Nutritional Intake and Energy Expenditure of Police Officers in IPK Kota Kinabalu

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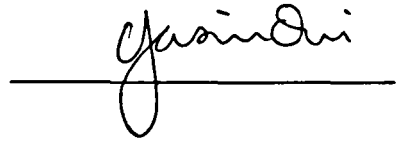

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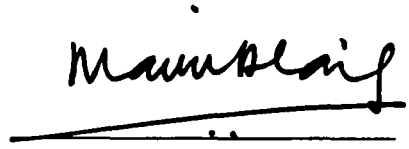

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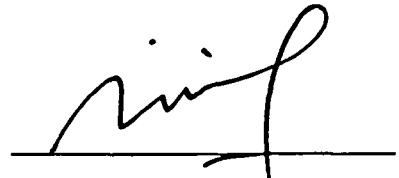

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ABSTRACT

NUTRITIONAL INTAKE AND ENERGY EXPENDITURE OF POLICE OFFICERS IN IPK KOTA KINABALU

The aim of this study is to determine the nutritional status of police officers and to access the prevelence of obesity among police officers, to determine their daily physical activity level, and to compare their energy intake and expenditure, and to determine the eating pattern and examine the interrelationship between dietary habits and body composition. This study was done in IPK Kota Kinabalu. There were 45 police personnel aged between 22 to 59 years involved in this study. Body mass index (BMI), waist circumference (WC) and body fat percentage of respondents were measured. Information on energy intake was collected using 3-days dietary food recalls and analysed using DietPlus 2.0 (1887.3 ± 423.5 kcal/d for men and 1907.0 ± 425.3 kcal/d for women). Respondents tend to have foods that contains high fat. Energy expenditure was calculated based on basal metabolic rate (BMR), thermic effect of food (TEF) and physical activity level (PAL) (2639.6 ± 229.4 kcal/d for men and 2268.9 ± 203.5 kcal/d for women). BMR was calculated using predictive equation for estimation of BMR in Malaysian adults, TEF was estimated as 8% of total energy intake, while PAL was measured using information collected through 24-hour Physical Activity Recalls. In conclusion, majority of police personnel in Kota Kinabalu was overweight (54.9%) and having high body fat percentage (51.6%). All respondents were had sedentary lifestyles. There is significant relationship between BMI and body fat percentage ($r=0.685$, $p<0.001$). However, there is no significant relationship between BMI and WC ($r=0.288$, $p=0.055$).

ABSTRAK

PENGAMBILAN NUTRISI DAN PENGGUNAAN TENAGA ANGGOTA POLIS DI IPK KOTA KINABALU

Tujuan kajian ini adalah untuk menentukan status nutrisi dan anggota polis serta mengakses tahap kegemukkan anggota polis, mengkaji tahap fizikal anggota polis dan membanding pengambilan dan penggunaan tenaga anggota polis. dan mengkaji tabiat pemakanan anggota polis serta menentukan kaitan antara tabiat makanan dengan komposisi badan anggota polis IPK Kota Kinabalu. Sebanyak 45 anggota polis yang berumur antara 22 hingga 59 tahun terlibat dalam kajian ini. Data antropometri iaitu Indeks Jisim Tubuh (IJT),lilitan pinggang dan peratus lemak badan responden ditentukan. Pengambilan tenaga responden ditentukan melalui rekod diet 3 Hari dengan bantuan Perisian DietPlus 2.0 (1887.3 ± 423.5 kcal/h bagi lelaki dan 1907.0 ± 425.3 kcal/h bagi perempuan). Penggunaan tenaga responden ditentukan berdasarkan kadar metabolisma basal (BMR), kesan haba makanan (TEF) dan aktiviti fizikal (2639.6 ± 229.4 kcal/h bagi lelaki dan 2268.9 ± 203.5 kcal/h bagi perempuan). BMR dikira melalui formula anggaran BMR penduduk dewasa Malaysia, TEF adalah 8% daripada pengambilan tenaga dan aktiviti fizikal harian dikumpul melalui Ingatan Aktiviti Fizikal 24 Jam. Kesimpulannya, majoriti anggota polis di Kota Kinabalu adalah pra obes (54.9%) dan mempunyai peratus lemak badan yang tinggi (51.6%). Kajian menunjukkan perkaitan signifikan antara IJT dan peratus lemak badan ($r=0.685, p<0.001$). Walau bagaimanapun, keputusan kajian ini tidak menunjukkan perkaitan signifikan antara IJT dan lilitan pinggang ($r=0.288, p=0.055$).

LIST OF TABLES

LIST OF ABBREVIATION

BMI	Body mass index
WC	Waist circumference
CVD	Cardiovascular disease
HDL	High density lipoprotein
LDL	Low density lipoprotein
RNI	Recommended nutrient intake
BIA	Bioelectrical impedance analysis
PAL	Physical activity level
TEE	Total energy expenditure
BMR	Basal metabolic rate
ANOVA	Analysis of variance
EI/BMR	Energy Intake Basal Metabolic Ratio

LIST OF APPENDIX

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 Introduction

Since the early of the 20th century, the major areas of concern in public health nutrition have changed from the problem of nutritional deficiencies to the problem of inadequate exercises and energy imbalances. The existing obesity epidemic is now a major concern in increasing the incidence of weight-related chronic health problems such as diabetes mellitus, cardiovascular disease, osteoarthritis, and some forms of cancer (Calle *et al.,* 2003 ; Mokdad *et al.,* 2003). Cardiovascular disease has been refer as number one fatal disease in Malaysia and the whole world. Poor diet and physical inactivity has now been showed to overtake tobacco use as the primary actual cause of death (Mokdad *et al.,* 2005).

An extensive body of scientific evidence suggests that diet that are high in total fat, saturated fat, and cholesterol while remain low in fiber content and complex carbohydrates are linked to coronary artery disease, stroke, diabetes and certain forms of cancer. Regarding diet, fat-related diet habits are a major concern in the development of obesity. Among the macronutrients, fat contains 9 kcal/g. Thus, the trend towards higher fat intake is disconcerting. Higher fat intake that combined with a sedentary lifestyle creates an energy imbalance resulting in excess weight gain.

In the public eye when a citizen sees a police officer on the street, this officer represents and is a symbol of the entire force. A trim and fit officer can send the right message to the community and this includes criminals also. However, police officers tend to have a higher prevalence of overweight and obesity.

Study also showed that law enforcement officers will have a higher prevalence of some cardiovascular disease risk factors than the general public population (Franke *et al.,* 1998) and a higher risks for disease and death. Increased morbidity among law enforcement officers has been attributed to an increase prevalence of cardiovascular disease risk factors, including physical inactivity, hypercholesterolinemia, higher body mass index (BMI), alcohol and tobacco use, and hyperinsulinemia (Franke *et al.,* 1998).

Generally, police work is considered sedentary in nature (William *et al.,* 1997). However, police work has always been cited as a stressful occupation (Violanti, 1985). Although some research found that police work has not been adequately compared with other occupation (Terry, 1983), they still agree that police officers experience a certain stress-related problem in their work. The specific factors that were related to stress in police work have been categorized in various ways, this included organizational practices and characteristics, the criminal justice system, the public, and the specifics type of of police work (Violanti, 1985). The sedentary nature of police work, lack of control inherent in unpredictability event, and sudden burst of adrenaline may all contribute to cardiovascular disease risks.

Franke & Anderson (1994) showed that most of the police officers were categorized as non-exercisers. Overweight police officers stated that the main reasons for the excess weight were "poor dietary habits due to varying work schedules with no scheduled meal times, lack of nutrition knowledge, and lack of an organized exercise program" (Demling & DeSanti, 2000).

Research has showed that irregular work hours, lack of routines, fatigue and unpredictable events impeded police officer's efforts to establish a healthy diet and exercise habits (Ramey *et al.,* 2008). Retired police officers have a even higher incidence of cardiovascular diseases. When surveyed on how their positions increased their cardiovascular risks, former police officers has also cited that job-related stress, poor dietary habits while at work, and shift work rotation as the most common reasons (Franke *et al.,* 1998).

Because public safety workers, such as police officers, must be in good health to meet the demands of their jobs, health care research is needed to study health promotion issues among these employees. Consequently, police work is a high-risk profession for which health promotion research is needed. Because fat intake can significantly impact cardiovascular disease risks and obesity risks, it is important to investigate the factors that influence both fat related diet habits and body composition among police officers.

Unfortunately, there is a shortage of scientific data on the variables that influences these health outcomes. Little is known about which characteristics of police officers are significantly associated with their diet habits and body composition, or what role occupational stress may play. Therefore, research is needed to examine the relationships among variables, such as personal and cognitive factors that contribute to diet habits and body composition in this population. Personal factors include gender, age, race, ethnicity, marital status and shift work. Cognitive factors include the knowledge and the barriers to healthy eating.

1.2 Objectives

1. To determine the nutritional status of police officers and to assess the prevalence of obesity among police officers.
2. To determine the daily physical activity level of police officers, and to compare their energy intake and energy expenditure.
3. To determine the eating pattern of police officers and examine the interrelationships among dietary habits and body composition in police officers in IPK Kota Kinabalu.

1.3 Significance Of Study

So far there is lack of research has ever been done on specific at-risk worker populations at Malaysia, such as police officers. However, as level of obesity and cardiovascular disease is increasing rapidly nowadays, research on this field is important in order to prevent this trend from going uprising. As police officers must be fit for duty, findings from this study may assist the police force in identifying the characteristics of police officers that can be incorporated in the development of more effective fat-related dietary interventions for these workers. The benefit of this research is to create an effective nutrition intervention strategies and the possibility to be used by the police force in Malaysia. It is hoped that by improving fat-related diet habits in the police population, health risks would be attenuated and the prevalence of obesity-related diseases would decrease.

1.4 Background Of The Problem

Personal factors such as demographic variables influence diet habits through various mechanisms. Studies have found that the demographic variables of gender, age, ethnicity, income, and educational level are significantly correlated with healthy dietary intake (Foote *et al.,* 2004). Another personal factor that are relevant to the police profession health outcomes is shift work. Study has found that police officers who worked rotating shifts had significantly elevated norepinephrine levels, which may contribute to the development of hypertension (Ely & Mostardi, 1986). Night shift work also has been found to be associated with a significantly larger mean weight gain than day shift work (Geliebter et al., 2000).

The healthy eating habits of health professionals and other predominately populations have been studied (Hann *et al.,* 2001). Police officers have an above-average risk for cardiovascular disease (CVD) and retired and current officers typically attribute their health risks to shift work, irregular work hours, job-related stress, fatigue, lack of routine, and poor dietary habits while working (Franke et al., 1998; Ramey et al., 2008). Because total fat, saturated fat and *trans* fat intake can significantly impact cardiovascular disease risks, it is important to study the fat-related diet habits among this group of workers.

Cognitive variables relating in health-promoting behaviours include personal self-efficacy, perceived barriers, and perceived benefits (Pender *et al.,* 2002). These factors have been found to be correlated to diet habits in several studies (Fowles & Feucht, 2004; Glanz *et al.,* 1998; Wilson *et al.,* 2002). Perceived barriers represent the difficulties in performing a certain behaviour (Pender, 1996). Specific barriers to healthy eating are food unavailability or difficulty to get, amount of expenses, inconvenience and loss of satisfaction of healthy food options (Fowles & Feucht, 2004). Research is needed to analyze the relationships among these personal and cognitive factors that may contribute to diet habits and body composition in the police population.

CHAPTER 2

LITERATURE REVIEW

2.1 Obesity

Nowadays as Malaysia is experiencing rapid industrialization, urbanization and a nutrition transition, there is concern in Malaysia of a possible increase in the prevalence of overweight and obesity. Socio-economic status, lifestyle behaviours, and psychosocial factors have been heavily contributed in the development of overweight and obesity in Malaysia. Based on logit regression analysis, the results suggest that obesity risks in Malaysia are affected mostly by gender, education level, family history, health conditions, smoking status, and ethnic backgrounds (Quah & Tan, 2010).

In Malaysia, the prevalence of overweight and obesity (>18 years old) is slowly increasing from 16.6% and 4.4% in 1996 to 29.1% and 14.0% in 2006 and 33.6% and 19.5% in 2008 (Kambalia & Seen, 2010). Evidence showed that there is a greater risk for overweight and obesity among women compared with men in Malaysia. The overweight and obesity levels were highest among adults from the age of 40 years old to 59 years old. Overweight levels were highest among Indians, followed by Malays, Chinese and Aboriginals (Kambalia & Seen, 2010).

Evidences showed that socio-demographic factors (age, gender, and education) and psychosocial factors (perceived health status, body weight perception, and weight-control goals) were significantly associated with body mass index (BMI). Long working hours were also significantly associated with the increasing of BMI. However, weight control practices (diet-control practices and physical activity practices) were not significantly associated with BMI (Siew *et.al,* 2010).

Generally, a high fat diet is defined as dietary intake of more than 30% of calories from fat content which has nine calories per gram. Combined with a sedentary lifestyle, excessive dietary fat intake creates an imbalance in energy intake which will eventually lead to weight gain.

Regarding nutrition, it is important to have a proper proportions and amounts of protein, carbohydrates, and fat in a daily diet in order to prevent caloric excess. Based on a reference 2,000-calorie intake, individuals should consume a total of at least 5 cups of fruits and vegetables, three cups of low-fat or fat-free milk, and three ounces of whole grains per day. Additionally, individuals should consume only 20% to 35% of calories from total fat, mostly polyunsaturated and monounsaturated fats while consuming less than 10% of calories from saturated fat and keeping trans fatty acid intake and cholesterol intake (no more than 300 milligrams daily) to a minimum. Lastly, less than one teaspoon of salt (2,300 mg of sodium) should be consumed daily (U.S. Department of Health and Human Services and USDA, 2005). The above recommended amounts would be higher or lower depend on an individual's body composition and his/her daily caloric requirements.

In Malaysia, according to the latest Malaysian food pyramid (NCCFN, 2010), there are five food groups situated in four levels. Cereal, tubers and grain group located at the base of the pyramid. The number of serving for this group is 4 to 8 serving per day. However the size of serving for this group is different compared with the previous food pyramid. One serving of food contains 30g carbohydrates while in the previous dietary guideline (NCCFN, 1999), one serving of food only contains 15g carbohydrates.

2.2 Cardiovascular Disease Risk

Cardiovascular disease is a class of diseases that involve the heart or blood vessels. Cardiovascular diseases remain the biggest cause of deaths worldwide, with a responsibility of 30% of all deaths worldwide (Murray & Lopez, 1997). Cardiovascular disease remains the most common cause of death in industrialized countries, and hypertension is the most common treatable risk factor. Although over the last two decades, cardiovascular mortality rates have declined gradually in many high-income countries, however cardiovascular deaths and disease have increased rapidly in low- and middle-income countries. Cardiovascular disease has been refer as number one fatal disease in Malaysia and the whole world.

Age, gender, high blood pressure, high serum cholesterol levels, tobacco smoking, excessive alcohol consumption, family history, obesity, lack of physical activity, psychosocial factors and diabetes mellitus are the risk factors for cardiovascular disease. Some of these risk factors, such as age, gender or family history cannot be avoid, however most of the cardiovascular risk factors can be modified by lifestyle change, drug treatment or social change.

Risk factors for cardiovascular disease have also been correlated with psychological stress (Murray & Lopez, 1997). The focus group data support that law enforcement officers encounter organizational stressors. Organizational stressors include irregular hours, poor diet, unpredictable events, and a hierarchical workplace structure that can be demoralizing and fails to provide adequate acknowledgment of job effort. These stressors clearly contribute to law enforcement officers' higher prevalence of cardiovascular disease and related risk factors.

Generally, police work is considered sedentary in nature (Rebecca *et al.*, 2009). Research suggests that police officers have above average prevalence of risk factors for cardiovascular disease such as obesity, smoking, hypertension and hypercholesterolemia (Ramey, 2003). Because police officers may have a higher risk for cardiovascular disease and diet is an important component of controlling

the disease, therefore improving the diet habits among police officers is an important area for intervention to counter against cardiovascular disease.

2.3 Hypertension

Cardiovascular disease is responsible for 30% of all deaths worldwide, and It remains the most common cause of death in industrialized countries. Hypertension is the most common treatable risk factor of cardiovascular disease.

The prevalence of hypertension has been widely reported in various regions of the world. Hypertension is an important public health problem worldwide because of its high prevalence and its detrimental sequel. Hypertension is as prevalent in many developing countries as in the developed world. Currently, hypertension is ranked third as a cause of disability adjusted life years and is currently a leading risk factor for mortality. It is estimated that by the year 2025, 1.56 billion people are expected to have hypertension (29% of the world's adult population) (Murray & Lopez, 1997).

Recent study had showed the prevalence of hypertension increases with age in both sexes. For Malaysians aged 15 to 39 years, hypertension was significantly more prevalent in males than females. In all ethnic groups in Malaysia, the Chinese had the highest prevalence of hypertension (30.6%), followed by the Malays (26.7%) and the Indians (25.1%). While the Bumiputra people from the state of Sarawak and Sabah had a highest prevalence of hypertension (31.1%) compared with the other ethnic groups.

Evidence for the risks imposed on human health by excess salt consumption has become compelling nowadays. Most adult populations around the world have average daily salt intakes higher than 6 g, and for many in eastern Europe and Asia higher than 12 g. While the international recommendations suggest that average population salt intake should be less than 5-6 g per day.

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