Ethnicity and Health Literacy: A Survey on Hypertension Knowledge among Canadian Ethnic Populations

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Objectives: With an increase and diversity in ethnic populations in Westernized countries, understanding the differences in levels of knowledge surrounding hypertension is important in planning appropriate prevention strategies. The purpose of our study was to assess levels of hypertension knowledge in Chinese, Indian and White populations in a large metropolitan Canadian city.

Design: A telephone survey was conducted in English, Chinese (Cantonese and Mandarin) and Indian languages (Hindi, Punjabi and Urdu). Hypertension knowledge was assessed through a 10-item validated instrument; respondents received 1 point for each correct answer. Logistic regression was used to test differences in hypertension knowledge among these three populations.

Results: Survey response rates were 68.7% (301) for Chinese, 61.3% (248) for Indian and 69.7% (254) for White populations. The average hypertension knowledge score for Chinese respondents was 7.23 out of 10, 7.11 for Indian respondents and 7.28 for White respondents. Compared to White respondents, Chinese respondents were less likely than White respondents to know high blood pressure can cause heart attacks (adjusted odds ratio [aOR]: .43, 95% confidence interval [CI]: .19–.96] and Indian respondents were less likely to know losing weight usually decreases blood pressure (aOR:.38, 95% CI: .21–.68).

Conclusions: Hypertension knowledge levels among these three ethnic/racial populations were similar and relatively high and varied by content. Low levels of knowledge for Chinese and Indian ethnic populations were on hypertension risk factors, long-term consequences of hypertension and anti-hypertensive medication adherence. Specifically, females, recent immigrants to Canada and Chinese seniors were identified as sub-groups who should be targeted for hypertension knowledge promotion. (*Ethn Dis.* 2014;24(3):276–282)

Key Words: Hypertension, Knowledge, Ethnic Groups, Awareness, Health Literacy

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Introduction

Increasing immigration rates have contributed to greater diversity in many Westernized countries. In countries such as Canada, non-White and non-Aboriginal populations are projected to increase to approximately 20% of the overall population by 2016.[1,2] Studies from United States, United Kingdom, and Canada[3–8] have shown that individuals of Asian-Pacific and South-Indian descent are identified as at-risk populations for hypertension as compared to their White counterparts.[3–5,9] Hypertension awareness and knowledge in these ethnic groups may be suboptimal. For example, a recent Canadian study indicated that when compared to their White peers, Chinese and South Asians were 2.3 times more likely never to have had their blood pressure measured.[10] A substantial amount of evidence demonstrates ethnic minorities tend to have lower health-literacy scores compared to White populations.[4,11–14] Health literacy has been defined as "…the ability to access, understand, evaluate and communicate information as a way to promote, maintain and improve health in a variety of settings across the life course."[15] One possible explanation for the large difference between populations is that ethnic minorities tend to be unfamiliar with the health care system in terms of seeking and navigating health-related services and they may encounter barriers to accessing and understanding information.[16–19]

Given these circumstances, the goal of our project was to assess hypertension knowledge levels among Chinese, Indian and White populations in a large Canadian city. The information derived from this study is helpful in identifying subgroups within these populations with low levels of hypertension knowledge and providing evidence for developing culturally sensitive hypertension education programs.

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Methods

Data Source and Study Population

A cross-sectional telephone survey was conducted using randomly selected samples from Chinese, Indian and White populations living in Calgary, a large Canadian city in 2010 (population about 1.1 million). The surnames listed

in the 2010 telephone directory were screened using lists of Chinese and Indian surnames to form the Chinese and Indian sampling frames, from which random samples were extracted. After excluding both Chinese and Indian surnames from the same telephone directory, a random sample of telephone numbers was obtained to select the White sample.

The lists of Chinese and Indian surnames used in this study were previously validated.[20–22] Compared with self-reported ethnicity, the sensitivity for the Chinese surname list was 78%, specificity was 99.7%, and positive predictive value was 81% and validation studies for the South Asian surname list reported sensitivity of 90% to 94%, specificity of 99.4%, and positive predictive value of 63% to 96%.[23,24] A total of 1,211 Chinese, 1,000 Indian, 1,061 White individuals were randomly selected as potential participants for the survey. We included individuals who were aged ≥18 years, and residents of Canada on or before January 1, 2010 and self-identified as being Chinese, Indian, or White. Respondents who did not speak English, Cantonese, Mandarin, Hindi, Urdu or Punjabi were excluded from the study. Only one respondent who met these criteria at each household was interviewed. Each of the randomly selected telephone numbers was called at different times (weekdays and weekends at various times of the day) up to six times.

Survey Instrument

Hypertension knowledge was assessed using a validated instrument developed by Williams.[11] The Cronbach reliability score for the instrument was .70 indicating adequate internal consistency.[25] The instrument contained 10 questions, with a score of 1 point per question. We collected information on the following themes: a) knowledge about hypertension, b) current prevention and self-management practices, c) barriers to hypertension prevention practices, d) self-reported mental and physical health and hypertension status and e) basic demographic characteristics. To adjust for hypertension knowledge related variables, we collected self-reported mental and physical health.

Data Collection

Trained interviewers in health sciences and nursing conducted the telephone survey. Before the interviews, interviewers trained for a month in a group setting, practicing interviews with each other, discussing potential issues and ways to improve the interviewing process. Interviewers were assigned weekly readings to enrich their interviewing skills and knowledge regarding pertinent cultural beliefs with different ethnicities. The survey questionnaire in English was translated by an individual who was highly fluent (speaking and reading) in both English and their native language (eg, Mandarin, Urdu) and had knowledge about hypertension. This person then interviewed an individual with the same ethnic background for feedback and comments. The questionnaire was revised based on feedback. Then the translator interviewed a different person for additional comments. Through the sequential interview and revision, the questionnaire was finalized. The questionnaire was tested through a pilot study with 25 people. Interviews were conducted in English, two major Chinese dialects (Cantonese and Mandarin) and three Indian languages (Hindi, Punjabi and Urdu). The interviewers explained the purpose and confidentiality of the survey to participants before starting the survey. Their verbal acknowledgement and participation in the survey was accepted as oral consent.

Statistical Analysis

Descriptive statistics were employed to assess the characteristics of the study populations and hypertension knowledge. A square transformation was used to normalize the distribution of hypertension scores for use in a multivariable linear regression. Logistic regression was used to compare differences in hypertension knowledge among three ethnic/racial groups after adjustment for potential confounding variables, including age, sex, immigration status, hypertension status, annual household income, marital status, educational attainment, and overall physical and mental health. Ethics approval for this study was granted by the Conjoint Health Research Ethics Board at the University of Calgary.

RESULTS

A total of 1,563 individuals (661 Chinese, 545 Indian and 357 White) were contacted by telephone for interviews. Of those contacted, 573 refused to participate, 340 were ineligible and 2 had incomplete questionnaires. Response rates were 68.7% for Chinese, 61.3% for Indian and 69.7% for White populations.

Of the 803 respondents (301 were Chinese, 248 were Indian, and 254 were White), the proportion of males was lower for Chinese (39.2%) and White (40.6%) than Indian (47.6%) respondents (Table 1). Income levels were similar across the three groups and over 50% of the respondents reported having an income ≥$70,001/year.

A high proportion of Chinese (86.0%) and Indian respondents (91.1%) were immigrants to Canada and 17.9% of Chinese and 18.1% of Indian respondents spoke English as their primary language.

The overall hypertension knowledge scores were 7.23 out of 10 maximum for Chinese, 7.11 for Indian and 7.28 for White respondents (Table 2). Chinese respondents were less likely than White respondents to know that high blood pressure can cause heart attacks (adjusted odds ratio [OR]: .43, 95% confidence interval [CI]: .19–.96) and Indian respondents were less likely than White respondents to know that losing weight usually decreases blood pressure

Table 1. Demographic characteristics of survey respondents, *n* (%)

Variable	Chinese, *N*=301	Indian, *N*=248	White, *N*=254	*P*
Male	118 (39.2)	118 (47.6)	103 (40.6)	.114
Age				
18–34	98 (32.6)	77 (31.0)	118 (47.0)	.002
35–64	181 (60.1)	147 (59.3)	117 (46.0)	
≥65	22 (7.3)	24 (9.7)	19 (7.0)	
Household income[a]				
<30,000	37 (12.3)	0 (0.00)	36 (14.2)	<.001
30,001–50,000	36 (12.0)	42 (17.0)	32 (12.6)	
50,001–70,000	27 (9.0)	28 (11.3)	39 (15.4)	
≥70,001	111 (36.8)	105 (42.3)	120 (47.2)	
Missing data	90 (29.9)	73 (29.4)	27 (10.6)	
Marital status				
Married or common law	235 (78.0)	147 (59.0)	150 (59.0)	<.001
Never married or divorced	66 (22.0)	101 (41.0)	104 (41.0)	
Education				
Did not complete high school	18 (6.0)	9 (3.6)	20 (7.9)	.251
Completed high school	63 (20.9)	47 (19.0)	43 (16.9)	
Completed college/university	220 (73.1)	192 (77.4)	191 (75.2)	
Immigration status				
Born in Canada	42 (14.0)	22 (8.9)	210 (82.7)	<.001
Immigrant	259 (86.0)	226 (91.1)	44 (17.3)	
Immigrant's length of stay in Canada[b]				
<5 years	55 (22.5)	61 (27.7)	11 (27.5)	<001
5–9 years	50 (20.4)	46 (20.9)	2 (5.0)	
≥10 years	140 (57.1)	113 (51.4)	27 (67.5)	
English as primary language spoken at home	54 (17.9)	45 (18.1)	245 (96.5)	<.001
Self-reported health status				
Fair or poor overall physical health	55 (18.3)	35 (14.1)	28 (11.0)	.001
Fair or poor overall mental & emotional health	43 (14.3)	23 (9.3)	14 (5.5)	
Self-reported hypertensive, yes	32 (10.6)	39 (15.7)	36 (14.1)	.193

[a] Income % calculated among individuals with non-missing data; 190 individuals did not provide information, resulting in *n*=211 Chinese, *n*=175 Indian and *n*=227 White with income information.

[b] Immigrants length of stay in Canada % calculated among individuals with non-missing data; 24 individuals did not provide information resulting in *n*=245 Chinese, *n*=220 Indian and *n*=40 White with length of stay information.

(OR: .38, 95% CI: .21–.68). Chinese respondents who answered incorrectly about the relationship between hypertension and heart attacks were more likely to be in the group: aged 18–34 or ≥65; whose length of stay in Canada was 5–9 years; or who had income <$30,000 or in the $50,000 to 70,000 range (Table 3). Compared with Indian respondents, Chinese respondents had significantly lower level of hypertension knowledge on ''high blood pressure can cause heart attacks'' (OR: .44, 95% CI: .23–.84), and higher knowledge level on ''losing weight usually makes blood pressure go down'' (OR: 1.63, 95% CI: 1.10–2.44) (Table 2).

DISCUSSION

To the best of our knowledge, this is the first report of hypertension knowledge levels among Chinese, Indian, and White Canadians. Although overall knowledge level was similar across these three populations, variation was significant in certain content areas. Chinese Canadians were less aware of the relationship between hypertension and heart attacks and Indian Canadians were less aware of the relationship between hypertension and weight. Surprisingly, approximately only half of the respondents knew the impact of hypertension on the kidneys, the chronic nature of hypertension and the need of taking medication to control blood pressure. These findings clearly indicate that hypertension education should be further promoted in ethnic populations, aimed at the identified knowledge gaps by socio-demographic characteristics.

Our survey demonstrated Chinese, Indian and White Canadians had similar levels of hypertension knowledge. This equality may be related to availability of multiple language health information sources (eg, internet with multiple languages, ethnic language TV channels, magazine and newspaper and interpretation services to patients and family members). However, we found

Table 2. Correct responses to hypertension knowledge questions, *n* (%)

Hypertension Knowledge Item	Crude Analysis			Adjusted Odds Ratio[b]		
	Chinese *N*=301	Indian *N*=248	White *N*=254	Chinese vs White OR (95% CI)	Indian vs White OR (95% CI)	Chinese vs Indian OR (95% CI)
If someone's blood pressure is 120/80, it is normal.	191 (64.0)	154 (62.1)	146 (58.0)	.90 (.55, 1.47)	.83 (.49, 1.40)	1.15 (.76, 1.72)
If someone's blood pressure is 160/100, it is hypertension.	227 (75.4)	200 (81.0)	179 (69.3)	1.08 (.63, 1.82)	1.34 (.75, 2.41)	.82 (.51, 1.30)
High blood pressure can cause strokes.	296 (89.4)	225 (91.0)	235 (92.5)	.82 (.37, 1.84)	.97 (.40, 2.36)	.99 (.52, 1.88)
High blood pressure can cause heart attacks.	256 (85.0)	230 (93.0)	238 (93.7)	.43 (.19, .96)	1.00 (.40, 2.52)	.44 (.23, .84)
High blood pressure can cause kidney problems.	146 (48.5)	130 (52.4)	150 (59.0)	.90 (.57, 1.44)	1.04 (.63, 1.71)	.84 (.57, 1.23)
High blood pressure can kill you.	278 (92.4)	218 (88.0)	238 (93.7)	1.00 (.41, 2.43)	.60 (.24, 1.50)	1.84 (.95, 3.57)
Hypertension usually lasts for the rest of the life.	171 (57.0)	129 (52.0)	130 (51.1)	.87 (.54, 1.41)	.61 (.34, 1.02)	1.43 (.97, 2.12)
Losing weight usually makes blood pressure go down.	195 (65.0)	138 (56.0)	208 (82.0)	.61 (.35, 1.07)	.38 (.21, .68)	1.63 (1.10, 2.44)
Eating less salt usually makes blood pressure go down.	259 (86.0)	208 (84.0)	204 (80.3)	1.72 (.99, 3.22)	1.43 (.74, 2.78)	1.03 (.61, 1.75)
People with high blood pressure should take their medicines everyday.	184 (61.1)	132 (53.2)	123 (48.4)	1.54 (.95, 2.47)	1.15 (.69, 1.91)	1.45 (.97, 2.15)
				Coefficient[b] (95% CI)	Coefficient[b] (95% CI)	Coefficient[b] (95% CI)
Total average score[a]	7.23	7.11	7.28	−.07 (−.49,.35)	−.24 (−.69, .21)	−.20 (−.15, .55)

[a] 1 score per question, the maximum of 10, linear regression was used to calculate the risk adjusted coefficient.
[b] Adjusted for age, sex, immigration status, hypertension status, annual household income, marital status, education, overall physical and mental health.

that immigrants had lower levels of knowledge regarding the long-term consequences of hypertension and relation between hypertension and weight compared to those born in Canada. Indian immigrants tended to have better knowledge with longer stay in Canada for the correct answer to weight and hypertension, correct response rate: 61.4% for length of stay in Canada ≥10 years vs 39.3% for < 5 years. Those with a longer length of stay in Canada may be more familiar with the Canadian health care system and more adept at Canadian culture and linguistic acculturation than new immigrants.

Chinese Canadians were less aware of the relationship between hypertension and heart attacks and Indian Canadians were less aware of the relationship between hypertension and weight.

Our study showed that Chinese and Indian Canadians reported lower levels of basic knowledge compared to White Canadians on preventive measures of health (ie, losing weight usually makes blood pressure go down) and health outcomes relating to high blood pressure (ie, high blood pressure can cause heart attacks). Our findings are in accordance with previous literature indicating prevention and control are areas of poor understanding among ethnic populations and immigrants.[9,10,26–28] Liu et al analyzed the Canadian Community Health Survey and reported Chinese and South Asian Canadians were 1.6 times more likely to be physically inactive compared with White Canadians after adjustment for sociodemographic characteristics.[9] High prevalence of physical inactivity for Chinese has also been reported in the United States and China.[29,30] Another study reported that one-third of patients with inadequate literacy did not know that losing weight lowers blood pressure, and canned vegetables are high in salt, and 60% did not know that exercise lowers blood pressure.[11]

Our study indicated that Chinese and Indian Canadians had relatively lower levels of knowledge regarding the need for antihypertensive medications to control blood pressure than White Canadians, although the Canadian Hypertension Education Program has been promoting antihypertensive medication use and adherence.[31] The level of knowledge is related to health care system utilization that is determined by personal beliefs, health knowledge, and awareness of the health care system.[32] Furthermore, hypertension is an asymptomatic condition that may create little concern as people tend to underestimate their own risk of hypertension and are often wary of taking medication.[32–34] Therefore, there is still a great need for

Table 3. Respondents with incorrect responses to two specific hypertension knowledge questions, *n* (%)

Hypertension Knowledge Items	High Blood Pressure Can Cause Heart Attacks			Losing Weight Usually Makes Blood Pressure Go Down		
	Chinese	Indian	White	Chinese	Indian	White
Age						
18–34	17 (17.3)	9 (11.7)	8 (6.7)	31 (10.2)	38 (15.3)	20 (16.9)
35–64	24 (13.3)	6 (4.1)	7 (6.0)	61 (20.3)	61 (24.6)	22 (18.8)
≥65	4 (18.1)	3 (12.5)	1 (5.3)	14 (4.7)	11 (4.4)	4 (21.1)
Sex						
Male	16 (13.6)	7 (5.9)	8 (7.7)	35 (29.7)	41 (34.7)	10 (9.7)
Female	29 (15.8)	11 (8.5)	8 (5.3)	71 (38.8)	69 (53.0)	36 (23.8)
Immigrant status						
Born in Canada	5 (11.9)	1 (4.5)	15 (7.1)	9 (21.4)	3 (13.6)	38 (18.1)
Immigrated to Canada	40 (15.4)	17 (7.5)	1 (2.3)	97 (37.5)	107 (47.3)	8 (18.2)
Length of stay[a]						
<5 years	5 (9.1)	4 (6.6)	0	22 (40.0)	37 (60.7)	3 (27.3)
5–9 years	10 (20.0)	5 (10.9)	0	17 (34.0)	22 (47.8)	0
≥10 years	22 (15.7)	8 (7.1)	1 (3.7)	52 (37.1)	44 (38.9)	5 (18.5)
Has Hypertension						
Yes	4 (12.5)	1 (2.6)	3 (8.3)	8 (25.0)	18 (46.2)	6 (16.7)
No	41 (15.2)	17 (8.1)	13 (6.0)	98 (36.4)	92 (44.0)	40 (18.3)
Annual household income[b]						
<$30,000	7 (18.9)	0	2 (5.6)	19 (51.4)	0	5 (13.9)
$30,001–$50,000	2 (5.6)	6 (14.3)	5 (15.6)	15 (41.7)	26 (61.9)	7 (21.9)
$50,001–$70,000	6 (22.2)	3 (10.7)	2 (5.1)	10 (37.0)	12 (42.9)	14 (35.9)
>$70,001	16 (14.4)	4 (3.8)	7 (5.8)	29 (26.1)	33 (31.4)	14 (11.7)
Language English as primary	4 (7.4)	2 (4.4)	15 (6.1)	15 (25.9)	11 (24.4)	42 (17.1)
Education						
<Senior high school	6 (33.3)	3 (33.3)	2 (10.0)	11 (61.1)	8 (88.9)	5 (25.0)
Senior high school	8 (12.7)	3 (6.4)	2 (4.7)	33 (52.4)	24 (51.0)	10 (23.3)
Technical college	1 (2.2)	2 (4.7)	4 (6.2)	16 (35.6)	21 (48.8)	12 (18.5)
University/secondary	30 (17.1)	10 (6.7)	8 (6.3)	46 (26.3)	57 (38.3)	19 (15.1)

[a] Immigrants length of stay in Canada % calculated among individuals with non-missing data; 24 individuals did not provide information resulting in $n=245$ Chinese, $n=220$ Indian and $n=40$ White with length of stay information.

[b] Income % calculated among individuals with non-missing data; 190 individuals did not provide information, resulting in $n=211$ Chinese, $n=175$ Indian and $n=227$ White with income information.

promoting antihypertensive medication use.

Our findings are important in the context of clinical practice and identifying areas for health promotion and education targeting ethnic populations. While educational tools and clinical guidelines are important, they are not useful if the target audience is not accessing the proper information at the right time. Healthy lifestyle behaviors need to be established over time and unhealthy behaviors are often difficult to break as they are ingrained within the surrounding home environments. It is likely many still remain at risk for developing hypertension due to unhealthy lifestyles, particularly physical inactivity.

We acknowledge that this study has several limitations. First, we missed residents whose telephone numbers were not listed in the telephone directory, whose surnames were not included in the surname lists that we used to form Chinese and Indian samples, and who could not speak English, Cantonese, Mandarin, Hindi, Punjabi or Urdu. Second, our study was conducted in the city of Calgary, Alberta with about 1.1 million populations. Most immigrants in Canada live in the metropolitan areas such as Toronto, Vancouver and Montreal.[35] Calgary is the fourth largest destination of immigrants in the last few years. We found that the hypertension knowledge is related to length of stay in Canada. Calgary has a higher proportion of recent immigrants than other cities. In our analysis, we adjusted for this variable and believe that our study findings are highly likely to be generalizable to other Canadian areas. Generalizing our findings to other countries should be done with caution. Third, approximately 10% of White respondents and 30% of Chinese and Indian respondents did not provide household income data. The missing data suggests a cultural sensitivity around questions related to income. In our sample, between 37% and 47% of the respondents reported having an annual household income ≥$70,001 and more than 73%

had attended a post-secondary institute. This is similar to Statistics Canada data,[36] which reports the median annual income for Calgary families in 2008 was $91,570.

In conclusion, knowledge gaps surrounding methods of prevention (eg, healthy lifestyle behaviors), long-term consequences of high blood pressure (eg, heart attack, stroke), and control of hypertension (eg, medication guidelines) are important areas for educational programs and public health policy to target. Our study found Chinese, Indian and White Canadians had similar and relatively high level of hypertension knowledge but varied by hypertension content. Females, recent immigrants and Chinese seniors were identified as sub-groups who should be targeted for hypertension knowledge promotion.

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