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A COMPARISON OF PHYSICAL ACTIVITY ENVIRONMENTS BETWEEN SOUTH ASIANS AND WHITE CAUCASIANS WITH CORONARY HEART DISEASE

South Asians (SA) are predisposed to developing premature coronary heart disease (CHD), partly due to the early onset of classic risk factors, including physical inactivity. The nature of physical activity (PA) environments in South Asians in Canada remains unknown. Our objective was to examine differences in PA environments for South Asian vs White Caucasian (WC) CHD patients. In a cross-sectional study, 2657 hospitalized CHD patients in Ontario completed The Perceived Environments Related to Physical Activity Questionnaire to assess their home and neighborhood environment, perceived neighborhood safety and availability of recreational facilities. Patients self-reporting their ethnocultural background as WC (N=1301, 48.6%) or SA (N=171, 6.4%) were included in this study. South Asians were significantly younger, had lower body mass index, higher levels of education, lower income, were less likely to smoke and reside rurally, and were more likely to be married, have diabetes mellitus and have experienced prior myocardial infarction (MI) than WC patients. South Asians also had lower availability of home exercise equipment and perceived convenience of local PA facilities, but better and safer neighborhood environments than WC patients. Multivariate analyses revealed that SA ethnocultural background remained significantly related to reduced availability of home exercise equipment and fewer convenient local PA facilities. Since physical inactivity is an important CHD risk factor, and SA ethnocultural background is associated with high CHD risk, this may represent a novel target for risk reduction. Thus, further research is required to optimize SA awareness of the need for PA, and access to equipment and facilities. (*Ethn Dis.* 2010;20:390–395)

Key Words: Cardiovascular/Coronary Disease, Ethnology, South Asian, Exercise, Motor Activity, CV Risk Factors

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INTRODUCTION

Coronary heart disease (CHD) is a leading cause of morbidity and mortality worldwide.¹ Although rates of CHD mortality are declining overall due to early detection strategies, advanced medical treatment, and risk factor management,¹ this decline is not as evident for certain vulnerable populations such as visible minorities.^{2–5} People of South Asian (SA) origin comprise one fifth of the global population, and are the largest and fastest growing minority group in Canada.⁶ South Asians have a higher prevalence of CHD when compared to other ethnic groups due to a combination of both genetic and environmental factors.⁷ They are also susceptible to developing premature CHD, partly due to the early onset of classic risk factors⁶ including abdominal obesity and insulin resistance.⁸

Physical activity (PA) is a leading modifiable risk factor for CHD, and has been shown to be beneficial in cardiac patients to reduce cardiovascular (CV) risk.⁹ The INTERHEART study showed that most myocardial infarction (MI) risk relates to modifiable lifestyle risk factors, including physical inactiv-

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ity, across all ethnic groups worldwide.¹⁰ Studies have shown, however, that PA levels in SA populations are lower than those of the general population,¹¹ and that a sedentary lifestyle may therefore be an especially important risk factor in SA.⁷ Environmental barriers, including perceived outdoor safety, neighborhood structure, and the built environment (ie, man-made surroundings that provide the setting for human activity), are determinants of PA participation, especially among immigrants to Canada and the United States.^{2,12} A neighborhood environment has also been shown to be significantly associated with CV risk factors, such as smoking, physical inactivity, and obesity.¹³ Whether or not SA in Canada reside in environments conducive to physical activity remains unknown. The objective of this study was to examine ethnic differences in environmental components of PA activity (safety, home, neighborhood and convenient facilities) for SA versus White Caucasian (WC) patients with CHD.

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METHODS

Design and Procedure

This study represents a cross-sectional quantitative component of a larger prospective study comparing the effectiveness of cardiac rehabilitation (CR) referral strategies on enrolment (CRCARE study¹⁴). Ethics approval was obtained from all participating institutions, which included 11 acute care hospitals in Ontario, Canada. Inpatients hospitalized with CHD (January 2006–November 2008) at each participating center were approached when medically stable for informed consent by a site recruiter. Medical chart data were extracted, including nature of cardiac event or procedure, comorbid conditions, and risk factors. Participants were then provided with a self-report survey, in English, French, Hindi, Urdu or Punjabi, to complete.

Participants

Inclusion criteria for the larger CRCARE study were a confirmed acute coronary syndrome (ACS) diagnosis or coronary revascularization procedure, eligibility for CR based on guidelines,¹⁵ and proficiency in English, French, Hindi, Urdu, or Punjabi (languages into which the survey was translated). A diagnosis of ACS was confirmed based on documented clinical history, diagnostic ECG changes (ie, new Q waves, and/or ST-T segment changes), and/or troponin levels above the 99th percentile of normal. Exclusion criteria were: patients who had life-threatening comorbidities, participation in CR within the past 2 years, and significant orthopedic, neuromuscular, visual, cognitive or non-dysphoric psychiatric conditions that would preclude CR participation.

Measures

We collected sociodemographic and clinical data through both chart extraction and self-report. Sociodemographic characteristics extracted from patients'

medical charts included age, sex, and body mass index (BMI). Clinical data extracted from medical charts included the presence of diabetes mellitus (yes or no), hyperlipidemia (defined as total cholesterol >5.18 mmol/L, LDL >2.59 mmol/L, HDL <1.04 mmol/L, triglyceride levels >1.70 mmol/L or the use of lipid-lowering medications), hypertension (defined as BP >140/90 mm Hg or the use of antihypertensive medications) and whether or not patients experienced previous MI, percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG). Self-reported sociodemographic variables included smoking history (yes or no), education (above or below high school completion), marital status (married or not married; single, divorced, widowed), income (above or below \$50,000 CAD), rurality as self-reported drive time to the closest hospital >30 minutes (yes or no) and ethnocultural background. Ethnocultural background was categorized based on Statistics Canada as North Americans (eg, Canadian, American), French (not French-Canadian), British Isles (eg, British, Scottish, Irish), Western Europeans (eg, Austrian, Belgian, German, Swiss), Northern Europeans (eg, Danish, Finnish) and South Asians (eg, East Indian, Punjabi, Pakistani).¹⁶

The Perceived Environments Related to Physical Activity Questionnaire was included in the survey to assess 4 environmental components of PA: patients' home environment (ie, availability of equipment such as a treadmill), neighborhood environment (ie, sidewalks, enjoyable scenery), perceived neighborhood safety, and recreation facilities (ie, parks, trails, gyms) within a 5-minute drive from their home or workplace.¹⁷ The home environment section consisted of 15 items, the neighborhood environment consisted of 8 items, and the convenience of facilities section listed 18 items. The total score for these 3 subscales was computed by summing the affirmative

responses. Finally, neighborhood safety was rated on a five-point Likert scale (1 = very unsafe, 5 = very safe). Higher scores denoted more positive PA environments on all subscales. Test-retest reliabilities were .89 for the home equipment scale, .68 for the neighborhood scale, and .80 for the convenient facilities scale.¹⁷

Statistical Analysis

SPSS Version 16.0 was used for data analyses.¹⁸ Sociodemographic variables with more than two response options were dichotomized using a median split where possible. Using the forced-choice self-report ethnocultural background variable on the survey, a new variable was created selecting patients into WC (ie, North American, French, British Isles, and Western and Northern European) or SA. Only patients who reported their ethnocultural background as SA or WC were included for analyses. Differences between the SA and WC cohort and CRCARE participants on sociodemographic and clinical characteristics were tested by Pearson's chi-square and an independent samples *t*-test as appropriate. Independent sample *t*-test was then used to test for significant differences in PA environment subscale scores by ethnocultural background. Multivariate analyses were used to account for sociodemographic and clinical differences between the WC and SA participants on each PA environment subscale.

RESULTS

Respondent Characteristics

Overall, 2657 patients completed a survey for the larger CRCARE study. For this sub-study, however, only patients who self-reported their ethnocultural background as WC (*N*=1301, 48.6%) or SA (*N*=171, 6.4%) were included for analyses (Table 1). The overall CRCARE cohort was older, less likely to smoke, had a higher prevalence

Table 1. South Asian, White Caucasian and CRCARE sociodemographic and clinical characteristics

Characteristic	South Asian N=171	White Caucasian N=1301	P	CRCARE N=2657
Sociodemographic				
Age, mean±SD	61.7 ± 11.4	64.4 ± 11.2	<.005	65.01 ± 11.25
Sex, % (n) female	21.6 (37)	37.1 (352)	ns	27.2 (722)
Body mass index, mean±SD	25.9 ± 4.6	28.8 ± 5.8	<.001	28.36 ± 5.60
Marital status % (n) married	84.6 (143)	71.6 (918)	<.01	73.4 (1925)
Smoking status, % (n) yes	10.2 (13)	19.0 (223)	<.001	8.1 (205)
Education, % (n) <high school	17.6 (29)	27.9 (356)	<.01	27.3 (703)
Income, % (n) >\$50000	30.0 (42)	49.5 (532)	<.001	47.1 (990)
Rurality, % (n) yes	5.8 (10)	14.7 (191)	<.05	12.3 (327)
Clinical, % (n) yes				
Diabetes mellitus	54 (81)	32.9 (392)	<.001	35.2 (840)
Hyperlipidemia	81.5 (119)	80.2 (864)	ns	80.9 (1800)
Hypertension	69.1 (103)	71.5 (856)	ns	67.2 (1785)
Prior myocardial infarction	39.4 (67)	29.3 (378)	<.01	29.6 (777)
Prior coronary artery bypass grafting	31.8 (54)	35.7 (459)	ns	36.9 (969)
Prior percutaneous coronary intervention	36.4 (62)	33.7 (434)	ns	32.8 (861)

CRCARE=The Cardiac Rehabilitation Care Continuity through Automatic Referral Evaluation Study.
 Note: Percentages are based on number of valid responses per item, not percentage of total group.

of diabetes than WC but not SA, more likely to have prior CABG and less likely to have hypertension and prior PCI than our cohort. With regard to ethnocultural differences in sociodemographic characteristics, SA patients were significantly younger, had lower family incomes and had a lower BMI than WC patients. SA patients were less likely to smoke, more likely to have higher education levels, more likely to be married, and were less likely to reside in a rural setting than WC patients. With regard to clinical characteristics (Table 1), SA patients were more likely to have diabetes and prior MI than WC patients. Other characteristics were similar between ethnocultural groups.

Ethnocultural Differences in Environmental Components of Physical Activity

Mean perceptions of environmental components of PA are shown in Table 2. South Asians reported significantly lower availability of home equipment, lower perceived convenience of PA facilities, but neighborhood environments were found to be more conducive to PA and were perceived as safer when compared to WC.

After controlling for the 9 socio-demographic and clinical characteristics shown to distinguish between South Asians and White Caucasians in Table 1 (age, BMI, marital status, smoking status, education, income, rurality, dia-

betes and prior MI), multivariate analyses revealed that SA ethnocultural background remained related to both poorer home PA environment and convenience of PA facilities (F=42.875, P<.001 and F=20.446, P<.001; Table 3). The effect of ethnocultural background on neighborhood environment and safety did not remain significant after adjustment. The models revealed that observed power was sufficient (>.80) for these analyses.

DISCUSSION

Environmental barriers, including safety, neighborhood and other aspects

Table 2. Unadjusted mean South Asian (SA) vs White Caucasian (WC) physical activity environment scores

	SA N=171	WC N=1301	P	CRCARE N=2657
Home environment*	2.25±2.04	3.20±2.50	<.001	2.95±2.40
Neighborhood environment†	6.25±1.17	5.91±1.39	.004	6.02±1.33
Convenient facilities††	3.94±4.39	5.88±4.87	<.001	5.54±4.85
Safety§	4.66±0.67	4.47±1.11	.035	4.51±1.05

CRCARE=The Cardiac Rehabilitation Care Continuity through Automatic Referral Evaluation Study.

* Scored out of a possible 15.

† Scored out of a possible 8.

†† Scored out of a possible 18.

§ Scored out of maximum of 5.

Table 3. Multivariate F-test results of South Asian vs White Caucasian physical activity environment subscales

	Home Environment*		Neighborhood Environment†		Convenient Facilities††		Safety‡	
	F	P	F	P	F	P	F	P
Ethnocultural background	42.875	.000	3.193	.075	20.446	.000	.749	.387
Age	72.981	.000	3.739	.053	35.946	.000	6.370	.012
Body mass index	14.059	.000	.095	.758	3.930	.048	.000	.985
Marital status	19.451	.000	.684	.408	.927	.336	.176	.675
Smoking	12.854	.000	1.548	.214	1.199	.274	4.191	.041
Education	.995	.319	10.214	.001	13.974	.000	.133	.716
Income	31.759	.000	15.763	.000	38.256	.000	9.997	.002
Rurality	4.746	.030	15.686	.000	4.531	.034	.670	.413
Prior myocardial infarction	.168	.682	.050	.824	.079	.779	.181	.671
Diabetes mellitus	4.146	.042	.164	.686	2.261	.133	.012	.914
Corrected model	26.258	.000	6.623	.000	19.193	.000	3.271	.000

* Scored out of a possible 15.

† Scored out of a possible 8.

†† Scored out of a possible 18.

‡ Scored out of maximum of 5.

of the built environment, are determinants of PA participation. Classic risk factors accrue earlier in SA, especially diabetes/insulin resistance and visceral adiposity.⁷ Thus, risk reduction behaviors may be particularly beneficial for SA patients, yet they report lower PA levels than other ethnic groups.¹¹ Our study was novel in demonstrating that PA environments differ between SA and WC patients with CHD. South Asians were less likely to have home exercise equipment and reported fewer convenient PA facilities in their neighborhoods compared to White Caucasians. After adjustment, there were no ethnocultural differences in local neighborhood PA environment and safety between SA and WC patients.

Sociodemographic and clinical differences between SA and WC CHD patients were observed. In general, the profile of our SA population is similar

to that observed in other studies. However, SA patients were found to have a lower BMI than WC patients. The use of BMI rather than waist circumference may not be appropriate. Moreover, BMI may not provide a consistent reflection of adiposity and fat distribution across ethnic groups.¹⁹

One of the potential reasons for the difference in PA environments between SA and WC groups may be that living in Canada as an immigrant constitutes a barrier to PA.^{8,20} Migration, especially immigration of SA to Canada, can involve a shift towards a more sedentary lifestyle, living in a colder environment, and experiencing language barriers and cultural differences. Each of these factors can act as a barrier to PA. A recent study on culturally and linguistically-diverse migrants illustrated that these individuals have an increased risk of hypertension, diabetes mellitus, overweight/obesity and cardiovascular disease compared to others in the same environment.² Despite their increased risk, they are less likely to be proactive in accessing healthcare or undertaking preventative measures, including participating in PA, to ensure optimal health outcomes.

Potential explanations for reduced availability of home PA equipment include cultural differences in perceptions of exercise, lower heart disease

awareness and lack of guidance from healthcare professionals. It is important to note that the disparity observed between SA and WC environments remained significant, independent of sociodemographic characteristics, including socioeconomic status. With regard to cultural differences in perceptions of exercise, Sriskantharajah and Kai showed that SA emphasized the cultural importance of being active day to day, rather than the western concept of organized exercise.²¹ Another postulation for less availability of home exercise equipment among SA lies with awareness of heart disease and its prevention, which has been shown to be lower among South Asians.^{22,23} Rankin and Bhopal interviewed SA men and women in the UK and found that their understanding of the risk factors, cause and prevention of CHD and diabetes was low, with 35% of respondents not understanding the meaning of the term heart disease.²⁴ More importantly, SA patients reported that specific guidance from health professionals and exercise equipment availability were lacking.²¹ South Asians have less awareness of the need for PA in the prevention and management of CHD and their cultural beliefs around exercise are different than those of White Caucasians.²¹ Lastly, most of

Our study was novel in demonstrating that PA environments differ between SA and WC patients with CHD.

the items included in the home environment score of the questionnaire were sports-related and since South Asians are less represented in Canadian sports,²⁵ this may be why they report less availability of home PA equipment.

Plausible explanations for SA reporting fewer convenient local PA facilities independent of socioeconomic status, education and rurality, may include cultural differences in perceptions of convenience and language barriers. For example, SA may consider convenient facilities for activities that are a part of their culture, including sports such as cricket, as an example. With regard to language, we hypothesize that most recreation centers in Ontario only offer services in English, which would not make them convenient or accessible for non-English speaking Canadians. Research on the convenience of local PA facilities is lacking and we believe this study is the first to examine convenient local PA facilities in South Asian CHD patients in Canada.

Implications

It is promising to note that the differences in PA environments identified are modifiable. The availability of home PA equipment has the potential to be increased among SA through public health promotion efforts, tailored to the sensitivities of immigration and culture. Moreover, with a greater understanding of why PA facilities are perceived as less convenient, changes to local facilities could be put into place, such as culturally sensitive programs and activities, and staff members of the same ethnic origin. We recommend that community recreation facilities undertake a needs assessment of their community's South Asian members in order to offer services that meet the needs of the South Asian residents.

Limitations

Limitations of this study include issues related to the sample, survey validation, self-report bias, and general-

izability. Unequal SA and WC sample sizes and unmatched WC and SA cohorts raise the potential that differences in power or the nature of the participants may explain the findings. However, we did control for socio-demographic and clinical differences in the SA and WC cohorts, and we met the rule-of-thumb of 10 cases per variable. However, there could be unmeasured factors other than ethnocultural background which explain the differences in PA environments reported. Moreover, because this was a secondary analysis from a larger study, we did not have data on the background of SA including their primary language spoken, place of birth, and the age at which they migrated to Canada. Perhaps SA who lived in Canada for longer periods of time would have PA environments more similar to White Caucasians since they may be more likely to share similar perceptions about PA and heart disease. There may be differences among responses for South Asians who speak English as a second language and those who do not. In addition, South Asians within this study are from Ontario and may not be representative of South Asians in general. Future studies are needed that consider these factors to allow generalizability of the results.

With regard to the survey, although we translated our survey materials into Hindi, Urdu and Punjabi, the Perceived Environments Related to Physical Activity Questionnaire¹⁵ has not been validated in South Asian patients. Therefore, cultural factors may have biased our results. Moreover, PA environments were assessed via self-report. We cannot, therefore, rule out the effect of social desirability bias on the findings. Future research objectively assessing PA environments is needed.

CONCLUSION

Our study demonstrates that people of SA origin with CHD have environ-

ments that are less conducive to PA, specifically with regard to availability of home exercise equipment and convenient facilities. Since SA ethnocultural background is associated with premature CHD and physical inactivity is a key risk factor, more investigation is warranted regarding why South Asians have suboptimal PA environments. This may be due to reduced awareness, lack of guidance from health care professionals, or language, migration and cultural barriers. More research is necessary to understand and address the difference in PA environments in Canada's largest and fastest growing minority group.

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