KNOWLEDGE AND BEHAVIOURS OF INDO-CANADIANS ABOUT CARDIOVASCULAR DISEASE RISK FACTORS AND PREVENTION

BY

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Abstract

Indo-Canadians are a significant minority group residing in Canada. Several well designed comparative studies conducted in Europe have demonstrated that East Indians suffer higher rates of cardiovascular disease morbidity and mortality than the other white populations (Hughes, raval, and Raftery, 1985; Hughes, Yeo, et al., 1990; McKeigue, Marmot, Adelstein, et al., 1985; McKeigue & Marmot, 1988). There is limited knowledge available about behavioral practices of Indo-Canadians that could explain the possible causes of increased heart disease risks among members of this community.

This study describes Indo-Canadians' existing level of knowledge about cardiovascular disease risk factors. It further explores the relationship between the knowledge and their risk reducing behaviours. A descriptive correlational study design was used, and a convenience sample of 27 healthy Indo-Canadians, men and women between ages of 30 and 65 years, was selected for the purposes of this study.

The findings of this study suggest that many Indo-Canadians (96%) are well aware of the major cardiovascular disease risk factors: high blood pressure, high blood cholesterol and smoking. There was a moderately strong ($r = .34$, significant at $p = .05$) relationship between Indo-Canadians' knowledge about cardiovascular disease risk factors and their reported risk reducing behaviours. The implications that this study has for nursing research, administration, practice and education are discussed.

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Chapter One

Background to the Problem

Canada has a health care system that is among the best in the world (Freeman, 1990). Despite this fact, there exists some major health problems in the country, such as the high prevalence of chronic diseases and inequities in health status among some populations, that jeopardize health and quality of life (Epp, 1986). Chronic diseases are the major causes of mortality and morbidity in Canada and because chronic diseases require long-term management, they create a major economic burden on individuals and society. An enormous pool of the Canadian health care budget goes toward the management of chronic diseases. According to Wiggle, Mao, Wong, and Lane (1991), chronic diseases are responsible for almost one-half (47%) of the total health care cost in Canada.

Chronic diseases of adulthood are highly correlated with adoption of negative lifestyle behaviours such as smoking, lack of exercise, poor nutrition, and excessive alcohol intake (Balram, 1989). Since lifestyle behaviours can be modified, health promotion programs have the potential to significantly reduce the prevalence of chronic

diseases. Over the past several years, the thrust of health promotion programs has been on convincing people to adopt healthy lifestyle behaviours. However, the federal government's discussion paper "Achieving Health for All: A framework for health promotion" (Epp, 1986) proposes that since a wide range of social, political, physical and economic factors influences health and illness, health promotion must be viewed within a broader context.

Among all chronic illnesses, cardiovascular diseases are by far the most common causes of death, disability, and illness in Canada (Reeder, Lauzon, Mao, Nair, & Petrasovits, 1991). However, the incidence of heart diseases has decreased over the past decades. Reeder, Lauzon, et al. (1991) reported that changes in lifestyle are the major factors accounting for the decline in cardiovascular disease mortality in Canada and the United States. Nevertheless, a recent survey of the Canadian population reported that two-thirds of Canadians between the ages of 18 and 74 years have one or more major cardiovascular disease risk factors: regular smoking, high blood pressure and high blood cholesterol (MacDonald, Joffres, Stachenko, Horlick, & Fodor, 1992). The continuing level of modifiable risk factors among the Canadian population (e.g. elevated blood

cholesterol level 36%, high blood pressure 14%, and smoking 26% prevalence), dictate that the preventive efforts should be continued and, if possible, must be enhanced and intensified (MacDonald et al., 1992).

A number of population based intervention studies have demonstrated the possibility of reducing cardiovascular disease risks by modifying the behaviours of individuals (Saab, Dembroski, & Schneiderman, 1990). Many of these studies employed health education and/or other health promoting strategies such as screening for risk factors, behaviour modification and social support to help individuals and communities modify behaviours related to increased cardiovascular disease risks. These strategies were found to be effective in reducing the risks and subsequent incidence of the diseases in many investigations (Hejermann, Velve-byre, Holme, & Leren, 1981; Puska, et al., 1981; Rabkin, Boyko, Shane, & Kaufert, 1984). However, it has been noted (Gottlieb & Green, 1987) that the health promotion campaigns are targeted mainly to the middle class white collar section of the population and not to disadvantaged and minority groups.

It is clear from the discussion above that health promotion

offers a promising approach towards decreasing the high prevalence of chronic diseases (e.g. cardiovascular diseases). A wide range of factors such as knowledge, attitude, habits, social, cultural, political, economic, and environment, influences lifestyle behaviours and the development of chronic diseases (Carleton & Lasater, 1987). The recognition of this fact makes it necessary to address the concept of health promotion within a broader context, extending beyond merely persuading people to adopt healthy lifestyle.

Epp (1986) argues that health promotion programmes, to be successful, must encompass three major mechanisms. They are self care, mutual aid (or social support), and creation of conditions and surroundings conducive to health (e.g. production, marketing and distribution of foods low in cholesterol, calories, and sodium, creation of smoke free spaces in public recreational places, restriction on promotion and merchandising of tobacco, and support for the development of fitness programs). Provision of social support services and the availability of healthy environments (e.g. fitness programs, etcetera) that are accessible and cost-effective, along with health education, offer a range of choices for individuals and are thus likely to influence behaviours positively.

For the purposes of this study, it is impossible to consider all the factors that influence health behaviours and lead to the development of cardiovascular diseases. Several investigations have suggested people's knowledge as a necessary condition that influences adoption of healthy behaviours (Allard & Mongeon, 1982; Farrow, Charny, & Lewis, 1990; Kemm, 1991; Rudd & Glanz, 1990). Therefore, this study focuses on the assessment of the health knowledge of Indo-Canadians, and the impact of this knowledge on their health behaviours.

One of the major purposes of health education programs is to increase the public's knowledge and understanding, and to change people's behaviours in relation to cardiovascular disease risks and prevention. The relationship between knowledge and behaviour change has been debated extensively in the literature (Kemm, 1991). Many investigators have argued that knowledge by itself does not lead to behaviour change as behaviours are rooted in sociocultural norms and a variety of other factors (Avis, McKinley, & Smith, 1990; Ryan, 1987; Sutterer, Carey, Silver & Nash, 1989). Even though this contention may be true to a certain extent, the influence of knowledge on behaviours should not be completely disregarded. Dean

(1991) comments that changes in smoking behaviour among younger people suggest that knowledge can affect norms that shape habit formation.

When discussing the importance of providing information in health promotion programs, Rudd and Glanz (1990) suggest that knowledge plays a central role in life-style choices, health care interactions and compliance with therapeutic advice. Likewise, Green and Kreuler (1991) suggest that increased knowledge and awareness about preventive behaviours seep into the system of beliefs, values, attitudes, intentions and, eventually, into behaviours. Furthermore, Kemm (1991) argues that often health education programs fail to bring the desired change in behaviours because health education messages are irrelevant, inconsistent, confusing, not specific, impractical and inappropriately translated. It follows from the above discussion that basic health knowledge that is translated clearly and specifically, is essential to promote conscious personal health actions. Yet this knowledge and the strategies for communicating it are not available to all segments of the Canadian population.

Canada's present population is comprised of several ethnic groups. In a survey commissioned by the Social Planning Council of

Metropolitan Toronto, it was reported that members of minority groups experienced difficulties in securing access to health and social services in mainstream organizations (Doyle & Visano, 1987). Some of the barriers that hamper access were reported as: inadequate information about availability of services, cultural practices, language, and lack of sensitivity of the administrative staff towards the needs of other cultures (Doyle & Visano, 1987).

On account of the fact that members of minority groups experience difficulty in securing health services, it is likely that these individuals suffer high morbidity and mortality. A health survey of non-institutionalized Canadians in 1985 reported that disadvantaged Canadians, including ethnic minorities, with lower income, poorer education and higher rates of unemployment are much more likely to rate their health as poor and to have poor health habits than others (Critchton, Hsu, & Tsang, 1990). Many Canadians do not speak English or French. The Report of the British Columbia Royal Commission on Health Care and Costs (1991) suggests that the language barrier combined with cultural practices unfamiliar to health care workers, and a lack of knowledge of health care services by Canadian immigrants, greatly complicates meeting the needs of these

people.

Indo-Canadians are a significant minority group living in Canada since 1905 (Singh, 1981). Data from several well-designed comparative studies have illustrated that East Indians (people from South East Asia) living in western countries suffer high rates of morbidity and mortality from cardiovascular diseases (Hughes, Raval & Raftery, 1989; Hughes, Yeo, et al. 1990; McKeigue, Marmot, Adelstein, et al., 1985; McKeigue & Marmot, 1988).

Based on 1981 census figures, there are about 145,000 Indo-Canadians living in Canada. This represents a little less than one percent of the total Canadian population (Redway, 1984). According to a socio-economic survey of Indo-Canadians in Greater Vancouver, a large percentage (74%) of Indo-Canadians are factory workers or technicians (Redway, 1984). The findings of this survey suggest that the educational status of Indo-Canadians is low compared to the general population. Gottlieb and Green (1987) contend that poorer education may contribute to lack of knowledge about preventive health practices and lower income, which then leads to lack of access to health promotion and treatment services.

The 1992 Year book mentions that one of the cornerstones of

effective health care planning is comprehensive, reliable data on the health status and attitudes of the population (Ministry of Industry, Science and Technology, 1991). There is no research data available in Canada about the incidence of cardiovascular disease morbidity and mortality among the Indo-Canadian population. However, there is sufficient evidence from research in other western countries to suggest that this community suffers higher rates of cardiovascular disease morbidity and mortality than the other white white populations. There might be some cultural practices specific to this ethnic group that influence lifestyle behaviours and increase the risk for developing cardiovascular diseases. However, identifying these cultural practices is not the focus of this study. This study primarily identifies the knowledge and behaviours of Indo-Canadians about cardiovascular disease risk factors.

There is limited available knowledge about Indo-Canadians' level of awareness and their lifestyle behaviours about cardiovascular disease risk factors and prevention. Therefore, this study focuses on investigating the knowledge of Indo-Canadians about cardiovascular disease risk factors and prevention. The study further explores the relationship of Indo-Canadians' knowledge with their lifestyle

behaviours. A western biomedical knowledge model is used to assess the knowledge and behaviours of individuals in this community. Moreover, this study provides an initial data base about the existing level of awareness among Indo-Canadians about the western scientific knowledge in cardiovascular disease risk factors and prevention.

Statement of the Problem

It is implied from the findings of the studies in Europe (Hughes, Raval, et al., 1989; Hughes, Yeo, et al., 1990; McKeigue, Marmot, Adelstein, et al., 1985; McKeigue & Marmot, 1988) that East-Indians are at increased risk for developing cardiovascular diseases. In order to instigate appropriate health management strategies for Indo-Canadians, it is important that health professionals have some understanding of their basic knowledge about the risk factors and prevention of cardiovascular diseases. Similarly, measures of knowledge are also necessary to gather information on how the diseases are perceived in this community. In addition, unhealthy lifestyle behaviours that lead to the development of cardiovascular diseases must also be detected.

Only one study (Bhopal, 1986) has been located that examined the health knowledge and behaviours of East-Indians. This study was conducted with East Indians living in Glasgow, Scotland. No Canadian studies were found with Indo-Canadians. Therefore, this study examines the existing knowledge of Indo-Canadians about cardiovascular disease risk factors and their behavioral practices to reduce the risks.

Purpose

The purposes of this study are to: (a) assess the knowledge and behaviours of Indo-Canadians about cardiovascular disease risk factors and prevention; (b) determine the relationship between Indo-Canadians' knowledge about cardiovascular disease risk factors and their self-reported risk reducing behaviours; and (c) determine the association of demographic variables and the level of knowledge about cardiovascular diseases of Indo-Canadians. The following research questions are formulated:

1. What is the level of knowledge of Indo-Canadians about cardiovascular disease risk factors and prevention?

2. Is there a relationship between Indo-Canadians' knowledge of

cardiovascular disease risk factors and their self-reported risk reducing behaviours?

3. How are sociodemographic factors related to Indo-Canadians' knowledge about cardiovascular disease risk factors and their prevention?

Theoretical Framework

The theoretical framework used in this study is the health belief model. The health belief model was developed in the 1950s by a group of social psychologists G.M. Hochbaum, S.S. Kegels, H. Leventhal, and I.M. Rosenstock (Rosenstock, 1974). The model attempts to explain why people fail to take preventive actions despite the availability of preventive services (Rosenstock, 1974).

Overview of the Health Belief Model

The basic components of the health belief model are derived from a well-established psychological and behavioral theory (Janz & Becker, 1984). The model emphasizes that an individual's motivations and beliefs are the primary determinants of health behaviour. The model proposes the following assumptions:

1. In order for an individual to engage in health protective

behaviours, one must first believe that one is personally susceptible to the illness. Susceptibility is defined as perceived risk of contracting a condition. Individuals vary widely in acceptance of their personal susceptibility to a condition. At one extreme might be the individual who denies any possibility of contracting a given disease. On the other extreme, a person may perceive a feeling that one is in real danger of contracting the condition (Rosenstock, 1974).

2. An individual must believe that the occurrence of the disease would have at least moderate impact on some component of one's life. Research supports a significant positive association between perceived severity of disease and the desired behaviours (Janz & Becker, 1984). According to Rosenstock (1974), perceived susceptibility and severity of a disease have a strong cognitive component and are partly dependent on an individual's knowledge.

3. The likelihood of adopting a desired behaviour depends on an individuals' perception of how beneficial the recommended action would be.

4. Finally, an individual may believe that a given action will be effective in reducing the threat of disease, but at the same time may see that action itself as being inconvenient, expensive, unpleasant,

painful or upsetting. These negative aspects of health action serve as barriers to behaviour and arouse conflicting motives of avoidance. The perceived benefits and barriers would provide one with a preferred path of action.

One additional variable that is considered important in the model is "cues to action". According to Rosenstock (1974), in the health area, cues to action or stimuli might be internal (e.g. interpersonal interaction, the impact of media communication). The required intensity of a cue that was deemed sufficient to trigger behaviour varied with difference in level of perceived susceptibility and severity. With relatively little acceptance of susceptibility or severity of a disease, rather intense stimuli would be needed to trigger a response. On the other hand, with relatively high levels of perceived susceptibility and severity even slight stimuli may be adequate.

Additional variables that influence and modify the probability of creating the desired behaviour include demographic variables (e.g. age, sex, ethnicity, etc.), sociopsychological variables (personality, social class, peer and reference group pressure, etc.), and structural variables (knowledge about the disease, prior contact with disease

etc.).

Since its development, the model has been applied to a wide variety of health related research in the preventive, therapeutic and rehabilitative domains (Janz & Becker, 1984). Furthermore, Janz & Becker (1984) in their critical review of the studies that focussed on the health belief model and were conducted between 1974 and 1984, reported that these studies have provided substantial empirical evidence that supports the use of the model's dimensions in explaining and predicting individual's health related behaviours. However, research that demonstrates the use of the model for people of different age groups and different cultural backgrounds is lacking (Mikhail, 1981).

One of the limitations of the model is that it is highly individualistic. As Janz and Becker (1974) pointed out, the model is based on the premise that health is a highly valued concern of all individuals, and "cues to action" are widely prevalent. Where these conditions are not satisfied, the model is not likely to be useful in explaining behaviours. Furthermore, the model places sole responsibility of health on an individual which can be seen to encourage victim blaming (Rosenstock, 1990). The current health

promotion perspective emphasizes a much broader context for modifying individuals' behaviours and proposes to take into account the social, political, cultural, economic and physical factors that influence behaviours (Epp, 1986).

From the discussion above, it is concluded that the model does not explicitly explain all the variables that influence health behaviours. Although the model provides a well-established scientific base to understand individual health related behaviours, it is not considered complete, as the theory does not cover all other dimensions that influence behaviours (Rosenstock & Kirscht, 1974).

This study explores health knowledge of Indo-Canadians about cardiovascular disease risk factors, and the relationship of this knowledge to their self-reported risk reducing behaviours. The importance of other factors (e.g. social, cultural, economic, etcetera), that influence an individual's behaviours are acknowledged. However, because of the lack of resources and limitation of time only one condition, knowledge, which is predicted to influence behaviours, is investigated in this study. The assumptions of the health belief model about the health related behaviours are congruent with the purposes of this study. Therefore, the model is used as a frame of reference

within which the phenomenon, the knowledge level of Indo-Canadians about cardiovascular disease risk factors, is explored and correlated with their behavioral practices.

Furthermore, this study is conducted on a specific cultural group, Indo-Canadians, living in Canada. The model has not been tested on people with different cultural backgrounds. This study is conducted in a western country and it focuses on one of the many variables (knowledge) that influences behaviours of a specific cultural group, Indo-Canadians. A western biomedical knowledge model is used to provide direction for the study.

Assumptions

Because of the language barrier and cultural practices among individuals in the Indo-Canadian community, it may be difficult for them to access the health care system and acquire necessary knowledge in relation to cardiovascular disease risk factors and prevention. Based on this fact, it is assumed that the knowledge level of Indo-Canadians may be limited. The health belief model assumes that an individual will take health protective actions if given appropriate information on risks, benefits and consequences of the

condition. In keeping with this assumption, it is anticipated that the knowledge of Indo-Canadians about cardiovascular disease risk factors and prevention may be positively associated with the risk reducing behaviours.

Furthermore, based on the available western knowledge (Avis, et al., 1990; MacDonald et al., 1992; Millar & Wigle, 1986) it is assumed that certain demographic factors such as income and education may be positively related to the knowledge about cardiovascular disease risk factors and prevention and risk reducing behaviours of Indo-Canadians.

Limitations

The lack of time, material and human resources compounded with the difficulty of getting a random sample with a minority population like Indo-Canadians make it impossible to design a random survey that would have been ideal in this type of study. Because a non-probable, relatively small convenience sample is used to study the problem in this study, the generalizability of results to a larger Indo-Canadian community is limited. In addition, since western norms are used to asses knowledge and behaviours, the cultural practices

unique to Indo-Canadians that may increase the risk of cardiovascular diseases among individuals are not specifically determined from this study. Finally, variables other than knowledge, such as coping style, social norms, and social support that are predicted to influence behaviour are not measured in this study.

Significance

Use of a homogeneous sample (Indo-Canadians) to study the problem may provide reliable estimates of the study variables. The study provides a beginning understanding and database about cardiovascular disease risk factors' knowledge and behaviours of Indo-Canadians. The measures of knowledge provide information on Indo-Canadians' awareness of the western concept of cardiovascular disease risk factors. Moreover, the study provides a basis for understanding unhealthy behavioral practices among Indo-Canadians (according to the western scientific knowledge), that might increase their risk of developing cardiovascular diseases. In addition, implications for further studies and recommendations for reducing cardiovascular disease risks among Indo-Canadians are discussed.

Definition of terms

Cardiovascular disease: presence of one or more definitive manifestations of coronary heart disease, cerebrovascular accident, congestive heart failure, and intermittent claudication (Stokes III, et al., 1987).

Risk Factor: a factor associated with either a disease or condition and suspected of being causative (Stokes III, 1987).

Indo-Canadians: individuals from India, Pakistan, Bangladesh, and individuals who have East Indian ancestors who lived in Fiji, Srilanka, and East Africa (Johnston, 1985).

East Indians: same as Indo-Canadians. The terms Indo-Canadians and east Indians are used synonymously.

Knowledge: western scientific knowledge about the cardiovascular disease risk factors.

Health behaviour: any activity undertaken by a person believing himself to be healthy for the purpose of preventing disease or detecting it at an asymptomatic stage (Kasl & Cobb, 1966).

Overview:

This chapter provided the background for the study by identifying and discussing the problem that exists within the Indo-

Canadian community. The health belief model that was selected as the conceptual framework to guide the study was described. Chapter Two contains a review of the seleted literature pertaining to cardiovascular disease risk factors. Chapter Three reviews the methods and Chapter Four, the analyses and interpretation of the findings obtained from the participants. Finally, in Chapter Five a summary, conclusions, and implications for further research are presented and discussed.

Chapter Two

Literature Review

The literature review is divided into three sections: (a) cardiovascular disease risk factors and prevention; (b) cardiovascular disease risk factors in Indo-Canadians (East-Indians); and (c) knowledge and behaviours of individuals about cardiovascular disease risk factors and prevention.

Cardiovascular Disease Risk Factors and Prevention

The Framingham Heart Study has provided valuable insight into risk factors of cardiovascular diseases (Levy, & Kannel, 1988). The Framingham Study is a long term prospective epidemiological survey that provided the most valuable data about the risk factors. The study began in 1949 at Framingham, Massachusetts. Five thousand men and women aged 30-62 years at entry were examined for the development of coronary heart disease. The results of the study identified major modifiable and non-modifiable risk factors such as hypertension, smoking, elevated serum cholesterol level, obesity, age and male sex (American Heart Association, 1966).

Thereafter, a number of population based intervention studies have demonstrated the possibility of reducing coronary heart disease

risk factors by modifying coronary prone behaviours (Saab, Dembroski, & Schneiderman, 1990). To illustrate, a community-based program was initiated in North Karelia, Finland in 1972 (Puska et al., 1981). The aim of the program was to decrease cardiovascular disease mortality and morbidity among the North Karelian population by carrying out community based health intervention. The interventions used to modify risk factors and thereby reduce morbidity and mortality of heart disease, involved provision of preventive services such as: public education, establishing a communication and information network, social support, environmental modification, and providing training on such practical skills as modifying diet. The representative sample from the intervention county was contrasted with the matched controlled sample from a neighbouring county. More than 10,000 subjects in North Karelia and the neighbouring county were assessed and followed-up after five years. An overall risk score was computed for each individual using a multiple logistic function, based on their smoking habits, serum cholesterol and blood pressure values. The results demonstrated a significant reduction in the multiple risk factors in the intervention county. After five years, the score for multiple risk factors reduction exceeded 17% for men

and 11% for women in the intervention group as compared to the control group.

Another large scale project conducted in Oslo, Norway evaluated the effect of individual advice on reducing the level of cardiovascular disease risk factors (Hejermann et al., 1981). Over 12000 healthy middle-aged men, at high risk of coronary heart disease were selected for a five-year randomized trial to show whether lowering of serum lipids and cessation of smoking could reduce the incidence of coronary heart disease. The men in the intervention group were told about heart disease risk factors and were recommended to lower their blood lipids by modifying their diets and to stop smoking.

At the five-year follow-up about 90% of the men in the intervention group reduced their serum cholesterol level. Serum cholesterol level was 13% lower and tobacco consumption dropped down to 45% in the intervention group compared to the control group. The rate of myocardial infarction and sudden death was 47% lower in the intervention group than in the controls ($p = .028$). On the bases of these findings Hejermann et al. (1981) concluded that in healthy men at high risk for developing coronary heart disease, advice

to change eating habits and to stop smoking, significantly reduced the first event of myocardial infarction and sudden death.

Cardiovascular Disease Risk Factors in East Indian Immigrants

The prevalence, incidence and risk factors for developing cardiovascular diseases among East Indian immigrants in North America is unexplored. However, data available from Europe and Singapore suggest that East Indians suffer relatively higher rates of morbidity and mortality from cardiovascular diseases than other ethnic groups in Europe. The critical studies relevant to the point at issue are discussed below.

Comparative studies by McKeigue, Marmot, Adelstein, et al. (1985) and McKeigue and Marmot (1988) in England and Wales documented that Asian immigrants have a high mortality rate from coronary heart diseases. Asian immigrants in this study were defined as immigrants from India, Pakistan, Bangladesh, Srilanka, and East Africa. Studies by Miller, Alexis, Beckles, Byam and Price (1982) and Miller, Beckles, and Byam (1984) in Trinidad (Caribbean) reported that Asian Indians have a lower high-density lipoprotein cholesterol concentration compared to other ethnic groups. Miller, Alexis, et al. (1982) also documented that the low-density lipoprotein cholesterol

was significantly higher in the Indian group. Gordon et al. (1989) reported that epidemiological data consistently demonstrate that there is an inverse association between high-density lipoprotein cholesterol and, subsequent, rates of coronary heart disease. This means that the incidence of cardiovascular diseases has been demonstrated to decrease with an increase in high-density lipoprotein cholesterol.

A retrospective survey by Balrajan (1991) in England and Wales identified that in 1979-83 mortality from ischemic heart disease was highest in men and women born in the Indian Subcontinent. These findings are parallel with the findings of the other comparative study by Beckles et al. (1986) in Port-of-Spain, Trinidad. The study reported that people of Indian decent (India, Pakistan and Bangladesh) have significantly higher rates of death from cardiovascular disease compared to Europeans and Africans.

A recent study in Singapore (Hughes, Yeo, et al. 1990) evaluated and reported that Indians suffer higher mortality from ischemic heart disease compared to other ethnic groups, that is Malays and Chinese living in Singapore. It was identified that Indians have lower levels of high-density lipoprotein cholesterol and have a higher rate of diabetes mellitus. It was explained that lower levels of

high-density lipoprotein cholesterol indicates that Indians remove cholesterol less efficiently and this may explain some of their excess risks for developing ischemic heart disease. These findings are consistent with the findings of Miller, Alexis, et al. (1982) and Miller, Beckles, et al. (1986) studies discussed earlier.

A study by Hughes, Raval, et al. (1989) found that the relative risk of infarction was 4.9 times higher in Asians than in the white population. It was suggested that atherogenesis starts earlier in Asians, contributing to their premature first myocardial infarction. In a recent review article, Enas, Yusuf and Mehta (1992) agreed with findings of Hughes, Raval et al. (1989) and commented that coronary artery disease is often premature, severe and follows a malignant course in Asian Indians.

There are no current population-based data on coronary artery disease incidence, prevalence or mortality in India (Enas et al., 1992). Because of this, the studies conducted in the western countries have failed to explain the specific mechanism or factors that might expose Asian Indians to high risk for developing cardiovascular diseases in western countries. However, it seems important to comment that the dietary practice of the East Indian community differs from white

Canadians. Certainly diet is a factor that plays an important role in the development of obesity that in turn increases the risks for developing diabetes mellitus and cardiovascular diseases. Rice is the staple food of East Indians. Henningsen (1988) reported that polished rice has lower nutritive value because it lacks minerals such as potassium, magnesium, and phosphate which are considered important in protecting against cardiovascular diseases. In addition many Indian meals are cooked in ghee (clarified butter). A study by Jacobson (1987) revealed that there are substantial amounts of cholesterol-oxides in ghee (12.3% sterol) which are not found in fresh butter. Jacobson (1987) further reported that in both animal and in-vitro studies, cholesterol-oxides had angiotoxic and atherogenic properties. Besides, Roberts (1990) reported that in India many individuals use palm kernel and coconut oil, which are high in saturated fatty acids, for cooking purposes. This means that even though many Indians claim to be vegetarians, they may be consuming a diet high in saturated fats. It is possible that, perhaps, diet is the major risk factor that contributes to high morbidity and mortality of East Indians from cardiovascular diseases.

Knowledge and Behaviours of Individuals about Cardiovascular Disease Risk Factors and Prevention

Public knowledge related to cardiovascular disease risk factors and modification has improved over the past decade (Schucker et al. 1987). When discussing the findings of two national surveys in the United States, Schucker et al. (1987) reported that the knowledge level of general population about heart disease risk factors and prevention was high. In the 1983 national survey of the United States, 85%, 82%, and 64% of the respondents, respectively, knew that reducing smoking, lowering high blood pressure and cholesterol levels would prevent heart diseases. Furthermore, analysis and comparison of the data obtained in 1983 and 1986 demonstrated an added gain in the public knowledge in relation to high blood cholesterol (from 64% to 72%) and its prevention.

Another study commissioned by Pierce et al. (1984) in the State of Oregon, also reported the similar findings. About 900 households were randomly selected for the study. The questionnaire contained items concerning demographics and knowledge about heart diseases, and was administered to the individual in each household who had the responsibility of cooking. The majority of the

respondents recognized the association between coronary heart disease and the three major risk factors: smoking (92%), high blood pressure (96%), and high blood cholesterol (80%).

There is only one study located in Europe (Bhopal, 1986), that has investigated the health knowledge and behaviours of Asians (people from the India sub-continent, comparable to Indo-Canadians) in relation to cardiovascular disease and other health problems. In this study, the participants were selected from Glasgow because of high proportion of Asians in the city. Out of 100 Asians that were randomly selected from the register of patients at the Glasgow Health Board, 65 were located and interviewed. A questionnaire containing 55 open-ended questions was used to assess the knowledge and behaviours of Asians. The responses were coded and a knowledge score was computed for each participant. A significant deficit in knowledge related to heart disease prevention was found in Asians. Only 40% of the respondents knew that high fat intake is positively related to heart disease. And only 19%, and 5% of the respondents, respectively, indicated that reducing smoking and controlling high blood pressure are likely to prevent heart diseases.

In relation to risk reducing behaviours, it was identified that the

prevalence of cigarette smoking (19%) and alcohol consumption (28%) is low in Asians. Within the sub-groups of Asians, there are taboos against smoking (in Sikhs) and alcohol (in Muslims). Bhopal (1986) reported that it was the taboos rather than awareness of the risks associated with smoking and alcohol that possibly explained the low prevalence of smoking and alcohol among individuals in this community. Western biomedical knowledge was used as a basis to assess knowledge and behaviours of Asians in Bhopal's (1986) study. The investigator reported that the sample population seemed to understand and accept western concepts of health and disease without any difficulty. However, since the study (Bhopal, 1986) only assessed knowledge and behaviours of limited cardiovascular disease risk factors, it is difficult to make any definitive conclusion about Asians' awareness of cardiovascular diseases risk factors and their behaviours.

The association between knowledge and behaviours has been extensively argued in the literature. Bettinghous (1986) reviewed fifty years of research to identify the relationship between knowledge, attitudes and behaviours. He reported that the correlation between information level and overt behaviours or between attitudes and overt

behaviours are generally positive, but low. Some recent studies have reported positive association between knowledge and risk reducing behaviours.

To illustrate, a cross-sectional population based study was conducted in Denmark to assess the influence of health knowledge and beliefs on behavioral practices (Dean, 1991). A random sample of about 500 individuals, over 45 years of age, was selected. A questionnaire that included both open and closed-ended questions was used to collect information on knowledge and beliefs and preventive practices. The responses to open-ended questions were coded. According to the findings, health knowledge was moderately correlated with health related behaviours. The correlation coefficients between knowledge and the smoking behaviour were -.17 ($p = .01$) in males and .20 ($p = .003$) in females. The correlation coefficients between knowledge and the exercise behaviour were -.22 ($p = .002$) in males and .33 ($p = .000$) in females.

Another study by Haralson, Sargent, and Schluchter (1990) reported a significant negative association between knowledge and purchase of saturated fats. Over 150 shoppers from five supermarkets in South Carolina, were randomly selected and invited

to participate in the study. A questionnaire was administered to determine their cardiovascular and nutrition knowledge. The descriptive sales slips issued by the supermarkets were analyzed to determine food purchasing behaviour of the shoppers. Food items were categorized according to the content of fat (low, medium, and high), cholesterol (low, medium, high), and polyunsaturated / saturated ratio (<1 or >1). Pearson product-moment correlation was used to measure the relationship between participants' cardiovascular and nutrition knowledge and their purchasing behaviour. The results identified a moderate significant negative correlation ($r = -.25$, $P = .0008$) between cardiovascular and nutrition knowledge and purchasing of saturated fats. In other words, as knowledge increased purchase of saturated fats decreased significantly and conversely. Rabkin, Boyko, Shane, and Kaufert (1984) reported that in a randomized clinical trial, a significant reduction in the smoking behaviour occurred when a health education program was used as an intervention strategy to modify the smoking behaviour of individuals. The health education program basically involved providing the information about smoking and its consequences through didactic teaching. At a three week follow-up, 32% of the participants in the

education intervention program reported that they have stopped smoking compared to 0% in the control group. Furthermore, when the health education intervention was compared with the other intervention strategies (hypnosis and behaviour modification), the health education program was found to be equally effective as hypnosis and the behaviour modification programs. The reported cessation of smoking in hypnosis and behaviour modification intervention groups was 29% and 37% respectively.

However, other studies have failed to demonstrate similar results. A community-based risk reduction program was implemented to identify high risk individuals through screening and to identify factors that are related to participation in screening and subsequent, change in risk status (Sutterer et al., 1989). The health belief model was used to hypothesize that knowledge of cardiovascular disease would be related to individual risk status and self-initiated change in risk status over time. Out of about 1,500 individuals who participated in the screening, over 700 individuals were identified as "at risk" because of the presence of one or more risk factors. Eighty percent of the sample knew that smoking, hypertension and cholesterol were risk factors. When knowledge was compared with individual risk

status and self-initiated change in risk status over time, there was no significant association between knowledge score on cardiovascular disease risk and risk status of individuals (r= .14, P=.05) or between the knowledge score and self-initiated risk status (.01, P= .05) over eighteen months follow-up. However, a few methodological concerns have been reported in the study. The major one was unknown reliability and validity of the questionnaire. As the investigators confessed, failure to establish the relationship could be due to error variance in either the cholesterol or knowledge measurement.

A study by Avis, McKinlay and Smith (1990) also failed to demonstrate a positive relationship between knowledge and behaviours such as smoking and overweight. The study was conducted in Boston. Over 700 individuals were randomly selected for the study. An open-ended question was asked to measure the knowledge level of participants. Self-report method was used to assess risk reducing behaviours such as smoking and stress, and measures of blood pressure, cholesterol level, and body mass index were taken to assess high blood pressure, high cholesterol and overweight. Multiple regression analysis was performed to compare the overall knowledge with self-perceptions of health, cardiovascular

risk factors and sociodemograpghic characteristics. The results indicated that the total knowledge score was positively related to education ($P < .01$), being female ($P < .01$), and amount of exercise ($P < .05$). When separate logistic regression analysis was performed to compare specific knowledge with behaviours, it was identified that awareness that smoking and obesity causes heart disease was positively related to behaviour of smoking and overweight.

Summary of Literature Review

The Framingham Heart Study identified major modifiable risk factors for coronary heart disease as high blood pressure, smoking, elevated serum cholesterol, and obesity (American Heart study,1966). Later, a number of subsequent clinical trials have demonstrated the possibility of reducing the morbidity and mortality due to cardiovascular disease by modifying the risk factors.

The incidence of cardiovascular diseases among East Indians has been unexplored in North America. However, considerable evidence exists from the studies done in Europe that indicates that East Indians, relatively, suffer higher mortality from cardiovascular diseases than the other white populations. The behaviours that may

be predicted to increase the risk of cardiovascular diseases in this community have not been identified.

The studies of Schucker et al. (1987) and Pierce et al. (1984) demonstrated that public knowledge in relation to cardiovascular disease has improved considerably over the past decade. A study by Bhopal (1986) in Glasgow indicated that the knowledge level of Asians (population comparable to Indo-Canadians) was significantly low.

The relationship between knowledge and behaviours has been extensively argued in the literature. It is concluded from the several studies reviewed, that knowledge precedes behaviour change and is a necessary factor in life-style choices. However, knowledge is not the only factor responsible for behaviour change. Other factors such as cultural norms, motivation and social support must also be considered in health promotion programs. Although the investigator in this study recognizes the importance and influence of factors other than knowledge on individuals' behaviours, this study only focuses on the health knowledge of people in relation to cardiovascular disease risk factors and identifies it's relation to health behaviours.

Chapter Three

METHODS

The research design, sample, data collection procedure, instrument for data collection, and statistical procedure in data analyses are described in this chapter.

Research Design

In order to describe knowledge and behaviours of Indo-Canadians about cardiovascular disease risk factors and their prevention, and to explore the relationship between knowledge and behaviours, a correlational survey of Indo-Canadians living in Vancouver was used.

Sampling

Considering the limited availability of time and resources, a non-probability sampling design was used. A convenience sample of healthy Indo-Canadian men and women between ages 30-65 years, residing in Greater Vancouver was selected for the study.

Sampling Size:

In order to identify the appropriate sample size it is necessary

to specify the significance level, the effect size and the power of the statistical test (Glenberg, 1988). For the purposes of this study a standard significance level or type I error, $p = .05$ is used. Effect size is the difference between hypothesized and true population mean. Since no specific values for hypothesized and true population means are being identified, a standard value of 0.5 is used, assuming that the difference between the value of Pearson-Product Moment r in the true population and hypothesized population of Indo-Canadians is moderate. The power is defined as the probability that a statistical test will detect a significant difference between two means (Burns & Grove, 1987). A maximum power is desired because it reflects a type of correct decision. The power set for this study is .8.

After predicting the values of the significance level, the effect size and the power, respectively as .05, 0.5, and 0.8, Kraemer and Theiman's (1987) Master Table is used for estimating the sample size. According to the table, a sample of 27 individuals is required to obtain reliable findings from the statistical data analysis.

Characteristics of the Sample:

There are three major sub-groups within East Indians, namely Sikh, Muslim and Hindu (Bhopal, 1986). According to the 1981

Canadian census (Statistics Canada, 1981), there are over 40,000 Sikhs, over 12,000 Muslims and about 9,000 Hindus living in British Columbia. In order to ensure representativeness of each Indo-Canadian group in the study, a quota was set for sub-groups. The sample (N=27) comprised of 14 (50%) Sikhs, 8 (30%) Muslims, and 5 (20%) Hindus. Hindi and Urdu are the most widely spoken languages in India and Pakistan and the majority of Indo-Canadians speak Hindi or Urdu. It is necessary to clarify that the differences among the three Indo-Canadian groups were not taken into account in the sample size selection, and the power and significance level of the statistical analysis are based on the consideration that Indo-Canadians are a single group.

Selection of the subjects for this study was based on the following criteria:

-men and women between 30-65 years of age.

-either themselves, their parents or their grandparents born in India, Pakistan, Bangladesh, Fiji or East-Africa.

-able to communicate in English, Urdu, or Hindi.

-currently belong to either the Sikh, Muslim or Hindu religions.

-presently living in Greater Vancouver.

-had no chronic disease such as diabetes, high blood pressure, etc.

-willing to participate in the study.

Data Collection Procedures

Participants in the study were obtained through selected Indo-Canadian care providers (doctors, nurses, and social workers) who previously had agreed to assist the investigator in locating potential subjects. These Indo-Canadian care providers are active in the provision of health care / social services to the community and have access to the names and telephone numbers of many Indo-Canadians.

Information letters that explained the purpose of the study and listed the criteria for inclusion were given to the Indo-Canadian health care providers (see Appendix D) along with the information letters for the potential participants (see Appendix E). The Indo-Canadian care providers were advised to briefly assess the potential participants for meeting the criteria for inclusion in the study and then to give them the letters of information. The participants were requested that if they agreed to participate, to contact either the student investigator or the health care provider from whom he/she has received the information

letter.

The participants phoned either the student investigator or the health care providers to schedule the date, time and place for the interviews. When a total of 27 participants were scheduled for the interviews, other participants were thankfully refused. The interviews were conducted at either an agency such as Collingwood Neighbourhood House and Sunset Community Centre, a mosque or a church where the Indo-Canadians meet for various social, religious or educational activities. All interviews were conducted between September 1992 and November 1992 by the student investigator who speaks and understands English, Urdu and Hindi (and is familiar with Punjabi).

Study instrument

Data pertinent to the research questions were gathered by means of a structured interview guide. An interview guide was developed on the basis of the modules utilized by the previous researchers (Avis et al., 1990; Heller, Pedoe & Rose, 1981; Magnus, 1990; Pierce et al, 1984; Schechtman, Barzilai, Rost & Fisher, 1991). Considering the fact that many Indo-Canadians cannot communicate

in English, the questions in the interview guide were translated into Urdu and Hindi. The translation of the instrument was done after the thesis advisory committee reviewed the interview guide. The questions were then back translated into English by an Indo-Canadian physician to ensure consistency, clarity and accuracy of the questions in the interview guide.

The interview consisted of 34 close-ended items (see Appendix A). The close-ended questions provided standardization for analyses of the data, thus enhancing reliability and validity of the findings (Dean, 1988). The interview sought three major areas of information: (a) knowledge of Indo-Canadians about cardiovascular disease risk factors and prevention, (b) risk reducing behaviours of Indo-Canadians, and (c) sociodemographic information. Each item in the interview was number coded and the sections on knowledge and behaviours were scored.

Knowledge of Indo-Canadians about Cardiovascular Disease Risk Factors and Prevention

There were 14 true/false statements in this section of the instrument (see Appendix A). The items were based on the instruments used by Magnus (1990) and Pierce et al. (1984). The

instrument used by Magnus (1990) on assessing "the heart health knowledge" was pre-tested by Magnus on 20 individuals and test-retest reliability determined to be 0.89 among 20 individuals. Cronbach's alpha for all the items in the study (Magnus, 1990) was 0.64. The instrument used by Pierce et al. (1989) was also pre-tested on 80 individuals, however, data on reliability and validity of the instrument is not provided in the study.

Items in the knowledge section (see Appendix A) were number coded to facilitate data entry and statistical analysis. All correct responses were scored and coded as "1" and all incorrect responses were assigned a score and code of "0". Each respondent received a score of +1 for each correct response. An individual who answered incorrectly received a score of 0. Scores were then summed, resulting in a ratio scale of 0-14 for measuring the variable of knowledge. Items 1, 2, 5, 6, 7, 9, 10, 11, 12, 13, and 14 are "true", and items 3, 4, and 8, are "false". A maximum of +14 could have been received for all correct responses in the knowledge scale. The higher score was interpreted as the better knowledge of the individual participants.

Risk Reducing Behaviours of Indo-Canadians

The self-report method and measurement of Body Mass Index were used to assess risk reducing behaviours of Indo-Canadians (see Appendix A). Dunbar and Shin (1988) reported that the self-report method used in several studies to assess cardiovascular disease risk behaviours such as smoking, diet and exercise has provided accurate and valid information that is comparable to other standard physiological measures.

There were 12 items in the behaviour section of the instrument that measured risk reducing behaviours of Indo-Canadians (see Appendix A). The relevant items selected for assessing the risk reducing behaviours were based on the work of Avis et al. (1990); Heller et al., (1981); Schechtman et al., (1991). Each item in this section was scaled from zero to three. Scores were then summed, resulting in a possible range of 2-22. The high score on the risk reducing behaviours sub-scale was interpreted as positive risk reducing behaviours. For the purposes of computer analysis, each item in this section was also number coded. A further description of the risk reducing behaviours sub-scale follows.

Self Report. Questions 15 through 25 assessed self-reported

risk reducing behaviours of Indo-Canadians (see Appendix A). The aim of question 15 was to measure smoking behaviour. Questions 16-22 assessed individuals' dietary behaviours. Heller, Pedoe, and Rose's (1991) module was used as a basis to construct the items that assessed dietary behaviour. The investigators reported that the eight-item diet questionnaire that they used was found to have good repeatability, and a score derived from it correlated significantly ($r = -.3$, $p < 0.05$) with a more lengthy dietary recall method in assessing the amount of dietary fat in the diet. Question 23 assessed the exercise behaviour of individuals. A single question was used to assess exercise behaviour because Schechtman et al., (1991) reported that a single self-report question about participation in regular exercise demonstrated significant reliability in their study. Items 24 and 25 determined individuals' health maintenance behaviour through self-awareness of their own blood-pressure and cholesterol level.

Measurement. Body Mass Index (BMI) was calculated from measures of height and weight of each Indo-Canadian in order to assess his/her weight maintenance behaviour (see Appendix A). BMI was used as an index of obesity because it conveniently measures

body fat and correlates well with other measures such as skin-fold thicknesses that also measures body fat (Micozzi, Albanes, Jones, & Chumlea, 1986).

Demographic information

Information about the individual's age, gender, education, family history of heart disease, religion, and income was collected during the interview (see Appendix A). There were seven variables in this section. Each item in this section was also number coded for the purposes of computer analyses of the data.

Reliability and Validity of the Instrument

An instrument is valid when it measures what it is supposed to measure (Woods & Catanzaro, 1988). Content and face validity of the instrument were obtained from a panel of six experts. Five of them were experts in the field of cardiovascular diseases and one of them was an Indo-Canadian physician who had culture specific knowledge on the behaviours of Indo-Canadians about cardiovascular diseases. These experts were asked to review the items to determine if they represent the area of the study.

A number of items were identified that needed to be appropriately stated in order to enhance understanding and

clarification of the use of some words. For example, suggestions were made to use the words 'fat', 'soft margarine' and 'broil' instead of 'cholesterol' 'unsaturated fats' and 'grill', respectively. Besides, the addition of some items was suggested. For example, it was suggested that another option "ghee (clarified Butter)" to measure the dietary fat consumption, be added. The addition of another question on "the kind of milk" along with "the amount of milk" that people use was suggested to accurately measure the amount of fat. Two experts suggested the addition of a question on stress to assess knowledge and behaviours of Indo-Canadians. Since there is no conclusive evidence to suggest that stress increases the risk of cardiovascular disease (Strasser, 1992) and besides stress is a difficult concept to define and measure precisely, the question on stress was not included in the interview guide.

The comments from the panel of experts on each item of the interview guide were summarized and quantitatively analyzed (see Appendix B). The suggestions were then reviewed by the thesis advisory committee for the approval of changes/addition of items that are discussed earlier. Based on this feedback, a second draft of the instrument was prepared.

The instrument was pilot tested on two subjects to determine the clarity and time required for the interview. Two further changes were made in the instrument based on this pilot testing. One of the changes was in the question on exercise behaviour. A phrase was added to the question "over and above your household routines and your job activities" to clarify the meaning of exercise to the interviewee. Another change was made in one of the questions that asked if an individual cuts the visible fat off the meat. An option was provided and credit was given to a person who does not eat meat. The final tool was then used to measure the two variables, knowledge and behaviours in the study (see Appendix A).

The reliability of the instrument was ensured by calculating the reliability coefficients after the completion of data collection and before the data analyses. Reliability coefficients were calculated for both knowledge and behaviour scales. The cronbach's reliability estimate for the knowledge scale was .55 and for the behaviour scale was .52. A low reliability coefficient was expected because the scale did not measure a single construct but a number of concepts (behaviours) such as smoking, diet, exercise, etcetera. When a scale measures more than one constructs, then there tends to be low

correlation among items that may result in low reliability coefficient.

Ethical Considerations

The study proposal was approved by the University of British Columbia Screening Committee before data collection commenced. The information letters and consent forms clearly explained the purpose, nature and implications of the study. The prospective participants were informed that their participation was strictly voluntary. Individuals who agreed to participate contacted the investigator or the care provider from whom they initially received the information letter. A mutually agreed date, time and place for the interview was scheduled with each individual who contacted the investigator. Each participant was asked to sign a written consent prior to the interview (Appendix F). The participants were informed that there was no risk associated with participation and also that there were no apparent benefits to the individual for participating in the study. Confidentiality of the data obtained was assured to each individual. Each interview form was number coded that precluded the need to have a name and address on the survey instrument. A separate file was established to link each name and address to a code

number for the purpose of confidentiality. This list of names is only accessible to the student investigator.

Data Analysis

Data were first edited for completeness and accuracy. After editing the "raw" data carefully, data from the interview were coded and placed in the computer file created for this study. Data were analyzed using procedures in the statistical manual of Mystat, the version of Systat. Demographic data were first described and analyzed using descriptive statistics and Chi-Square procedures. To answer research question one (What is the level of knowledge of Indo-Canadians about cardiovascular disease risk factors and prevention?), descriptive statistics with frequency distribution, measure of central tendency, and variability were used to analyze the data.

To answer research question two (Is there a relationship between Indo-Canadians' knowledge of cardiovascular disease risk factors and their self-reported risk reducing behaviours?), the Pearson Product-Moment Correlation Coefficient (r) was computed. The rationale for using this test is explained below.

It was mentioned earlier that each individual's knowledge was estimated by the score derived from the correct responses in the knowledge scale. The knowledge scale had a possible score range of 0-14. Further, risk reducing behaviours were assessed by the scores derived from the health behaviour scale that had a possible score range Of 2-22. Data on both variables yielded interval ratio measures. One of the purposes of the study was to determine the relationship between the knowledge and risk reducing behaviours. Since a linear relationship was expected, the Pearson Product-Moment Correlation Coefficient (r) was used to determine the magnitude and direction of the relationship between knowledge and self-reported risk reducing behaviours (Glenberg, 1988). The nature of the relationship between knowledge and behaviour was first explored by plotting the data points on a graph that demonstrated a linear relationship and provided a logic for using the Pearson Product-Moment Correlation Coefficient (r). Later, the graph substantiated the conclusion drawn from the computation of r.

To answer question three (How are socio-demographic factors related to Indo-Canadians' knowledge about cardiovascular disease risk factors and prevention?), independent samples t-test or One-Way

Analysis of Variance (ANOVA) were performed to identify any significant relationships. The following procedures were used to perform the tests:

Each sociodemographic variable e.g. age, sex, education, family history of heart disease, religion and economic status was considered as an independent variable. The total score on the knowledge scale was considered as the dependent variable. If there were two conditions within a single independent variable, then the independent samples t-test was used to identify a significant relationship between the two variables. For example, the independent t-test was used to identify the relationship between knowledge and gender since gender has only two conditions male or female. Similarly, for an independent variable for more than two conditions, a One-Way ANOVA was performed to identify any significant relationship between the two variables. Example, the variable religious affiliation has three conditions, Sikhs, Muslims, and Hindus, in this case, One-Way ANOVA was performed to identify a significant relationship between knowledge and religion.

Chapter Four

Presentation and Discussion of Findings

The findings of this study are analyzed and described in three sections. The first section includes a description of the individual participants based on the demographic characteristics. The second section analyses the data in relation to three research questions concerning Indo-Canadians' knowledge about cardiovascular disease risk factors and prevention, risk reducing behaviours and demographic variables. Finally, the third section presents an interpretation of the findings.

Demographic Characteristics of Indo-Canadians

The purposes of collecting the demographic data were as follows: 1) to determine the relative frequency (number) of individuals in each category of a demographic variable e.g. age, sex, education, family history of heart disease, religion and income, 2) to compare and identify if there is a difference in the relative frequency distributions of the individuals among demographic variables, and 3) to compare and identify if there is a significant relationship between the knowledge level and demographic variables.

Demographic data collected from the participants were age,

sex, level and place of education obtained, family history of heart disease, religion, income and place of birth. The information obtained about each demographic variable is summarized in Table 1 on page 56 and 57. A brief discussion of the data follows.

The participants ranged in age from 30 to 65 years. The sample was 48% (n = 13) male and 52% (n = 14) female. As discussed earlier, in order to maximize the representation of each ethnic group within the Indo-Canadian community, specific quota were set for each group. This resulted in a sample of approximately 50% Sikhs (n = 14), 30% Muslims (n = 8), and 20% Hindus (n = 5). All participants were born outside Canada.

Three types of comparisons were made between demographic variables. First, a comparison was made between gender and education to identify if the level of education differs between the male and the female population. Second, a comparison was made between education and income to identify if family income varies among low and high educated individuals. Finally, a comparison was made between family history of heart disease and religion, to determine if family history differs among Sikhs, Muslims and Hindus.

Chi-square procedures and contingency tables were used to make comparisons and conclusions about the differences among Indo-

Table 1 Grouped Frequencies and Percentages of Indo-Canadians' Responses to the Demographic data

Group	Frequency	Percentage
Age range		
50-65	13	48.1
40-49	6	22.2
30-39	8	29.6
Total	27	100.0
Gender		
Male	13	48.2
Female	14	51.8
Total	27	100.0
Place of Education		
India	15	55.5
Africa	3	11.1
Pakistan	0	0.0
Bangladesh	1	3.03
Fiji	3	11.1
Canada	5	18.5
Total	27	100.0

Group	Frequency	Percentage
Level of Education		
University/College	7	25.8
High School/Secondary	10	37.1
None/Elementary	10	37.1
Total	27	100.0
Family History of Heart Disease		
Yes	12	44.4
No	15	55.5
Total	27	100.0
Religion		
Sikh	14	51.9
Muslim	8	29.6
Hindu	5	18.5
Total	27	100.0
Income		
Under $19,999	7	25.9
Between $20,000-39,999	14	51.9
$40,000 and Over	6	22.2
	27	100.0

Canadians on the measured demographic characteristics such as gender, education, income, religion and family history of heart disease. Table 2 on page 59 summarizes the data obtained from the Indo-Canadians.

The following conclusions are made from the statistical analyses of the demographic data: 1) when the relative frequency distributions of male and female populations were compared against level of education, the obtained value of $X = 2.44$ was not found to be in the rejection region at $p = .05$. Therefore, the conclusion was reached that perhaps there are no differences in the level of education among males and females. 2) Comparison of the relative frequencies of the level of education and family income resulted in $X = 15.84$, which was significant at $p = .05$. Based on this analysis it was concluded that individuals with college and university degrees tended to have a higher family income than individuals who had lower education. 3) Finally, comparison of the relative frequencies of religion and family history of heart disease resulted in the value of $X = 1.5$. This value was not significant at $p = .05$. Therefore, it was concluded that perhaps there were no differences in the reported family history of heart disease among Sikhs, Muslims and Hindus.

Table 2

A: Classification of Indo-Canadians By Gender and Education

	Education		
Gender	None/ Elementary	Secondary	University or College
Male (n = 13)	5	3	5
Female (n = 14	5	7	2
Total	10	10	7

B: Classification of Indo-Canadians by Education and Income

	Income		
Education	Under $19,999	20,000 - 39,999	Over 40,000
None/Elimentary (n=10)	4	5	1
Secondary (n=10	3	6	1
University or College (n=7)	0	3	4
Total	7	14	6

C: Classification of Indo-Canadians by Family History of Heart Disease and religion

	Family History of Heart Disease	
Religion	Yes	No
Sikh	5	9
Muslim	5	3
Hindu	2	3
Total	12	15

Findings Related to the Research Questions

The results obtained from the data analyses are clustered into three groups. Results relating to the first question describe the knowledge of Indo-Canadians about cardiovascular disease risk factors and their prevention. Results pertaining to the second question determine the strength and direction of the relationship between Indo-Canadians' knowledge of cardiovascular disease risk factors and their risk reducing behaviours. Finally, results belonging to the third question identify the relationship between Indo-Canadians' knowledge about cardiovascular disease risk factors and their sociodemographic characteristics. In the following section the results related to the three questions are discussed and interpreted.

Research Question One: What is the Level of Knowledge of Indo-Canadians about Cardiovascular Disease Risk Factors and Prevention?

The knowledge scale consisted of 14 true or false items with a possible maximum score of +14. The knowledge level of Indo-Canadians about cardiovascular disease risk factors and their prevention was computed from the individuals' total scores obtained in the 14 item knowledge scale. Data were first organized using frequency distributions for knowledge scores of Indo-Canadians

(Table 3 on page 62). The scores range from 4 to 13, the calculated mean for the total scores is 10.56 and standard deviation is 1.83. This population of Indo-Canadians is normally distributed regarding the level of knowledge.

The responses to individual items in the knowledge scale are summarized in Table 4 on 63. Examination of these responses demonstrate that the majority of respondents (96.2%) were aware of the three major risk factors of heart disease: smoking, high blood pressure, and high blood cholesterol. The majority of the sample (92%) knew that lowering the salt intake in one's diet and maintaining body weight would prevent or control high blood pressure. All individuals agreed that reducing the intake of calories and increasing physical activity would reduce body weight. However, their knowledge with regard to certain specific facts such as the normal values of blood pressure, the harmful effects of cholesterol in a human body, the role of gender in increasing the risk and the importance of physical activity in the prevention of heart disease was limited.

Research Question Two: Is there a Relationship between Indo-Canadians' Knowledge of Cardiovascular Disease Risk Factors and their Self-Reported Risk Reducing Behaviours?

Table 3

Grouped Frequency Distribution of the Knowledge Scores

Class Interval	Relative Frequency	Percent	Cumulative Relative Frequency
13-14	2	7.4%	100.0
11-12	15	55.5%	92.5
9-10	8	29.6%	37.03
7-8	1	3.7%	28.6
5-6	0	0.0%	3.7
3-4	1	3.7%	3.7
Total	27	100.0%	100.0

Characteristics of the Distribution:

1. Central Tendency

   Mean = 10.56

2. Variability

   Variance = 3.33

   Standard Deviation = 1.83

Table 4 Percentage of Correct Responses of Individuals on Knowledge Questions

1. The three most important heart disease risk factors are high blood pressur, smoking and high blood cholesterol.	96%
2. Heart trouble runs in some families.	78%
3. Before age 50 women are more likely to suffer from heart attacks than men.	44%
4. A blood pressure of 120/70 or more is generally considered to be high.	33%
5. The two best ways to prevent or control high blood pressure are to lower salt intake and to maintain ideal body weight.	92%
6. Being overweight can increase the risk of heart attack.	89%
7. The two best ways to lose weight are to eat fewer calories and to increase physical activity.	100
8. Vegetable foods contain cholesterol and animal foods do not.	92%
9. Cholesterol is a fatty substance found in many foods.	89%
10. Hardening of the arteries is caused by too much cholesterol in blood.	18%
11. The most effective way to lower the level your blood cholesterol is by eating less cholesterol.	96%
12. People who quit smoking reduce their chance of developing heart disease.	85%
13. Physical activity is related to heart disease.	59%
14. Cigarette smoking by itself will increase your chances of having a heart attack	81%

The behaviour scale consisted of 12 items with a possible maximum score of 2-22. Data related to individual items in the risk reducing behaviours scale are summarized in Table 5 on page 65 and 66. Examination of each item in the behaviour scale demonstrated that all individuals (100%) in this population of Indo-Canadians were non-smokers. The mean score of the dietary behaviour (question 16-22) was 11.2 (out of the maximum of 15). Only about 29% of the participants reported that they exercise regularly and approximately 63% were either overweight or obese.

Dependent samples of "knowledge" and "risk reducing behaviours" scores were created by matching the "knowledge" scores of each individual with his/her scores on the "risk reducing behaviour" scale. The Knowledge score was treated as an independent variable and the self-reported risk reducing behaviour score was treated as the dependent variable when analyzing the data. The mean and the standard deviation of the knowledge scale were 10.56 and 1.83. The mean and the standard deviation of the behaviour scale was 12.11 and 2.15 respectively. The Pearson Product-Moment Correlation Coefficient (r) was calculated to determine the strength and direction of the relationship between the knowledge and behaviours.

The computed value of Pearson-Product Moment correlation

Table 5 Percentage of Responses of Individuals on Risk Reducing Behaviour Scale

15. Do you smoke cigarette?	
Yes	0%
No	100%
16.a) Do you usually use butter or margarine?	
Always or usually butter	22.22%
Always or usually margarine	77.78%
b) If you use margarine, which brand?	
Hard margarine	48.15%
Soft margarine	51.85%
17. How many eggs do eat in an average week?	
Not more than three a week	81.48%
More than three a week but less than one a day.	14.81%
At least one a day	3.70%
18. How much milk do you drink (including on cereals)?	
Less than one cup pint a day	11.11%
Between one and two cups a day	74.07%
More than two cups a day	14.81%
19. What kind of milk do you consume?	
skim milk / 1%	7.41%
2%	62.96%
Homogenized	29.63%
20. How often do you eat cheese (other than cottage cheese)?	
Twice a week or less	81.48%
More than twice a week but less than once a day	18.52%
At least once a day	0%
21. Do you usually cut the visible fat off your meat and bacon or do you usually eat it?	
I usually cut it off / I do not eat meat	96.3%
I usually eat it	3.7%

22.a) Do you (or does your wife) usually fry or grill foods? Usually fry Sometimes fry, sometimes broil Usually broil	 22.22% 70.37% 7.41%
b).If you fry food, what sort of fat or oil is usually used? (score 0 if usually broil) Cooking oil Lard or dripping (solid fat) / Don't know	 96.3% 3.7%
23. Do you do any kind of exercise over and above your household routines and your job (e.g. walking briskly, swimming, jogging, and cycling)? Yes No	 29.63% 70.37%
24: Do you know your blood pressure? Yes No	 22.22% 77.78%
25. Do you know your cholesterol level? Yes No	 11.11% 88.89%
Measurement: 24. I will measure your current height and weight (height without shoes and weight with a portable scale was taken and then the interviewer calculated Body Mass Index for each individual according to the guidelines provided by the Canadian Dietetic Association? If BMI is 20-25 If BMI is 25-27 If BMI is over 27	 37.04% 51.85% 11.11%

coefficient r = .34 was statistically significant at p = .05 and (df = 25). This means that the evidence in this population suggests that there is a moderate positive relationship between knowledge and self-reported risk reducing behaviours. Moreover the r value of .34 (r^2 = .11) means 11% of the variance in the behaviour scale was associated with changes in the knowledge scale.

Research Question Three: How are Socio-demographic Factors related to Indo-Canadians' Knowledge about Cardiovascular Disease Risk Factors and Prevention?

Data related to the eight demographic variables of age, sex, level and place of education, family history of heart disease, religion, family income and place of birth were collected from this sample of Indo-Canadians. The two demographic variables: "the place of education" and "the place of birth" are excluded from this analyses because there were no conditions for question on "born in Canada or outside Canada". All individuals reported that they were born outside Canada. Secondly, the data on "the place of education" cannot be analyzed meaningfully.

The following statistical analyses and tests were performed. Each demographic variable was treated as an independent variable and each total knowledge score as the dependent variable. Analyses

of variance (ANOVA) for variables having three conditions such as age, economic status and education level were computed to determine statistical significance of the data. For variables having two conditions such as family history of heart disease and gender, independent samples t-tests were used to compute the difference in the mean knowledge scores between males and females, and individuals with and without family history of heart disease. The results obtained from these tests are summarized in Table 6 on page 69 and 70.

The first comparison was made between the mean knowledge scores among the three age categories of participants. The results were not statistically significant at the standard $p = .05$. This means that the knowledge level of younger and older individuals was not different from each other.

The second comparison was made between the mean knowledge scores among the three educational levels of Indo-Canadians: none or elementary, secondary and college or university or college. F-ratio was statistically significant at $p = .05$. This means that the statistical evidence suggests that the knowledge level was different among the three groups of Indo-Canadians. Furthermore, the protected t-test was performed to identify if the overall mean of the

Table 6 Comparison of Indo-Canadians Knowledge Score and the selected Demographic Variables

A: ANOVA Summary Table to illustrate the difference in the knowledge score and age

Age Range						
	30-39	40-49	50-65	F	df	p
n	8	6	13	1.21	2.24	.316
Mean	10.0	11.5	10.46			

B: ANOVA Summary Table to illustrate the difference in the knowledge scores and education level

Education Level						
	None/Ele-mentary	Secodary	Univers/ College	F	df	p
n	10	10	7	3.25	2,24	.05
Mean	9.5	11	11.42			

C: ANOVA Summary Table to illustrate the difference in the knowledge scores and religion

Religion						
	Sikh	Muslim	Hindu	F	df	p
n	14	8	5	.78	2,24	.3
Meam	10.14	10.88	11.2			

D: ANOVAS Summary Table to illustrate the difference in the knowledge scores and income

Family Income						
	Under 19,999	20,000 to 39,999	Over 40,000	F	df	p
n	7	14	6	.73	2,24	.49
Mean	9.86	10.71	11			

E: t-Test Summary Table to illustrate the difference in the knowledge scores between males and females

Gender					
	Male	Female	t	df	p
n	13	14	1.23	25	.23
Mean	11.0	10.13			

F: t-Test Summary Table to illustrate the difference in the knowledge scores among individuals with and without family history of heart disease

Family History of Heart Disease					
	Yes	No	t	df	p
n	12	15	2.38	25	.025
Mean	11.42	9.87			

individuals in the none or elementary group differs from the mean of the individuals in the college or university group. The test demonstrated that the difference between the means, 1.92 was statistically significant at $p = .05$, $t(24) = 2.28$.

The third comparison was made between the mean knowledge scores among the three religious groups, Sikh Muslim and Hindu, within the Indo-Canadian community. The computed F-ratio demonstrated that using $p = .05$, the means of the knowledge scores of Sikh Muslim and Hindu were not significantly different. This means that perhaps Sikhs Muslims and Hindus do not vary in their level of knowledge about the cardiovascular disease risk factors.

The fourth comparison was made between the mean knowledge scores among the three major income categories of Indo-Canadians. The computed F-statistic was not statistically significant at $p = .05$. This means that there was insufficient evidence in this population of Indo-Canadians to suggest that the three groups; with high, lower and low income differ in their level of knowledge about the cardiovascular disease risk factors.

t-Tests were performed to analyze the difference in the mean knowledge scores between males and females, and between individuals with and without family history of heart disease. The

comparison of the mean knowledge scores between male and female participants demonstrated an insignificant difference between the two groups at $p = .05$. Similarly, the mean knowledge scores among individuals with and without a family history of heart disease were compared. Computation of the t-statistics demonstrated a significant difference between the two groups at $p < .o3$.

Interpretation of the Findings

A considerable number of Indo-Canadians in this study (96.2%) were aware of the three major cardiovascular disease risk factors: smoking, high blood pressure, and high blood cholesterol. The findings in this study are inconsistent with Bhopal's study (1986) that identified knowledge deficit among East Indians residing in Glasgow. This difference in the knowledge level of Indo-Canadians and Asian Indians in Europe could be due to the different methodology and sampling design utilized in both studies. There is also a possibility of self-selection by the sample in the present study in that the individuals who agreed to participate may have greater knowledge about cardiovascular disease risk factors than the individuals who refused to participate in the study.

Moreover, the overall mean knowledge score was positively

related to the mean risk reducing behaviours score. The value of Pearson-Product Moment $r = .337$ was statistically significant at $p = .05$. This is consistent with the results of previous studies (Dean, 1990; Haralson, Sargent, & Schluchter, 1990; Rabkin, Boyko, Shane, & Kaufert, 1984).

It can be argued that demonstration of the significant relationship between knowledge and risk reducing behaviours in this study does not establish a causal link. Glenberg (1988) contends that causal link between any two variables can only be established when experimental design and random assignment of individuals to two or more different conditions of an independent variable are used. Since this was not an experimental study and no random assignment of subjects was involved, one can not conclude that the higher knowledge of individuals about cardiovascular disease risk factors and their prevention causes more positive behaviours.

With regards to risk reducing behaviours, all individuals in this sample of Indo-Canadians were identified as non-smokers. This finding agrees with Bhopal's (1986) comment that smoking is unusual for Indo-Canadians. Furthermore, many individuals lacked awareness that smoking is an independent risk factor for heart disease. This again confirms Bhopal's (1986) comment that it is the religious taboo

against smoking rather than awareness of the risk of smoking that explains low prevalence of smoking within the East Indian community. Other data obtained from the assessment of behaviours suggest that a considerable number of individuals (63%) in this population are either overweight or obese.

Obesity has been identified in both men and women as an independent risk factor for cardiovascular disease in the Framingham Heart Study Population (Hubert, Feinleib, McNamara, & Castelli, 1983). A recent study by Reeder, Angel, et al. (1992) on the Canadian population between 18 and 74 years of age demonstrated that obesity was associated with high blood pressure, high total serum cholesterol, high low density and low high density lipid cholesterol, and serum triglycerides. The high prevalence of obesity among this population of Indo-Canadians suggests that obesity could be one of the major risk factors in increasing the incidence of cardiovascular disease. It is obvious from this finding that interventions are required to correct the problem of obesity among individuals in this community.

In a recent report by the Canadian Task Force on "The Treatment of Obesity" it was mentioned that causes of obesity are unknown, however, weight gain results when more energy (calories)

is consumed than is expanded. The report of the Task Force (1991) further recommended that a regular program of dynamic exercise along with calorie restriction offers the most promising solution to combat obesity. It is quite obvious and certain that the majority of Indo-Canadians (70%) in the present study did not exercise which suggests that there is an urgent need to develop and extend culturally acceptable exercise programs to Indo-Canadians.

Any precise conclusion about the amount of calories that Indo-Canadians consumed cannot be made on the basis of the data obtained on their dietary fat intake in this study. It appears from the data obtained that the majority of Indo-Canadians in the present study used low to moderate fat in their diet. For example their mean dietary fat intake score was 11.2 out of a maximum of 15. Furthermore, 96% of the population reported that they cut skin and visible fat off their meat and 96% said that they used vegetable oil instead of ghee and lard for cooking. Nevertheless, it is possible that these individuals may be unknowingly using other food products that are high in fat, high in sugar and low in fibre that could have contributed to their obesity. This study did not obtain detailed information on dietary practices among Indo-Canadians, therefore the investigator cannot make any conclusion about the usual amount of fat intake of Indo-

Canadians.

For both men and women, the level of knowledge was significantly related to the level of education. That is, the total knowledge score was higher among the individuals with high education than the individuals with less education. Similar patterns have been observed in a few studies (Avis etal., 1990; Farrow etal., 1990; MacDonald, et al., 1992; Millar & Wigle, 1986). Other studies have demonstrated an inverse relationship between education and prevalence of cardiovascular disease risk factors (Jacobsen & Thelle, 1988; Liu, et al., 1982; MacDonald et al., 1992). Liu et al. (1982) further contend that a lower incidence of risk factors among more educated individuals than less educated individuals leads them to believe that the recent decline in the morbidity and mortality of cardiovascular disease has predominantly occurred among educated individuals only.

Another major demographic factor that is reported in previous studies to determine knowledge and/or positive behaviours is income. Although no significant difference in the mean knowledge scores of low and high income groups were identified in this study, Chi-Square procedures demonstrated significant association between education level and income (see Table 2). These findings can be interpreted in

one of two ways. Either highly educated individuals had higher incomes than individuals who had less education. Or, individuals in higher income categories had greater chances of attaining university education than individuals in low income categories. However, the significant association between income and education suggests that it is possible that individuals in low income categories may not have opportunity to pursue higher education and this may limit their ability to acquire knowledge about preventive aspects of health.

Even though the linguistic barrier was overcome by translating the interview guide into Indo-Canadian languages, the major content of the interview was still based on a western biomedical knowledge model. This western biomedical knowledge model has not been assessed for its usefulness in cross-cultural research (American Heart Association, 1973). Ethnic groups may differ in their genetic inheritance as well as cultural practices. This western biomedical knowledge which is mainly based on western norms, may not be appropriate for assessing the risk factors, knowledge and risk reducing behaviours of Indo-Canadians. More so, as Webster (1990), said, the ethics of advising patients to adopt certain lifestyles in order

to limit further heart problems are questionable, when the factors that led up to the original heart problems are unclear.

Overview:

The findings of this study were presented in three sections. Section one described the demographic characteristics of Indo-Canadians who participated in this study. Section two presented the findings in relation to the three research questions. Descriptive, correlational, independent t-Tests, and analyses of variance procedures were used to analyze the data.

Analyses of the data in relation to the question one indicated that the mean knowledge score of Indo-Canadians is 10.56 (out of a maximum score of 14). Furthermore, a large segment of this population (96%) was aware of the three major cardiovascular disease risk factors: high blood pressure, smoking and high blood cholesterol. Analyses of the data in relation to question the two demonstrated that there is a moderately strong positive relationship between knowledge and risk reducing behaviours, $r = .34$, significant at .05. Finally, the data analyses in relation to the question three indicated that the knowledge score was significantly higher among

more educated than less educated individuals. In addition, individuals with a family history of heart disease possess significantly greater knowledge than individuals with no family history of heart disease. The results were then interpreted and discussed in section three.

Chapter Five

Summary, Conclusions, and Implications

Summary

Chronic diseases are the major causes of mortality and morbidity in Canada (Wiggle et al., 1991). Because there is no cure for chronic diseases and they require continuous care and long term management, chronic diseases create major economic and social burdens on Canadian society. Cardiovascular diseases are among many chronic conditions that are highly prevalent in Canada.

A number of prospective epidemiological surveys have identified a number of cardiovascular diseases risk factors such as high blood pressure, high blood cholesterol, cigarette smoking, obesity, lack of physical activity, age, male sex, and positive family history of heart disease. Many studies have demonstrated that these risk factors can be modified by healthy behavioral practices.

Over the past few decades a number of educational campaigns were promoted to make people aware of cardiovascular disease risk factors. The major purpose of these campaigns was to encourage people to adopt a healthy lifestyle. However, the more recent health promotion programs acknowledge that information advices is not

sufficient to modify behaviour. The Epp (1986) document identified that in order to be successful, the health promotion programs must address and encompass social, political, economic, and environmental issues and must make an effort to reduce inequity among people.

The ethnic minorities presently living in Canada are identified as a disadvantaged community who might not have equal access to health resources in comparison to the rest of the population. Indo-Canadians are a significant minority group currently residing in Canada. Data from several studies conducted on East Indians living in western countries suggest that individuals in this community are a high risk group for developing cardiovascular diseases. There is limited knowledge available about the behavioral practices that could explain the possible cause of increased risk of heart disease among members of this community. The lack of this knowledge about Indo-Canadians provided the impetus for this study.

This study identified the existing level of knowledge of Indo-Canadians about cardiovascular disease risk factors and prevention and further explored the relationship between knowledge of cardiovascular disease risk factors and risk reducing behaviours of Indo-Canadians. The Health belief model provided the conceptual

framework for this investigation. The objectives of the study were to: (1) assess the knowledge and behaviours of Indo-Canadians about cardiovascular disease risk factors and prevention; (2) determine the relationship between Indo-Canadians' knowledge about cardiovascular disease risk factors and their self-reported risk reducing behaviours; and (3) determine the association of demographic variables and the level of knowledge about cardiovascular diseases of Indo-Canadians.

A descriptive correlational study design was used to investigate the problem in this study. Based on power analyses, a non-probability, convenience sample of 27 healthy Indo-Canadian men and women was selected. There are three major sub-groups within the East Indian community, namely Sikh, Muslim, and Hindu (Bhopal, 1986). In order to ensure representativeness of each sub-group within the Indo-Canadian community, a quota was set that included 14 (50%) Sikhs, 8 (30%) Muslims, and 5 (20%) Hindus. However, the statistical analysis treated all Indo-Canadians as a single group. A western biomedical knowledge model was utilized to assess the knowledge and behaviours of Indo-Canadians. The data collection instrument was based on the tools utilized by previous investigators. For the purposes of data analyses, descriptive, correlational,

independent t-tests, and analyses of variance procedures were performed.

The descriptive analyses of data revealed that a large segment of this population of Indo-Canadians (96%) knew about the three major risk factors of cardiovascular disease: high blood pressure, cigarette smoking, and high blood cholesterol. However, individuals' knowledge about normal values of blood pressure, the harmful effects of cholesterol in the body and the role of gender in increasing the risk of heart disease is limited.

With regards to the risk reducing behaviours, no one smoked cigarettes in this population of Indo-Canadians. However, a considerable number of individuals (63%) were either overweight or obese and about 70% did not exercise regularly. The results of correlational analyses demonstrated a moderate positive relationship between knowledge and behaviours of Indo-Canadians $r = .34$ that was significant at $p = .05$. The t-tests and analyses of variance demonstrated a significant difference between the means of knowledge scores and education level and between the means of knowledge scores and family history of heart disease. This means that people with high level of education had higher knowledge than

less educated individuals, and those with a family history of heart disease had higher knowledge than individuals with no history of heart disease.

Conclusions

The findings from this study provide a profile of health knowledge and behaviours of Indo-Canadians. The major conclusions of this study are:

1) Generally this population of Indo-Canadians was well aware of the major cardiovascular disease risk factors: high blood pressure, smoking, and high blood cholesterol.

2) Individuals' knowledge about normal values of blood pressure, the harmful effects of cholesterol and the role of gender in increasing the risk of heart disease is limited.

3) Smoking is unusual for Indo-Canadian men and women. 4) Overweight and obesity is a common condition among the Indo-Canadians in this sample.

5) The majority of the individuals did not participate in any regular exercise program.

6) The direct positive relationship between knowledge and self-reported risk reducing behaviours supported the health belief model

assumption that individuals tend to take health protective actions when provided appropriate information.

7) The moderately positive value of this relationship at $r = .34$ suggests that there are factors other than knowledge such as individual motivation, social support, economic conditions, educational level, and environmental factors that may affect the life-style behaviours of Indo-Canadians. However, these factors were not investigated in this study.

8) Educational level and family history of heart disease had a significant influence on the awareness of individuals about the risk factors of cardiovascular disease in this sample of Indo-Canadians.

Implications

The findings of this study have a number of implications for nursing research, nursing practice, nursing education, and nursing administration. The following section discusses these implications.

Implications for Nursing Research

The western health belief medical model and scientific knowledge that were used as bases to measure knowledge and behaviours of Indo-Canadians in this study have not been assessed

for their usefulness in this cultural group. Therefore validity of the findings in this study may be questioned. Ethnographic studies are needed that can explain the specific health practices and values of Indo-Canadians which leads to their increased risk of developing cardiovascular diseases. It is further recommended that the health belief model be examined for it's usefulness in studying non western populations living in western countries.

This study did not account for factors other than knowledge which might impact on risk reducing behaviours. Factors such as individual beliefs, attitudes, values, and motivation, social support, income, education, gender, specific cultural practices etcetera that are predicted to influence behaviours. Therefore, future studies on this population may consider these important factors to explain health behaviours of Indo-Canadians.

A comment made by the panel of experts that confirmed the face validity of the instrument for this study was that there is a possibility that dietary practices of Indo-Canadians change after migrating to Canada and this might expose these individuals to an increased risk of heart disease. Since this study did not evaluate such data, it is important that future studies focus on, and compare,

dietary behaviours of Indo-Canadians in Canada with those in their home countries. This comparison may bring forth dietary behaviours that may increase the risk of Indo-Canadians to heart disease.

It was also mentioned earlier that the Indo-Canadian diet seems to be lacking in minerals such as potassium, magnesium, and phosphate. These minerals have been reported to be cardio-protective (Henningsen, 1988; Singh, Ratozi, Sircar, Mehta, & Sharma, 1991). Perhaps future studies may investigate this important factor to explain Indo-Canadians' increased risk for heart disease.

Many studies (Hughes, Yeo, et al., 1990; Miller, Alexis, et al., 1982; Miller, Beckles, et al., 1984) have reported that Asian Indians have high low-density lipoprotein (bad) and low high-density lipoprotein (good) cholesterol. Perhaps further studies are required to compare dietary behaviours of Indo-Canadians with their blood cholesterol and lipoprotein levels to explain if the increased cholesterol in this population is related to dietary behaviour or if it is genetic.

Implications for Nursing Administration

The literature review section of this study identified that Indo-Canadians are a high risk group for developing cardiovascular heart

disease. Nurse administrators can use this information as a basis to design and implement heart health programs that are specifically tailored and targeted to Indo-Canadians. Nurses in management positions must advocate to make the cardiovascular diseases preventive programs available and accessible specifically to individuals who are less educated and have lower incomes.

Besides, nurse administrators can play an important role in developing culturally appropriate resources to prevent cardiovascular diseases among Indo-Canadians. For example, recently many educational materials have been translated and are available to Indo-Canadians in Punjabi and Hindi. However, it has been observed that many Indo-Canadians are illiterate in their own languages. Therefore translation of educated materials is not an absolute solution to overcome the knowledge deficit in this population. Nurse administrators should consider other possible avenues for extending cardiovascular disease preventive messages across this population.

One of the findings of this study was that the majority of individuals (70%) in this sample of Indo-Canadians did not participate in regular exercise. Nurse administrators can influence health care agencies to allocate budgets to design health and fitness classes for

this community. There are several community centres such as Sunset Community Centre, Collingwood Neighbourhood, etcetera where Indo-Canadians meet for social and recreational activities. Health and fitness classes can and must be incorporated along with these activities, as they are likely to promote cardiovascular health among Indo-Canadians.

Implications for Nursing Practice

The demonstration of a moderate positive relationship between cardiovascular disease risk factors knowledge and risk reducing behaviours of Indo-Canadians in this study suggest that information could have an impact on increasing the awareness and modification of risk behaviours of individuals in this community. However, it is important that nurses as health educators impart this knowledge in culturally sensitive, personally relevant, practical, and consistent ways. Kemm (1990) has suggested that consideration of these factors in health education is likely to have a much greater impact on promoting a healthy life-style among people.

One important finding of the study was that obesity is a common problem among many Indo-Canadian men and women. Thus, nurses working in a community setting must implement measures to

treat and prevent, and to promote healthy weights among Indo-Canadians. When providing dietary counselling with regards to obesity, nurses must be particularly aware of the dietary behaviour of Indo-Canadians and they must provide dietary advice within the cultural context, rather than imposing their own cultural values.

Other important findings of this study are that many Indo-Canadians did not know their blood pressure (78%) and blood cholesterol (79%) levels. This suggests that health maintenance may be of less concern for individuals in this population. Furthermore, the four individuals who knew their cholesterol levels, had elevated blood cholesterol and were observing dietary precautions because their doctors had asked them to do so. This further suggests that individuals in this community become concerned only when something goes wrong with their health. Nurses can play a vital role in assisting Indo-Canadians to learn the importance of health maintenance and disease prevention, and their responsibilities toward healthy behavioral practices.

With regards to the questions of individuals' awareness of the level of blood cholesterol and blood pressure, many individuals responded by saying that their doctors had told them that the values

are within normal range. This means that these individuals trust the knowledge and skills of health professionals and are receptive to their advice on matters regarding health. Nurses as expert consultants can help Indo-Canadians to perceive their increased risk of heart disease and to motivate them to modify their risk of heart disease by practising healthy behaviours.

Because this study was conducted within a framework of the western biomedical model, cultural specific practices that increase the risk of Indo-Canadians to cardiovascular diseases have not been identified. However, the investigator suggests that before implementing any nursing measures for this population, nurses must first assess individual behaviours within the framework of Indo-Canadian culture.

Implications for Nursing Education

Over the past few years nursing school curricula have put a greater emphasis on teaching health promotion and disease prevention concepts to future practitioners. However, these concepts have mainly been taught within the context of health education. Much emphasis is given in helping students learn the principles of teaching and learning and ways of imparting knowledge to consumer

of health care.

Recently, health promotion is viewed in a more global context which emphasizes socio-economic, educational, cultural, and environmental factors as influencing health. This study identified that individuals in the lower income category and who had less education, were less aware about cardiovascular diseases risk factors. This might have affected their health behavioral practices. This finding suggests that future practitioners must be educated to acknowledge and deal with much broader societal issues that are negatively impinging on the health of many Canadians.

Conclusion

In summary, a need exists to extend cardiovascular preventive programs to Indo-Canadians, since this community has been identified as a high risk group. There is also a need to modify preventive strategies according to the specific need of this community. Furthermore, as Epp (1986) suggested, issues of prevention must be addressed in a broader context that encompass culture, socioeconomic conditions and level of education and must make an effort to reduce inequity among the population.

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Appendices

Appendix A

Interview Guide

A: Knowledge of Indo-Canadians about cardiovascular disease risk factors and their prevention:

I am going to ask you a few questions about the causes and prevention of Heart Disease. Try to remember as best you can. If you are not sure or do not know please say so. (note: A score of "0" will be given if the participant will respond "don't know", "not sure", refuse to answer, or an incorrect response).

1. The three most important conditions that can cause heart disease are high blood pressure, smoking and high blood cholesterol (or fats).	T	F
2. Heart trouble runs in some families.	T	F
3. Before age 50 women are more likely to suffer from heart attacks than men.	T	F
4. A blood pressure of 120/80 is generally considered to be high.	T	F
5. The two best ways to prevent or control high blood pressure are to lower salt intake and to maintain ideal body weight.	T	F
6. Being overweight can increase the chances of a heart attack.	T	F
7. The two best ways to lose weight are to eat fewer calories and to increase physical activity.	T	F
8. Vegetables contain cholesterol (fats) and meats do not.	T	F

9. Cholesterol is a fatty substance found in many foods. T F

10. Hardening of the arteries is caused by too much cholesterol (or fat) in blood. T F

11. The most effective way to lower the level of your blood cholesterol (or fat) is by eating less cholesterol(fats). T F

12. People who quit smoking reduce their chance of developing heart disease. T F

13. Physical inactivity is related to heart disease. T F

14. Cigarette smoking by itself will increase your risk of having a heart attack. T F

B: Risk reducing behaviours of Indo-Canadians:

The next few questions concern your personal lifestyle habits. Try to answer as best you can.

15. Do you smoke cigarettes?
(0): Yes
(1): No

16.a) Do you usually use butter or margarine?
(0): Always or usually butter
(1): Always or usually margarine

b) If you use margarine, which knid?
(1): Soft margarine
(0): Hard margarine

17. How many eggs do eat in an average week (including in baked foods)?
(3): Not more than three a week
(1): At least one a day
(2): Between 3-6 per week

18. How much milk do you drink (including on cereals)?
(3): Less than one cup a day
(2): Between one and two cups a day
(1): More than two cups a day

19. What kind of milk do you consume?
(3): skim milk
(2): 1%
(1): 2%
(0): Homogenized/whole milk

20. How often do you eat cheese (other than cottage cheese)?
(3): twice a week or less
(1): At least once a day
(2): Between two and six times per week

21. Do you usually cut the visible fat off your meats or do you usually eat it?
(3): I usually cut it off
(0): I usually eat it

22.a) Do you (or does your wife) usually fry or broil food?
(0): Usually fry
(3): Usually broil
(1): Sometimes fry, sometimes broil
(0) Don't know

b). If you fry food, what sort of fat or oil is usually used?
(1): Cooking (vegetable) oil (score 0 if usually broil)
(0): Lard or ghee (solid fat)
(0): Don't know

23. Do you do any kind of regular exercise at least three times a week (e.g. walking briskly, swimming, jogging and cycling)?
(1): Yes
(0): No

24: Do you know your blood pressure?
(1): Yes
(0): No

25. Do you know your cholesterol level?
(1): Yes
(0): No

Measurement:

26. I will measure your current height and weight (height without shoes and weight with a portable scale will be taken and then the interviewer will calculate Body Mass Index for each individual according to the guidelines provided by the Canadian Dietetic Association (see Appendix C))?
    (2): If BMI is 20-25
    (1): If BMI is 25-27
    (0): If BMI is over 27

C: **Demographic dat:**

27. In which one of these categories does your age fall?
    Age in years
    0) 30 - 39
    1) 40 - 49
    2) 50 - 65

28. Gender (interviewer circles) 0) male 1) female

29. Where were you educated? _____.

30. Which one of following levels of education have you obtained?
    0) none or elementary
    1) high school
    2) university or college degree.

31. Do you have a family history of heart disease (e.g. high blood pressure, stroke, or heart attack)? 0) Yes---- 1) No---

32. What religious group do you belong to?
    0) sikh
    1) muslim
    2) hindu

33. In which one of the following family income categories do you fall?
    0) under $19,999
    1) $20,000 - $39,999
    2) $40,000 and over

34. Were you born in a) Canada b) Outside Canada

Appendix B

Item Analysis of the Feedback from the panel of experts on the Interview Guide

In order to determine the content validity of the interview guide, the instrument was distributed to five nurses who are expert in the Cardiovascular field. The following is a summary of their feedback on the instrument.

Knowledge:

1. Use "causes and prevention of heart disease" instead of "cardiovascular disease risk factors and it's prevention" (suggested by one nurse).

2. In question #1 use "conditions that can cause heart disease" instead of "heart disease risk factors"(suggested by one nurse).

3. Question #3 editorial correction (suggested by four nurses).

4. In item #4 exclude "or more" as 120/80 is normal and more is considered high (suggested by one nurse).

5. Question #5 needs editorial correction "to prevent or control high blood pressure are ..." (suggested by two nurses).

6. In question #6 hardening of arteries is related to aging and not high cholesterol level. High cholesterol level causes blockages in the arteries. Use the term "blood vessels" instead of arteries (suggested by one nurse).

7. Question #8 needs editing, use "vegetables" and "meats" instead of "vegetable foods" and "animal foods" (suggested by one nurse).

8. Question #8, 9, 10, 11 use the word cholesterol which may not have as much meaning as "high fat" for a general

population (suggested by one nurse).

9. Question #11 needs editing "level of..." (suggested by three (nurses).

10. Rephrase question #13 is not clear (suggested by three nurses).

11. Add one or two questions on stress (suggested by three nurses).

One nurse recommended to use the following questions related to stress: a) stress is related to heart disease; b) the way you cope with extra pressure in your life contribute to heart disease.

<u>Risk Reducing Behaviours</u>:

12. In question #16: 1) use the word "kind" instead of "brand"; 2) soft margarine is usually high in polyunsaturated fats (suggested by one nurse).

13. A comment is made in regards to question #17 that people may eat eggs as part of their baking foods (suggested by one nurse).

14. In question #18 use "cups"/metric measure instead of "pints"(suggested by two nurses).

15. In question #19 use the term "whole milk" instead of or in combination with "homogenized milk" (suggested by two nurses).

16. In question #20 specify low fat or not (suggested by two nurses). One of them suggested to add the following question after #20 "what kind of cheese do you use? 3) Mazzrella, 2) sometimes mazzrella sometimes cheddar, 1) Cheddar".

17. In question #22 use "broil" instead of "grill" (suggested by one nurse).

18. Question #23 is a difficult question to understand. May rephrase

instead as "Do you do any kind of regular exercise at least three times a week (e.g. walking briskly, swimming, jogging,
and cycling)? (suggested by one nurse).

19. Question # 24 is little unclear. Will you measure the hight and weight? (suggested by two nurses).
suggested change " I will measure your current height and weight (height without shoes and weight with a portable scale will be taken and then the interviewer will calculate BMI for each individual based on the guidelines provided by the Canadian Dietetic Association (see Appendix D).

20. Add question on stress (suggested by three nurses).
One of them recommended to use the following questions on stress: a) Do you usually give a relaxation break on a regular basis? 1) yes 0) no.

b) How do you cope with life's little stresses?
Yell and shout at those around you.
Talk it out with people who can help the situation.
Count to 10 and then decide what to do.

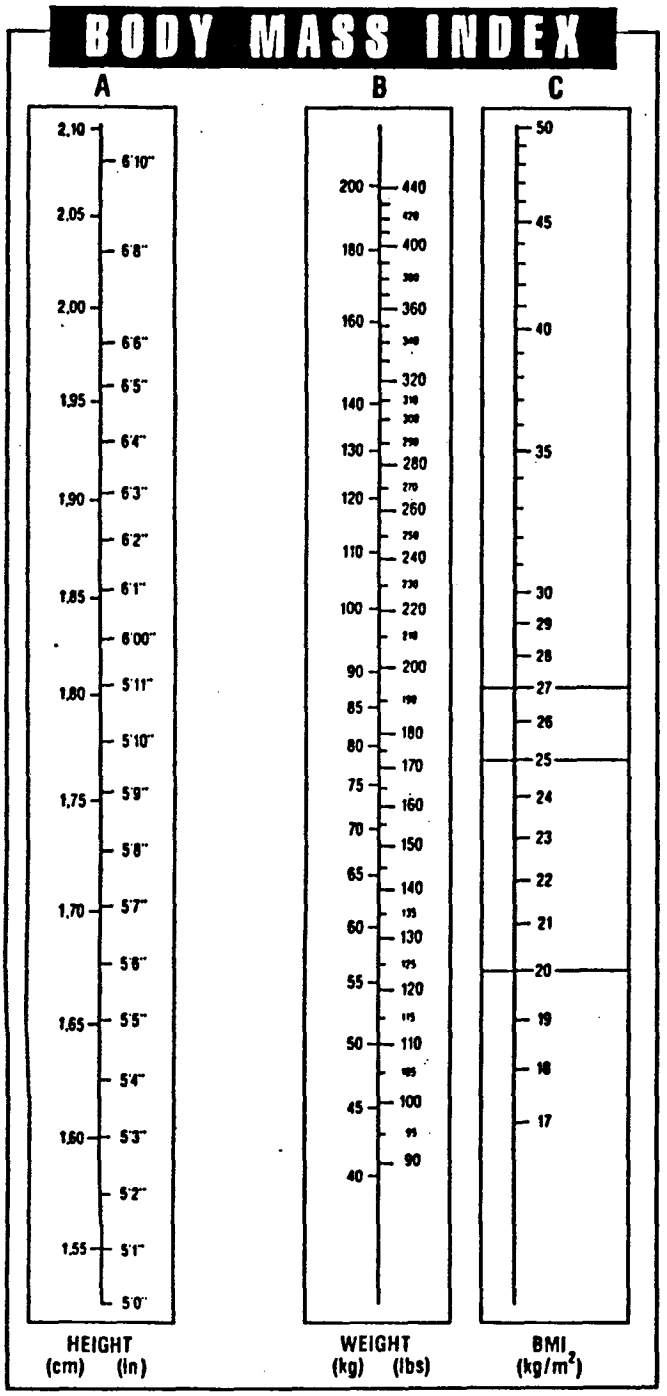
21. Remove the scale from the interview guide (suggested by one nurse).

22. Can you ask a question whether or not their diet has changed since leaving their previous country that is did they follow a Heart Smart Diet at one time and have changed when they came here or do they still follow their original customs? (suggested by one nurse)

<u>Demographic Data:</u>

23. In demographic data add a question "how long have you lived outside India?" (suggested by one nurse).

Appendix C
Body Mass Index Calculation Guide



Source: Expert Group on Weight Standards, Health and Welfare Canada

HOW TO FIND YOUR BMI - IT'S EASY

1. Mark an X at your height on line A.
2. Mark an X at your weight on line B.
3. Take a ruler and join the two X's.
4. To find your BMI, extend the line to line C.

FOR EXAMPLE:

- If Michael is 5'11" (1.80 m) and weighs 188 lbs (85 kg), his BMI is about 26.
- If Irene is 5'4" (1.60 m) and weighs 132 lbs (60 kg), her BMI is about 23.

Under 20 A BMI under 20 may be associated with health problems for some individuals. It may be a good idea to consult a dietitian and physician for advice.
20-25 This zone is associated with the lowest risk of illness for most people. This is the range you want to stay in.
25-27 A BMI over 25 may be associated with health problems for some people. Caution is suggested if your BMI is in this zone.
Over 27 A BMI over 27 is associated with increased risk of health problems such as heart disease, high blood pressure and diabetes. It may be a good idea to consult a dietitian and physician for advice.

Appendix D

Information Letter For Potential Participants

My name is Rozina Rajwani. I am a registered nurse and a student in the Masters of Science Program in Nursing at the University of British Columbia.

I am conducting a study that will become a part of my thesis. This study will assess Indo-Canadians' knowledge of heart disease and their behaviours to decrease their chances of getting the heart disease. This letter is an invitation to participate in the study. Participation in this study involves agreeing to give an interview and answering a set of questions. The interview will be conducted in the language of your choice (English, Urdu or Hindi) and will approximately last 60 minutes. You may refuse to answer any question during the interview or withdraw at any time. Your participation will be entirely voluntary. Your refusal or withdrawal to participate at any time will not jeopardize any treatment or medical care. If you are willing to participate, please call me at 224-4110 to arrange a mutually agreeable time and location for an interview. The interview will take place in a doctor's office or in your home if that is preferable. Participation in this study will not involve any risk to you. I would very much appreciate your participation in my study. If you have any further questions or concerns about the study please do not hesitate to contact me or my thesis advisor, Dr. Joan Anderson at 822-7455.

Sincerely,

Rozina Rajwani, R.N., B.Sc.N.,
Master's Student in Nursing,
University of British Columbia

Appendix E

Informed Consent

Study Title: Knowledge and Behaviours of Indo-Canadians about Cardiovascular Disease Risk Factors and their Prevention.
Investigator: Rozina Rajwani

I, hereby agree to participate in the above named study which intends to assess the Indo-Canadians' knowledge of heart disease and their health behaviours. I grant permission to be interviewed. I understand that interview will last approximately 60 minutes. I understand that the confidentiality of the information that I will provide, will be maintained by number coding the interview forms, and that my name or other identifying information will not be associated with any published or unpublished reports arising from this study.

I understand that participation in this study is entirely voluntary. I also understand that I am free to refuse answer any question or withdraw at any time if I wish to do so. **I further understand that my refusal or withdrawal to participate in the study will not influence my treatment or the medical care that I receive.** I also understand that there are no apparent benefits or expected risks associated with my participation. **I have been given the opportunity to ask questions and discuss my concerns.** I am satisfied with the responses provided.

I acknowledge receipt of a copy of this consent form. I understand that if I have further questions at any time, I can contact either the student investigator or her thesis advisors:

Ms. Rozina Rajwani, Student MSN
School of Nursing, University of British Columbia
Phone: 222-3317
Dr. Joan Anderson, Professor
Phone: 822-7455
Dr. Sonia Acorn, Assistant Professor
Phone: 822-7457

Participant's signature _____

Investigator's signature _____

Date _____

Appendix F
Information Letter for Indo-Canadians Health Care Providers

Dear Dr./Nurse,

I am currently a student in the Master of Science in Nursing Program at the University of British Columbia. Recently, I am planning to conduct a study on " Knowledge and Behaviours of Indo-Canadians about Cardiovascular Disease Risk Factors and their Prevention". This study will become a part of my thesis. Over the past several years, it has been demonstrated in the health care literature that East-Indians living in Western countries have a higher risk of developing cardiovascular disease than the other dominant cultures. I am interested in learning more about this ethnic group (Indo-Canadians) living in Canada.

To fulfil the sample requirements of this study, I am looking for Indo-Canadians who meet the study's selection criteria. The criteria for participation include, individuals: (1) male or female between the age range of 30-65 years; (2) were either themselves or their parents or grandparents born in India, Pakistan, bangladesh, Fiji, Srilanka, or East Africa; (3) are able to communicate in English, Urdu, or Hindi; (4) belongs to either Sikh, Hindu or Muslim religion; (5) have no chronic conditions such as heart disease, diabetes etcetera; and (6) are willing to participate. Participation in this study involves giving an interview that will last approximately 60 minutes.

Since you as a health care provider, are in contact with many Indo-Canadians, therefore I will greatly appreciate if you could help me in locating a part of this study's sample. The procedure for locating the individuals from Indo-Canadian community is as follows: (1) you will be requested to briefly assess the potential participants for their eligibi- lity of participation; (2) individuals who meet the criteria for selection, will receive verbal and written explanation of the study; (3) those individuals who agree to participate will call the investigator (Rozina Rajwani) to arrange a mutually agreeable date and time for the interview. At the time of interview the investigator will explain the study in more detail and ask them to sign a consent form prior to commencing the interview.

I would be pleased to provide you with copies of information letter for the potential participants, and interview guide, as well as answer any question that you might have about my research. If you have any questions or concerns please contact me at 224-4110 or my thesis advisor, Dr. Joan Anderson at 822-7455.

Rozina Rajwani
Master of Science in Nursing Student
U.B.C. school of Nursing