

Association of Duration of Residence, Obesity and Diet to Current Self-Reported Non-Communicable Diseases among Teachers in Korea

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Abstract: Foreign-population has rapidly increased in the Republic of Korea and little is known about the effect acculturation on the risk non-communicable diseases among these new comers. A cross-sectional survey was carried out with 391 participants. Using logistic regression, the research questions were whether the acculturation process measured by duration of residence in Korea might be linked to a higher obesity, or whether Korean diet favors obesity and consequently the risk of non-communicable diseases. Hypertension, diabetes, cancer and the body mass index were significantly associated with duration of residence in Korea. Foreign-born teachers who resided in Korea for >6 years had greater odds of reporting hypertension (OR= 2.07), heart disease (OR= 6.58), and diabetes (OR=8.66) compared to those who resided in Korea <1 year or 1 to 5 years. Foreign-born teachers between 41 and 50 years old also had greater odds of reporting hypertension (OR= 3.29), heart disease (OR= 4.39), diabetes (OR=11.09), cancer (OR=38.7) and being overweight/obese (OR=1.91) compared to those <30 years old. As for the gender, men had 2.3 greater odds (95% CI 1.26-4.20) of reporting hypertension and 1.89 greater odds (95% CI 1.26-2.83) of being overweight/obese compared to women. Finally, active smokers had 5.15 greater odds (95% CI 1.19-22.34) of reporting heart diseases than non-smokers and teachers with one of the parents with hypertension had 1.89 odds or reporting hypertension (95% CI 1.04-3.41). Eating typical food of Korea over 5 times a week was not associated with any non-communicable diseases nor contributed to increase BMI.

Keywords: Dietary Acculturation; Hypertension; Diabetes; Heart disease; cancer; Duration of residence; Body mass index.

I. INTRODUCTION

The Republic of Korea (Korea) has been composed of a single ethnic group and, until very recently, has had little or no experience with large-volume immigration [1]. It is reported that the number of Foreign-born population in Korea was more than 100,000 people in 2011 [2]. The Korean government has even recruited native English speakers, particularly Americans and Canadians, to teach English in public schools and universities [3]. As these Foreign-born populations continue to grow, they experience acculturation.

Acculturation is the process of adaptation to the traditions, values and practices of a host country [4-6]. Some reports have associated acculturation with non-communicable diseases (NCD) such as hypertension [7], heart diseases [8, 9], diabetes [8], and cancer [10, 11]. A non-communicable disease is a medical condition or disease that is by definition non-infectious and non-transmissible among people [12]. While a standard acculturation process is not fully agreed upon, researchers measures of acculturation have generally included place of birth (region of origin), age of migration, duration of residence, language use, language preference, and social interactions [4]. Researches on acculturation and health have mainly focused on the acculturation of Hispanic, European, and Asian immigrants in Western societies [3, 13]. With the

increase number of Foreign-born teachers in Korea, the research questions are whether the acculturation process measured by duration of residence in Korea might be linked to a higher obesity, or whether Korean diet favors obesity and consequently the risk of non-communicable diseases. The World Health Organization (WHO) reported that NCDs are the global leading cause of death and identified obesity as an important risk factor for NCDs [14].

Acculturation and non-communicable diseases:

Length of residency:

Research findings suggest that increasing length of stay in a new country, often used as a proxy for acculturation, may be associated with declines in health [15].

Hypothesis 1: Duration of residence in Korea will be positively correlated with being obese and consequently favors risk of non-communicable diseases

Obesity:

Obesity is an unhealthy condition resulting from excess weight [16]. Reports have associated obesity with hypertension [17], Heart diseases [18], Diabetes [19] and cancer [20]. The WHO has recommended classifications of bodyweight that include degrees of underweight and gradations of excess weight or overweight that are associated with increased risk of some non-communicable chronic diseases [21, 22]. The normal range for an adult BMI is 18.5–24.9; an adult with a BMI ranging from 25 to 29.9 is considered overweight whereas an adult with a BMI greater than or equal to 30 is considered obese [16].

Hypothesis 2: obesity will be positively correlated with the odds of reporting non-communicable diseases among foreign-born teachers in Korea

Dietary Acculturation:

Dietary acculturation refers to the process that occurs when members of a minority group adopt the eating patterns/food choices of their new environment [23]. Studies of acculturation and health show that the immigrant health advantage deteriorates over time, which may be attributed to diet [15]. Diet change has been studied as a component of acculturation associated with higher BM [24].

Hypothesis 3: Frequency of eating Korean food will be associated with good health and lower odds of reporting non-communicable diseases.

II. METHODS

Study population and sample:

A cross-sectional survey was carried out between August and December 2014 among foreign-born teachers in Korea. Posters about the study were placed in public coffee shops, universities and foreigners social groups. The criteria for inclusion were: foreign-born, age 18 and over and residing in Korea. Exclusion criteria included age under 18, participants residing outside of Korea, Koreans and pregnant women.

Demographic Variables:

Demographic variables included age, sex, education level (bachelor's degree or post-graduate), marital status and occupation. The outcome variables included four NCDs (hypertension, heart disease, diabetes and cancer) and common NCD risk factors (overweight/obese body mass index, cigarette smoking status and diet typical of Korea). The duration of residence in Korea was assessed by the question: "How long have you been living in Korea?" [25]. Responses were categorized as a three level variable (<1 year, 1-5 years, ≥ 6 years) [5]. Duration of residence has been found to be an objective indicator of acculturation, and has been routinely examined in studies of acculturation among immigrants [15, 16]. Self-reported NCD ascertained as previously published [7] by the question: "Has a doctor ever told you that you have?" Body mass index (BMI) was calculated based on the participant's self-reported weight and height as weight in kilograms divided by height in meters squared (kg/m^2). The normal range for an adult BMI is 18.5–24.9; an adult with a BMI ranging from 25 to 29.9 is considered overweight whereas an adult with a BMI greater than or equal to 30 is considered obese [16]. The dietary intake of typical food of Korea was estimated using a food frequency questionnaire

where participants were asked to report the frequency (how often) weekly. Cigarette smoking status was dichotomized into current smoker versus never smoker.

Human subjects research approval:

The study was conducted in accordance with the Declaration of Helsinki. The protocol was approved by the Institutional Review Board (IRB) of Keimyung University (IRB file number: 40525-201410-HR-71-02). Before the participants answered the questionnaire, they received information from the researcher about the survey, including its purpose, procedures, and confidentiality.

Statistical analysis:

Statistical analyses were conducted using IBM SPSS Statistics for Windows, Version 21.0 (Armonk, NY). Univariate analyses were used to generate descriptive statistics and the Chi-square test was employed to compare the distribution of demographic variables and self-reported NCD. Multivariate logistic regression analyses were performed to estimate the odds of each NCD risk factor in relation to the duration of residence in Korea. Based on the frequency distribution in the subpopulation, we dichotomized marital status into single or married, educational attainment into bachelor or post-graduate. All p values reported are for 2-tailed tests and a value of $p < 0.05$ was considered statistically significant. Reported odds ratios are based on the final logistic regression model.

III. RESULTS

The majority of the sample of the foreign-born teachers in Korea were females (57 %), average age at interview was 33.42, highly educated, single (59.3 %) and only 32.2 % resided in Korea for >6 years (Table 1). Hypertension (51 cases) was the most reported non-communicable disease, 49.4 % of the sample was overweight/obese and only 4.6 % of the participants reported to speak Korean very well.

Hypertension, diabetes, cancer and the body mass index were significantly associated with duration of residence in Korea (Table 2). Most non-communicable diseases; hypertension (24 out of 51), diabetes (6 out of 8), heart disease (4 out of 6) and cancer (4 out of 5) were self-reported after 6 years of residence in Korea. While no association was found between the dietary intake of typical food of Korea and the duration of residence in Korea, an increase of frequency of Korean food was observed.

The final multivariate logistic regression model (Table 3) suggests that foreign-born teachers who resided in Korea for >6 years had greater odds of reporting hypertension (OR= 2.07), heart disease (OR= 6.58), and diabetes (OR=8.66) compared to those who resided in Korea <1 year or 1 to 5 years (Table 3). Foreign-born teachers between 41 and 50 years old also had greater odds of reporting hypertension (OR= 3.29), heart disease (OR= 4.39), diabetes (OR=11.09), cancer (OR=38.7) and being overweight/obese (OR=1.91) compared to those <30 years old. As for the gender, men had 2.3 greater odds (95% CI 1.26-4.20) of reporting hypertension and 1.89 greater odds (95% CI 1.26-2.83) of being overweight/obese compared to women. Finally, active smokers had 5.15 greater odds (95% CI 1.19-22.34) of reporting heart diseases than non-smokers and teachers with one of the parents with hypertension had 1.89 odds of reporting hypertension (95% CI 1.04-3.41). Eating typical food of Korea over 5 times a week was not associated with any NCD nor contributed to weight gain.

Table I: Socio demographic Characteristics and Acculturation Variables of Participants

Characteristic	n (%)
Gender	
Female	223 (57%)
Male	168 (43%)
Age at interview (years)	
Mean (SD)	33.42 (8.63)
Range	21-68
Education	
Bachelor	209 (53.5%)
Post-graduate	182 (46.5%)
Marital status	
Single	232 (59.3%)
Married	159 (40.7%)

Hypertension	
Yes	51 (13.0%)
No	340 (87.0%)
Diabetes	
Yes	5 (1.3%)
No	386 (98.7%)
Heart disease	
Yes	8 (2%)
No	323 (98%)
Cancer	
Yes	6 (1.5%)
No	385 (98.5%)
Cigarette smoking	
Yes	43 (11.0%)
No	348 (89.0%)
Body mass index	
Underweight	6 (1.5%)
Normal	192 (49.1%)
Overweight/obese	193 (49.4%)
Korean language Proficiency	
Not at all/not well	259 (66.2%)
Well	114 (29.2%)
Very well	18 (4.6%)
Duration of Residence in Korea	
<1	61 (15.6%)
1-5 years	204 (52.2%)
>6 years	126 (32.2%)

Column percents shown

Table II: Unadjusted Bivariate Associations of Ncd Risk Factors With Length of Stay among Foreign-Born Populations in Korea

Outcome	n (%)	Duration of residence in Korea			p value
		<1 year	1-5 years	>6 years	
NCD					
Hypertension	51 (13.0%)	6 (9.8%)	21 (10.3%)	24 (19.0%)	0.05
Diabetes	8 (2.0%)	0 (0.0%)	2 (1.0%)	6 (4.8%)	0.03
Heart disease	6 (1.5%)	0 (0.0%)	2 (1.0%)	4 (3.2%)	0.17
Cancer	5 (1.3%)	0 (0.0%)	1 (0.4%)	4 (3.3%)	0.07
BMI					
Underweight	6 (1.5%)	4 (6.6%)	2 (1.0%)	0 (0.0%)	
Normal	192 (49.1%)	30 (49.2%)	106 (52.0%)	56 (44.4%)	0.005
Overweight/obese	193 (49.4%)	27 (44.3%)	96 (47.1%)	70 (55.6%)	
Korean food					
Never	13 (3.8%)	2 (3.6%)	5 (2.8%)	6 (5.2%)	
1-2	94 (27.2%)	15 (23.3%)	44 (25%)	35 (30.4%)	0.86
3-4	100 (28.9%)	17 (30.9%)	52 (29.5%)	31 (27%)	
>5	139 (40.2%)	21 (38.2%)	75 (42.6%)	43 (37.4%)	

p value obtained from Chi-square analyses

Table III: Multivariate Logistic Regression of NCD Risk Factors among Foreign-Born Teachers in Korea, or (95% CI)

	Hypertensio n	Heart disease	Diabetes	Cancer	Overweight/ obese	5 times/week Korean food
Duration of residence						
<1 year	Reference	Reference	Reference	Reference	Reference	Reference
1-5 years	0.60 (0.33-1.09)	0.29 (0.06-1.49)	0.23 (0.03-2.04)	0.45 (0.08-2.50)	0.83 (0.55-1.23)	1.23 (0.80-1.89)
>6 years	2.07 (1.14-3.77)	6.58 (1.31-33.05)	8.66 (0.96-78.3)	4.3 (0.78-2.86)*	1.44 (0.94-2.21)*	0.84 (0.53-1.33)
Age at interview						
<30 years old	Reference	Reference	Reference	Reference	Reference	Reference
31-40 years old	0.64 (0.33-1.29)	0.59 (0.12-2.97)	1.20 (0.20-7.26)	x	0.99 (0.66-1.51)	0.79 (0.50-1.23)
41-50 years old	3.29 (1.63-6.69)	4.39 (1.02-19.0)	11.09 (1.80-68.12)	38.7(4.42-339)	1.91 (1.03-3.55)	1.22 (0.65-2.30)
>50 years old	2.2 (0.77-6.29)	6.39 (1.2-33.77)	x	x	2.70 (1.02-7.1)	0.38 (0.12-1.17)*
Sex, male	2.3 (1.26-4.20)	1.34 (0.33-5.42)	2.00 (0.33-12.16)	x	1.89 (1.26-2.83)	1.23 (0.79-1.89)
Married	1.23 (0.68-2.23)	2.48 (0.58-10.52)	2.21 (0.37-13.39)	2.97 (0.54-16.40)	1.57 (1.04-2.35)	0.99 (0.65-1.54)
Overweight/ obese	2.80 (1.48-5.30)	1.73 (0.41-7.34)	x	x	x	0.92 (0.60-1.42)
5 times/week Korean food	0.91 (0.47-1.76)	x	1.5 (0.21-10.75)	0.29 (0.03-2.53)	0.92 (0.60-1.42)	x
Smoker	1.16 (0.43-3.09)	5.15 (1.19-22.34)	5.60 (0.91-34.56)	x	1.08 (0.57-2.04)	1.08 (0.57-2.04)
Parental	1.89 (1.04-3.41)	4.7 (0.95-23.91)*	6.09 (0.67-55.02)	3.19 (0.37-27.59)	x	x

OR adjusted odds ratio, CI confidence interval, Bold, $p < 0.05$, * $p < 0.10$

IV. DISCUSSION

The purpose of this study was to determine the possible association between acculturation and, Obesity to current self-reported non-communicable diseases among teachers in Korea. This is the first study to examine this association specific to foreign-born teachers in Korea. The study has several findings. Acculturation (as measured by duration of residence in Korea) was generally associated with elevated odds or reporting hypertension, heart disease and diabetes. While reported cancer cases were few, 4 out of the 5 cases were reported after residing in Korea for over 6 years. Our results indicate that longer duration of residence in Korea may play an important role in developing non-communicable diseases. These results are concordant with those of prior studies, which associate duration of residence with non-communicable diseases [7, 26].

Age was an important predictor of non-communicable diseases. We found higher odds or reporting hypertension, heart disease, diabetes and cancer among foreign-born teachers that were between 41 and 50 years old at the time of the interview compared to those younger than 40 years old. While age is associated with chronic degenerative diseases [27], acculturation may also bring changes in risk factors for NCDs. Such changes may include health-related behaviour such dietary changes, obesity and smoking. Being overweight or obese was associated with hypertension among foreign-born teachers in Korea. Recent literature shows that excess body fat weight is associated with increased risk of developing hypertension [28, 29], whereas weight loss has been shown to lower blood pressure [29, 30]. The study also showed that foreign-born teachers who said to smoke cigarettes had 5.15 odds of reporting heart diseases. These observations are an agreement with previous reports associating the risk of heart diseases with cigarettes smoking [31, 32]. An additional study reported that smoking attributed to 41% of coronary heart diseases and 26% of stroke in Korean men [33]. However,

it is not known if foreign-born teachers smoked cigarettes prior to coming to Korea to associate their loss of health advantage to smoking acculturation.

Of the four NCDs investigated, only hypertension was associated with family history of hypertension (OR=1.89). The increase in risk of self-reporting hypertension among those whose parents also had hypertension has been confirmed by some investigators [34, 35]. While the risk of developing hypertension as a result of family history has not been well quantified, the risk is likely attributable to two factors: shared environmental exposures and genetic susceptibility.

V. CONCLUSION

The present study has several strengths that make it an important contribution to the literature. First, Korea has been composed of a single ethnic group with no experience with large volume immigration. This is the first study investigating effect of acculturation on the health of foreign-born teachers in Korea. Years in Korea (>6 years) was associated with hypertension, heart disease, diabetes and cancer. Second, the change of diet or frequency of eating Korean food (>5 times/week) was not associated with mentioned NCDs nor disease precursors such as obesity or smoking. This is an important finding as dietary acculturation was reported to contribute to loss of health of immigrants [15, 20]. While BMI was associated with duration of residence in Korea ($p=0.005$), it is likely that the newcomers will eat more familiar food or food rich in fat and sugar [36]; contributing in the process of weight gain. It is therefore possible that the appearance of NCDs among foreign-born teacher was more associated with age due to chronic degenerative diseases [27], or through other unmeasured psychological and social factors [37-39]. Finally, the study confirmed the relationship between parental hypertension and the risk of developing the disease as already reported by other researchers some investigators [34, 35].

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Conflicts of Interest:

The author declares no conflict of interest.

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