UNIVERSITI PUTRA MALAYSIA

PREVALENCE OF METABOLIC SYNDROME AND FACTORS ASSOCIATED WITH IT AMONG WOMEN IN FELDA PALONG, GEMAS, NEGERI SEMBILAN

AZIZAH BTE MAT HUSSIN

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AZIZAH BTE MAT HUSSIN

MASTER OF SCIENCE
UNIVERSITI PUTRA MALAYSIA
2006
PREVALENCE OF METABOLIC SYNDROME AND FACTORS ASSOCIATED WITH IT AMONG WOMEN IN FELDA PALONG, GEMAS, NEGERI SEMBILAN

By

Azizah Bte Mat Hussin

Thesis Submitted to the School of Graduate Studies University Putra Malaysia in Fulfilment of the Requirement for the Degree of Master of Science

December 2006
Dedicated to:

My beloved parents (Mat Hussin B Anal and Wan Aminah Bte Wan Yaacob) for their love and care throughout my Master study.

My lovely siblings (Asma, Azlina, Aminudin, Azmanida) for their encouragement and understanding.

My supportive family members

My dearest Hafazi Burhan

And

My wonderful friends for their assistance.
A cross sectional study was carried out to assess the diet, physical activity and the prevalence of metabolic syndrome (MS) of 106 women aged 45 to 60 years old living in Felda Palong 4, 5 and 6, Gemas, Negeri Sembilan. The data collection processes included interviews, anthropometric measurements, blood pressure measurements and blood lipid sample collection. Out of the total sample, 67.0% were Malays, 29.2% were Indians and 3.8% were Chinese. The educational level of respondents (37.7%) was primary school level. Most of the respondents were housewives (70.8%), with a majority of the respondents (60.4%) earning between RM400 and RM699 per month. For the anthropometric measurements, almost half of the respondents (47.2%) were overweight (Body Mass Index (BMI) ≥ 25.0 - 29.9). Majority of the respondents (74.5%) had waist-
hip-ratio (WHR) of more or equal to 0.85 and 81.1% had waist circumferences (WC) equal to or greater than 80 cm. The prevalence of hypercholesterolemia (total cholesterol (TC) ≥ 6.2mmol/L) among respondents was 31.1%. Raised Low Density Lipoprotein- Cholesterol (LDL-C) was found in 43.4% of the respondents while low levels of High Density Lipoprotein- Cholesterol (HDL-C) were evident in 14.2% of the respondents. The prevalence of high blood pressure and high blood glucose were 47.2% and 21.7% respectively. The dietary pattern of the respondents showed that their main sources of carbohydrate were rice and white bread. Their main sources of protein were chicken and fish while their sources of vitamins and minerals were fruits and vegetables. A high percentage of respondents were deficient in nutrients like potassium, vitamin C, fiber and calcium that were found to be lower than the Malaysian Recommended Nutrient Intake (RNI) and Daily Reference Value (DRV). On the other hand, the mean intakes of protein, carbohydrates, total fat, sodium, vitamin A, vitamin E and iron were found to be more than RNI and DRV. For physical activity, the mean kcal spent for physical activity was 1843±355. Most of the respondents (55.7%) were in the category of moderate PAL. By using International Diabetes Federation (IDF) criteria, the prevalence of metabolic syndrome significantly increased from 48.1% (NCEP ATPIII) to 54.7% (r = 0.724, p<0.01). Respondents with metabolic syndrome had significantly higher mean BMI, WC, WHR, systolic blood pressure (SBP), diastolic blood pressure (DBP), fasting plasma glucose (FPG), LDL-C and lower mean of HDL-C. BMI, WHR, SBP, DBP, FPG,
triglycerides and HDL-C were found to be significantly associated with MS. The mean energy intake was $1846\pm450$ kcal for subjects with MS and $1927\pm521$ for subjects without MS, both lower than the Malaysian RNI (2180 kcal for female). Respondents with MS had higher protein, carbohydrate, total fat and sodium intakes whereas respondents without MS had higher energy intake, cholesterol, vitamin A, vitamin C, potassium, fiber, calcium and iron intakes. However, these differences were not statistically significant except for vitamin C ($p<0.05$). The results showed that intake of iron, sodium and total fat were significantly associated with metabolic syndrome while protein, vitamin A, vitamin C, calcium and fiber intake were not significant. In conclusion, this study found that there were associations between anthropometric measurements, blood pressure, fasting plasma glucose and lipid profiles with metabolic syndrome. This study also found that there were associations between certain nutrient intakes and physical activity with metabolic syndrome. Therefore, there is a need to address these problems at national and regional level with the aim of early identification and prevention and appropriate community based intervention program should be reinforced to increase the awareness of the community on healthy living.
Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

PREVALENS METABOLIK SINDROM DAN FAKTOR-FAKTOR YANG BERKAITAN DENGANNYA DI KALANGAN WANITA DI FELDA PALONG, GEMAS, NEGERI SEMBILAN

Oleh

AZIZAH BTE MAT HUSSIN

Disember 2006

Pengerusi: Professor Madya Rokiah Mohd Yusof, PhD

Fakulti: Perubatan dan Sains Kesihatan

Satu kajian keratan rentas dijalankan untuk mengkaji pemakanan, aktiviti fizikal dan prevalens metabolik sindrom (MS). Kajian ini telah dijalankan di kalangan 106 wanita yang berumur di antara 45 hingga 60 tahun dan tinggal di Felda Palong 4, 5 dan 6, Gemas, Negeri Sembilan. Proses pengumpulan data termasuk temubual, pengukuran antropometri, tekanan darah dan pengambilan sampel darah. Kebanyakan responden (67.0%) adalah Melayu, 29.2% India dan 3.8% Cina. Secara purata, tahap pendidikan responden adalah sekolah rendah (37.7%). Majoriti responden (70.8%) adalah surirumah dengan pendapatan isirumah antara RM400 hingga RM699 sebulan. Untuk pengukuran antropometri, hampir separuh dari jumlah responden (47.2%) adalah di dalam kategori berlebihan berat badan (Indeks Jisim Tubuh (IJT) ≥ 25.0 - 29.9). Distribusi nisbah pinggang-
pinggul (NPP ≥ 0.85) dan ukuran pinggang (UP ≥ 80cm) adalah masing-masing 74.5% dan 81.1%. Distribusi hiperkolestrolemia (Jumlah Kolesterol (JK) ≥ 6.2mmol/L) di kalangan responden adalah 31.1%. Paras Kolesterol Lipoprotein Ketumpatan Rendah (K-LKR) yang tinggi didapati di kalangan 43.4% responden sementara paras Kolesterol Lipoprotein Ketumpatan Tinggi (K-LKT) yang rendah terbukti di kalangan 14.2% responden. Distribusi tekanan darah dan glukosa darah yang tinggi adalah masing-masing 47.2% dan 21.7%. Corak pemakanan menunjukkan sumber karbohidrat responden adalah dari nasi dan roti putih manakala sumber protein adalah dari ayam dan ikan. Sayur-sayuran dan buah buahan adalah sumber utama vitamin dan mineral responden. Kajian ini juga menunjukkan peratusan yang tinggi terhadap kekurangan nutrien seperti potasium, vitamin C, serat dan kalsium di mana didapati kurang daripada RNI Malaysia dan DRV. Manakala purata protein, karbohidrat, lemak, sodium, vitamin A, vitamin E dan zat besi didapati melebihi RNI Malaysia dan DRV. Untuk aktiviti fizikal, min aktiviti fizikal adalah 1.43±55. Majoriti responden (55.7%) adalah di dalam aras aktiviti fizikal sederhana. Dengan menggunakan kriteria dari *International Diabetes Federation (IDF)*, prevalens MS meningkat secara signifikan dari 48.1% (kriteria dari *National Cholesterol Education Program Adult Treatment Panel III (NCEP ATPIII)*) kepada 54.7% (r=0.724, p<0.01). Responden dengan MS mempunyai perbezaan yang signifikan untuk purata IJT, UP, NPP, tekanan darah sistolik dan diastolik, glukosa darah, K-LKR dan K-LKT. IJT, UP, NPP, tekanan darah, paras glukosa darah,
trigliseride, dan K-LKT didapati mempunyai perkaitan yang signifikan dengan MS. Purata pengambilan tenaga di kalangan responden MS adalah 1846±450 kkal manakala 1927±521 untuk responden bukan MS, kedua-duanya adalah lebih rendah dari RNI Malaysia (2180 kkal untuk wanita). Responden dengan MS mempunyai pengambilan protein, karbohidrat, lemak dan sodium yang lebih tinggi manakala responden tanpa MS mempunyai pengambilan tenaga, kolesterol, vitamin A, vitamin C, potassium, serat, kalsium dan zat besi yang tinggi. Walau bagaimanapun, perbezaan pengambilan nutrien di kalangan responden dengan MS dan tanpa MS adalah tidak signifikan kecuali vitamin C (p<0.05). Kajian ini menunjukkan zat besi, sodium dan lemak mempunyai perkaitan yang signifikan dengan MS manakala protein, vitamin A, vitamin C, kalsium dan serat didapati tidak signifikan. Secara kesimpulannya, kajian ini mendapati perkaitan antara pengukuran antropometri, tekanan darah, paras glukosa darah dan profil lipid dengan MS. Kajian ini juga mendapati ada perkaitan antara nutrien-nutrien tertentu dengan MS. Oleh itu, adalah suatu kepentingan kepada pihak berwajib untuk mengenalpasti masalah ini dari peringkat daerah khususnya dan kebangsaan amnya. Pengesanan awal, pencegahan serta program berasaskan komuniti yang bersesuaian perlu dilakukan untuk meningkatkan kesedaran komuniti terhadap kehidupan yang sihat.
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I am greatly indebted to Pakcik Addnan Bin Abdullah and Makcik Halijah Bte Mohd Jantan for treating me like their own daughter during my stay in their home to complete this research. Not forgetting the manager of Felda Palong 4, 5 and 6; Encik Abdul Aziz, Encik Kamaruddin and Encik Md Mohiyar Ros for giving me the permission to carry out the survey in the village. I would also like to say a note of thanks to all the respondents for their cooperation.

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_Azizah Bte Mat Hussin_
I certify that an Examination Committee has met on 20 December 2006 to conduct the final examination of Azizah Bte Mat Hussin on her Master of Science thesis entitled “Prevalence of Metabolic Syndrome and Associated Factors Among Women in Felda Palong, Gemas, Negeri Sembilan” in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are follows:

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Date: 22 MARCH 2007
This thesis submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee are as follows:

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Date: 12 APRIL 2007
DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citation which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

AZIZAH BTE MAT HUSSIN

Date: 23/08/07
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LIST OF ABBREVIATIONS

AACE  American Association of Clinical Endocrinologists
ADA   American Diabetes Association
AHA   American Heart Association
BMI   Body Mass Index
BMR   Basal Metabolic Rate
BP    Blood Pressure
CHD   Coronary Heart Disease
CVD   Cardiovascular Disease
DBP   Diastolic Blood Pressure
DHA   Docosahexanoic Acid
DM    Diabetes Mellitus
DRI   Dietary References Intake
DRV   Daily Reference Value
EPA   Eicosapentanoic Acid
Etc   Et cetera
FFQ   Food Frequency Questionnaire
FPG   Fasting Plasma Glucose
HBP   High Blood Pressure
HDL-C High Density Lipoprotein Cholesterol
HOPE  Heart Outcomes Prevention Evaluation Trial
hr    Hour
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Term in English</th>
<th>Term in Indonesian</th>
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<td>IDF</td>
<td>International Diabetes Federation</td>
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<td>IFG</td>
<td>Impaired Fasting Glucose</td>
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<td>IGT</td>
<td>Impaired Glucose Tolerance</td>
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<td><em>Indeks Jisim Tubuh</em></td>
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<td>IR</td>
<td>Insulin Resistance</td>
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<td>IRPA</td>
<td>Intensification of Research in Priority Area</td>
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<td>European Group for the Study of Insulin Resistance</td>
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<td>JK</td>
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<td><em>Kolesterol Lipoprotein Ketumpatan Rendah</em></td>
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<td><em>Kolesterol Lipoprotein Ketumpatan Tinggi</em></td>
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<td>LDL-C</td>
<td>Low Density Lipoprotein Cholesterol</td>
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<tr>
<td>MUFA</td>
<td>Monounsaturated Fatty Acid</td>
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<td>NEFA</td>
<td>Non-esterified fatty acid</td>
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<td>Ox-LDL</td>
<td>Oxidative modified low density lipoprotein</td>
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<td>Very Low Density Lipoprotein</td>
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