PROBABILITY OF CARDIOVASCULAR DISEASE AND ASSESSING THE RELATIONSHIP OF JOB STRESS ON CVD RISK: A STUDY AMONG PRIMARY HEALTHCARE PROVIDERS IN KELANTAN USING THE FRAMINGHAM AND GLOBORISK SCORES

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In the name of Allah, the most compassionate and the most merciful.

“So verily, with every difficulty, there is a relief.” [94:5]

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DECLARATION

I, Wira Alfatah Bin Ab Ayah @ Ab Aziz, declare that the work presented in this thesis is originally mine. The information which has been derived from other sources is clearly indicated in the thesis.

Wira Alfatah Bin Ab Ayah @ Ab Aziz

Student ID: P-UD 0008/17

Signed on 29 December 2020

LIST OF PAPERS AND CONFERENCES

During my Doctor of Public Health (DrPH) course, the following articles were finally drafted for submission at the Web of Sciences Journal and/or presented at international level. Overall, the thesis comprises the three drafted papers, which corresponds to the study's four specific objectives.

Final draft papers for submission:

The application of a newly developed cardiovascular disease (CVD) risk calculator; Globorisk among healthcare providers in a predominantly Malay population state in Malaysia

Wira Alfatah AA (1), *Kamarul Imran M (1), Mohd Ismail I (1), Mohd Nazri S (1), Yelmizaitun O (2)

Job stress among Primary Healthcare Providers in a predominantly Malay population state in Malaysia and its association with social support

Wira Alfatah AA (1), Kamarul Imran M (1), Mohd Ismail I (1), *Mohd Nazri S (1), Yelmizaitun O (2)

Estimating the Effect Job Stress and Social Support on Cardiovascular Risk: A Study among Healthcare Providers Using the Framingham and Globorisk Scores

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Global Health Sciences Conference 2020 (GHSC 2020), Universiti Sultan Zainal Abidin, Terengganu, Malaysia (e-conference), 12 December 2020

- The application of newly developed Cardiovascular Disease (CVD) risk calculator among healthcare providers in the predominantly Malay population state in Malaysia **(oral presenter)**
- The trend of job strain among healthcare providers in a predominantly Malay population state in Malaysia and their association with social support **(poster presenter)**

Malaysia R-conference 2020 (e-conference), 21-22 November 2020

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LIST OF ABBREVIATIONS

ASEAN	**Association of Southeast Asian Nations**
AUC	Area under the curve
BMI	Body Mass Index
CDC	Center for Disease Control
CI	Confidence interval
CPG	Clinical Practice Guideline
CVD	Cardiovascular Disease
DASS	Depression Anxiety Stress Scale
DBP	Diastolic blood pressure
df	Degree of freedom
EnPHC	Enhanced Primary Health Care
FRS	Framingham Risk Score
GBD	Global Burden of Disease
HDL	High-density lipoprotein
HPA	Hypothalamic-pituitary-adrenocortical axis
IPAQ	International Physical Activity Questionnaire
IQR	Interquartile range
JCQ	Job Content Questionnaire

KOSPEN	Program Komuniti Sihat Pembina Negara
M-JCQ	Malay version Job Content Questionnaire
NIOSH	National Institute of Occupational Safety and Health
RME-40	Regular examination aged 40 and above
ROC	Receiver operating characteristic
SAM	Sympathetic-adrenal-medullary
SBP	Systolic blood pressure
SCORE	Systematic Coronary Risk Evaluation
SD	Standard deviation
SE	Standard error
SPSS	Statistical Package for Social Sciences
UNFPA	United Nations Population Fund
WHO	World Health Organization
WHO/ISH	World Health Organization/International Society of Hypertension

LIST OF SYMBOLS

>	More than
<	Less than
≥	More than or equal to
≤	Less than or equal to
=	Equal to
mmol/l	millimole per litre
mm Hg	millimetre mercury
kg/m2	kilogram per meter squared
%	Percentage
n	Number of populations

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ABSTRAK

KEBARANGKALIAN PENYAKIT KARDIOVASKULAR DAN PERKAITAN ANTARA TEKANAN AKIBAT PEKERJAAN DAN RISIKO PENYAKIT KARDIOVASKULAR: KAJIAN KE ATAS ANGGOTA KESIHATAN AWAM DI KELANTAN MENGGUNAKAN SKOR FRAMINGHAM DAN GLOBORISK

Latar belakang: Penyakit kardiovaskular (CVD) kekal sebagai penyebab utama kematian di seluruh dunia. Oleh itu, banyak penyelidik telah mencipta model ramalan CVD untuk mengenal pasti risiko awal CVD di mana perubahan gaya hidup dapat dilakukan lebih awal untuk mengurangkan risiko sebelum terjadi penyakit di masa depan. Sebaliknya, banyak kajian telah menunjukkan kesan buruk tekanan kerja terhadap CVD yang menjadi faktor risiko penyakit, namun sering diabaikan kerana kerumitan pengukurannya. Oleh kerana persekitaran kerja semakin mencabar, terutama di sektor kesihatan, sebuah kajian terstruktur telah dilakukan untuk menentukan hubungan antara tekanan pekerjaan dan CVD dalam kalangan anggota kesihatan awam di Kelantan.

Objektif: Kajian ini bertujuan untuk melihat kebarangkalian risiko CVD dalam tempoh 10 tahun akan datang dan stratifikasi risiko CVD dalam kalangan anggota kesihatan primer di Kelantan dengan menggunakan model ramalan CVD yang telah disyorkan dan juga model yang baru dicipta, menentukan prestasi model CVD yang baru dicipta berbanding model yang telah disyorkan, menentukan peratusan bilangan tekanan kerja dalam kalangan anggota kesihatan awam dan akhirnya untuk menentukan tekanan kerja sebagai faktor prognostik untuk CVD.

Metodologi: Kajian ini dilakukan dalam kalangan anggota kesihatan awam berumur 40 tahun ke atas di semua daerah di Kelantan. Tempoh kajian ini adalah enam bulan, bermula dari bulan Mac 2019 hingga Ogos 2019, yang terdiri dari pengumpulan data primer dan sekunder. Sepuluh pemboleh ubah diperlukan untuk ramalan CVD untuk model *General Framingham CVD* dan Mode*l Globorisk*, iaitu umur, jantina, tekanan darah sistolik, status diabetes, status merokok, status rawatan hipertensi, tinggi, berat badan, tahap kolesterol total (TC) dan kolesterol lipoprotein berkepadatan tinggi tahap.(HDL) Data diambil dari pangkalan data pemeriksaan kesihatan berkala luar talian (RME-40) dari unit kesihatan pekerjaan di setiap daerah. Dengan menggunakan model ramalan, risiko CVD diklasifikasikan menjadi rendah, sederhana dan tinggi. Soal selidik versi Bahasa Melayu yang telah disahkan (M-JCQ) diedarkan kepada peserta terpilih yang memenuhi kriteria kajian bagi mengenal pasti anggota dengan tekanan pekerjaan. Skor tiga skala utama dari M-JCQ, iaitu latitud keputusan, permintaan pekerjaan psikologi dan sokongan sosial dikira mengikut formula yang diberikan oleh JCQ (dilindungi hak cipta), lalu mengklasifikasikan anggota kesihatan awam kepada empat kumpulan iaitu; tekanan kerja tinggi, tekanan kerja rendah, pasif dan aktif. Ketegangan pekerjaan yang tinggi (*high job strain*) ditakrifkan sebagai tekanan kerja mengikut garis panduan oleh JCQ. Analisis deskriptif, analisis *Cohen Kappa*, analisis *Bland-Altman*, *Chi-square*, dan regresi linear digunakan untuk menganalisis data.

Keputusan: Model CVD meramalkan kumpulan berisiko rendah untuk CVD adalah antara 78 hingga 85% dan kumpulan berisiko tinggi antara 1% hingga 4% dari jumlah anggota yang terlibat. Untuk menentukan kesepakatan secara kategori, *The Globorisk Office* dan *The General Framingham CVD BMI* mempunyai nilai Kappa 0,628 ± 0,078 berbanding pasangan yang lain (nilai *Kappa* = 0,624 ± 0,12). Plot *Bland-Altman*

selanjutnya menyokong prestasi kedua-dua model ramalan CVD. Kira-kira 28.5% anggota dikenal pasti mengalami tekanan pekerjaan yang merangkumi 145 orang. Analisis berstrata menunjukkan kumpulan profesional (ijazah dan ke atas) mempunyai tekanan kerja yang tertinggi (41.2%), dan kumpulan diploma mempunyai tekanan kerja yang terendah (22.9%). Analisis lebih lanjut dengan kaedah *Chi-square* menunjukkan terdapat hubungan yang signifikan antara *Karasek Quadrant* dengan tahap sokongan sosial dari penyelia mereka ($p < 0.05$), tetapi tidak ada hubungan antara tekanan pekerjaan yang tinggi dan tahap sokongan sosial rakan sejawat ($p > 0.05$). Model regresi linier mendapati bahawa semua kategori *strain* pekerjaan kecuali kumpulan *high j*ob *strain* mempunyai risiko yang lebih rendah untuk CVD dengan hanya kumpulan pasif yang menunjukkan trend yang tidak konsisten untuk model *Globorisk-Lab*. Faktor sokongan sosial menunjukkan hubungan yang tidak konsisten dengan risiko CVD. Walau bagaimanapun, semua anggaran tidak mencapai ambang statistik yang signifikan ($p < 0.05$).

Kesimpulan: Hasil kajian menunjukkan bahawa kedua-dua model ramalan CVD sebanding dan boleh untuk penduduk Malaysia. Namun, ramalan risiko CVD dari model *Framinghan* adalah sedikit lebih tinggi berbanding model *Globorisk*. Hasil kajian juga menunjukkan bahawa kadar tekanan kerja dalam kalangan anggota dalah 28.5% dan telah mengenal pasti kumpulan profesional sebagai kumpulan yang paling terjejas. Model akhir menunjukkan tren yang konsisten dengan penemuan lain yang, menunjukkan tekanan kerja menimbulkan kesan buruk terhadap CVD. Walaupun semua anggaran tidak signifikan secara statistik, penemuan ini dapat membantu memberitahu para pembuat keputusan mengenai pentingnya mengenal pasti tekanan pekerjaan dalam kalangan anggota kesihatan awam sebagai risiko bahaya pekerjaan

yang signifikan dari aspek kesihatan mental dan seterusnya menekankan gaya hidup sihat untuk pencegahan risiko CVD.

KATA KUNCI: CVD, Globorisk, Framingham, model ramalan, tekanan kerja, persetujaun, JCQ, M-JCQ, anggota kesihatan awam.

ABSTRACT

PROBABILITY OF CARDIOVASCULAR DISEASE AND ASSESSING THE RELATIONSHIP OF JOB STRESS ON CVD RISK: A STUDY AMONG PRIMARY HEALTHCARE PROVIDERS IN KELANTAN USING THE FRAMINGHAM AND GLOBORISK SCORES

Background: Cardiovascular disease (CVD) remains the leading cause of mortality worldwide. Therefore, many researchers developed prediction models for CVD for early risk identification. On the other hand, numerous studies already demonstrated the detrimental effect of job stress on CVD, which often becomes the disease's neglected risk factor due to its complexity in measurement. Due to a challenging working environment, particularly in health sectors, a well-structured study was carried out to determine the relationship between job stress and CVD among primary healthcare workers in Kelantan.

Objectives: This study aimed to describe the 10-year probability of CVD risk and the stratification of CVD risk among primary healthcare providers in Kelantan by using the established and the newly developed CVD prediction model to determine the performance of the newly developed CVD model compared to the established one, to determine the proportion of job stress among them and finally to estimate the job stress as the predictive factor for CVD among them.

Methodology: This study was conducted among primary healthcare providers (HCPs) aged 40 and above at all Kelantan districts. This study period was about six months, from March 2019 until August 2019, comprising primary and secondary data collection. Ten variables were required for CVD prediction for The General Framingham CVD Model and Globorisk Model, namely age, gender, systolic blood

pressure, diabetic status, smoking status, treatment status of hypertension, height, weight, total cholesterol level and high-density lipoprotein cholesterol level. The data was retrieved from the offline regular medical database (RME-40) from the district level's occupational health unit. By using the models, the CVD risk was classified into low, medium and high.

A self-administered validated Malay version questionnaire (M-JCQ) was distributed to the selected participant who fulfilled the study criteria for identifying the HCPs with job stress. The score of the main three scales from M-JCQ, namely decision latitude, psychological job demand and social support, were calculated according to the given formula by JCQ (copyrighted) to classify the primary HCPs into four groups, namely Karasek strain category; high job strain, low job strain, passive and active. High job strain was defined as job stress according to the guideline by JCQ. Descriptive analysis, Cohen Kappa agreement analysis, Bland-Altman analysis, Chi-square, and linear regression were employed to analyze the data.

Results: CVD prediction models revealed the low-risk group for CVD ranging from 78 to 85% and the high group from 1% to 4% of the total HCPs. For categorical agreement, The Globorisk Office and The General Framingham CVD BMI showed good agreement with Kappa value of 0.628 ± 0.078 compared The Globorisk Lab and The General Framingham CVD Lipid (Kappa value = 0.624 ± 0.12). Bland-Altman plots further supported the model agreement of both CVD prediction models. About 145 (28.5%) HCPs identified with job stress. A stratified analysis demonstrated the professional group (Degree and above) has the highest proportion of job stress (41.2%), and the diploma group has the lowest proportion of job stress among the four job qualification groups (22.9 %).