom metabolic dalam kajian ini kurang sesuai untuk digunakan dalam populasi kajian kami ini. Namun demikian, dapat dibuktikan terdapatnya hubungan antara beberapa komponen sindrom metabolik dengan protin

C-reaktif dan adiponektin. Kajian lebih lanjut dan mendalam perlu dijalankan untuk memahami dengan dengan lebih mendalam mekanisma sindrom metabolic khususnya di kalangan remaja Malaysia.