Preventive Medicine 81 (2015) 209–215

Contents lists available at ScienceDirect

Preventive Medicine

journal homepage: www.elsevier.com/locate/ypmed

Co-occurrence of chronic disease lifestyle risk factors in middle-aged and older immigrants: A cross-sectional analysis of 264,102 Australians

Peter Eugene Andrew Sarich [a,b,*], Ding Ding [b], Freddy Sitas [b,c], Marianne Frances Weber [a,b]

[a] Cancer Research Division, Cancer Council NSW, Postal Address: PO Box 572, Kings Cross, NSW 1340, Australia
[b] Sydney School of Public Health, The University of Sydney, Postal Address: Edward Ford Building (A27), NSW 2006, Australia
[c] School of Public Health and Community Medicine, University of New South Wales UNSW, Sydney, NSW 2052, Australia

ARTICLE INFO

Available online 13 September 2015

Keywords:
Chronic disease
Immigrants
Australia
Smoking
Alcohol consumption
Body mass index
Physical activity
Fruit
Vegetables

ABSTRACT

Background. The way in which lifestyle risk factors for chronic disease co-occur among people with different cultural backgrounds is largely unknown.

Methods. This study investigated chronic disease risk among immigrants aged ≥45 years in Australia by combining common lifestyle risk factors into a weighted chronic disease risk index (CDRI). Among 64,194 immigrants and 199,908 Australian-born participants in the 45 and Up Study (2006–2009), Poisson regression was used to derive relative risks (RR) and 95% confidence intervals (CI) for five risk factors (smoking, alcohol use, overweight/obesity, physical activity, diet) by place of birth adjusting for socio-demographic characteristics. Multiple linear regression was used to determine adjusted mean differences (AMDs) in CDRI score by place of birth and years lived in Australia.

Results. Immigrants had higher RRs of smoking than Australian-born participants, lower RRs of excessive alcohol consumption and overweight/obesity, and no difference in RR for physical inactivity and insufficient fruit/vegetable intake. Participants born in the Middle East/North Africa (AMD 3.5, 95% CI 2.7, 4.3), Eastern/Central Europe (1.3, 0.8, 1.9), and Western Europe (0.5, 0.1, 0.8) had higher mean CDRI scores than Australian-born participants, while participants born in East Asia (−7.2, −7.8, −6.6), Southeast Asia (−6.6, −7.2, −6.1), Central/South Asia (−3.1, −4.0, −2.1), Sub-Saharan Africa (−1.9, −2.6, −1.2) and the United Kingdom/Ireland (−0.2, −0.5, 0.0) had lower scores. CDRI score among immigrants generally approximated that of Australian-born participants with greater years lived in Australia.

Conclusions. This study reveals differences in potential risk of chronic disease among different immigrant groups in Australia.

Introduction

Non-communicable diseases have a major impact on premature morbidity and mortality, comprising around 55% of the burden of disease globally, and 85% in Australia (2010) (Murray et al., 2012a). A large proportion of the burden comes from chronic diseases that share many lifestyle risk factors including smoking, alcohol intake, physical inactivity and poor diet (Australian Institute of Health and Welfare, 2014).

While the population prevalence of individual lifestyle risk factors is routinely ascertained through national health surveys, it is important to consider that these risk factors do not often occur in isolation. Indeed, risk factors often cluster and can interact, where the risk of chronic disease may be elevated above that of the sum of each risk factor considered individually (Australian Institute of Health and Welfare, 2005, 2012). Lifestyle risk factor co-occurrence has also been shown to influence mortality, whereby mortality risk is proportionate to the number of healthy lifestyle behaviours adhered to (Loef and Walach, 2012). To better estimate chronic disease risk it is therefore necessary to study lifestyle risk factors in combination.

Risk factor prevalence and the burden of chronic disease vary greatly across different regions of the world (Murray et al., 2012a; World Health Organisation, 2014). For example, in 2007–2010, 36% of the Chinese population aged ≥50 years were found to have three or more chronic disease risk factors, compared to 45% for India, 56% for Russia and 69% for South Africa (Wu et al., 2015). In Australia (2007–2008), it was found that 64% of adults had at least three chronic disease risk factors, with males, those aged ≥75 years, those with disadvantaged socioeconomic status, and those living in rural areas having the greatest proportion (Australian Institute of Health and Welfare, 2012). However, the way in which chronic disease risk factors co-occur among people

* Corresponding author at: PO Box 572 Kings Cross, NSW 1340, Australia.
E-mail addresses: peter.sarich@nswcc.org.au (P.E.A. Sarich), melody.ding@sydney.edu.au (D. Ding), freddy.sitas@gmail.com (F. Sitas), mariannew@nswcc.org.au (M.F. Weber).

http://dx.doi.org/10.1016/j.ypmed.2015.09.004

with different cultural backgrounds in Australia is largely unknown. Of twelve studies included in a systematic review of cardiovascular disease risk factors among immigrant groups in Australia, only one considered multiple risk factors together (Dassanayake et al., 2009). The Australian population has a relatively high proportion of immigrants (27% in 2011) and ethnic diversity (60% of immigrants originate from non-European countries and 53% speak a language other than English at home) (Australian Bureau of Statistics, 2012). Further, chronic disease incidence (Dassanayake et al., 2009; Hodge et al., 2004; Supramaniam et al., 2006) and mortality (Anikeeva et al., 2011, 2015), as well as individual risk factors (Centre for Epidemiology and Research, 2010; Singh and de Looper, 2002; Bennett, 1993) have been found to vary substantially in Australia by place of birth. For example, from 1981–2007, death from lung, stomach, and bladder cancer was more common among immigrants than the Australian-born population, whereas immigrants were less likely to die from colorectal cancer (Anikeeva et al., 2011). Death from cardiovascular disease was higher among immigrants from Eastern Europe (1997–2007), but lower for other parts of Europe, and lowest among Chinese Asians (Anikeeva et al., 2015). In the same period, the immigrant groups with the highest number of deaths from diabetes mellitus were those from Southern Europe, Eastern Europe, and Southern Asia (Anikeeva et al., 2015). Understanding how modifiable health behaviours may contribute to variations in health outcomes can potentially be achieved by exploring multiple risk factors.

There are various methods for quantifying multiple risk factors (McAloney et al., 2013), but it is important to account for the fact that some risk factors have stronger associations with chronic diseases than others. The Chronic Disease Risk Index (CDRI) developed by Miller and Bauman (2005) accounts for the proportional impact of each risk factor on disease using a population health survey in New South Wales (NSW), Australia (Miller and Bauman, 2005). This index takes into account the impact of each factor on loss of disability-adjusted life years in Australia (Miller and Bauman, 2005; Miller, 2003).

We applied this CDRI to self-reported health and lifestyle data from the baseline questionnaire of a large cohort study in NSW, the 45 and Up Study. We aimed to identify immigrant groups with higher or lower CDRI than Australian-born participants, and determine how this relationship varies by number of years lived in Australia.

Methods

Study sample

Baseline data from the Sax Institute's 45 and Up Study (2006–2009), a cohort study of 266,848 participants was used. The study is described elsewhere (Banks et al., 2008), but briefly, residents of NSW aged at least 45 years were randomly sampled from the general population using the Medicare Australia database. This database includes records for all citizens and permanent residents of Australia, and also some temporary residents and refugees. Persons aged 80 and over and those living in rural and remote areas were oversampled by a factor of two. The response rate to mailed invitations was estimated to be 18% (Banks et al., 2008). Ethics approval for the study was provided by the University of NSW Human Research Ethics Committee and the Cancer Council NSW Ethics Committee.

Place of birth and years lived in Australia

Immigrants were defined as persons who reported a country of birth other than Australia. To ensure adequate sample sizes for comparison, countries of birth were grouped into thirteen regions (see Table A.1 supplementary content). These are modified groups from the Global Burden of Disease Study and have been used previously to analyse 45 and Up Study data (Murray et al., 2012b; Weber et al., 2011). The regions were generated to maximise inter-region variation and minimise intra-region variation in infant mortality and adult morbidity and mortality (Murray et al., 2012b). Participants with missing or invalid places of birth were excluded from the analyses. Number of years lived in Australia was calculated using the survey date and year first lived in Australia for one year or more.

Chronic disease risk index (CDRI) and lifestyle risk factors

A CDRI score was calculated for each participant using the methods of Miller and Bauman (Miller and Bauman, 2005; Miller, 2003). Specifically, five self-reported risk factors (smoking, alcohol, BMI, physical activity and fruit and vegetable intake) were assigned values between 0 and 1 to capture the magnitude of associations with disability adjusted life years in Australia. These were then summed to create a CDRI score for each participant, with higher scores indicating greater chronic disease risk. Scores ranged from 0 to 3.8, and were re-scaled into a 100-point scale.

BMI (calculated from self-reported height and weight (Ng et al., 2011)) and physical activity (weekly number of sessions and time in minutes, with time spent in vigorous activity doubled as it was assumed to have twice the metabolic equivalent value of low and moderate activity (Australian Institute of Health and Welfare, 2003; Australian Government Department of Health, 2014)) were assigned risk values as per the original methodology (Miller and Bauman, 2005; Miller, 2003). Smoking status, alcohol and fruit and vegetable intake were modified as described below.

Current smoking was assigned a risk value of 1, former smoking 0.5 and never-smoking 0. We were not able to include a category for occasional smoking (assigned a value of 0.8).

Alcohol consumption was divided into 'low risk' (assigned a value of 0), 'hazardous' (assigned 0.3), and 'harmful' (assigned 0.4) levels. For men this equated to ≤4, >4 and ≤6, and >6 standard drinks per occasion respectively, and for women, ≤2, >2 and ≤4, and >4. We used days of drinking as a substitute for occasions of drinking.

Participants in the low tertile of fruit and vegetable intake (<3 serves of total fruit/vegetables per day) were assigned a value of 0.4, those in the moderate tertile (≥3 and <5 serves/day) a value of 0.2, and those in the high tertile (≥5 serves/day) a value of 0. Tertile cut-off values were based on the 2010 NSW Population Health Survey (Centre for Epidemiology and Research, 2011).

Participants with incomplete data for any of the five lifestyle risk factors were excluded from CDRI analyses.

Socio-demographic covariates

All socio-demographic covariates analysed are listed in Table 1. Remoteness was derived from postcode using the Accessibility/Remoteness Index for Australia (ARIA + 2006) (Glover and Tennant, 2003). A missing indicator variable was included for each factor.

Statistical analyses

We examined the distribution of socio-demographic characteristics by place of birth. All subsequent analyses were adjusted for sex, age, remoteness, education level, marital status, household income and health insurance status.

It has been shown that for binary outcomes, exponentiated linear coefficients estimated from Poisson regression provide valid estimates of adjusted relative risk, and robust standard errors produce confidence intervals that achieve nominal coverage (Zou, 2004; Greenland, 2004; Spiegelman and Hertzmark, 2005). This method has been referred to as modified Poisson regression, and was used to calculate the adjusted relative risk (RR) and 95% confidence interval (CI) of being in the highest risk category for each individual risk factor by place of birth. That is, being a current smoker, drinking a harmful level of alcohol, being obese, being physically inactive and being in the lowest tertile of fruit and vegetable intake.

Multiple linear regression was used to determine adjusted mean differences (AMDs) in CDRI score by place of birth and years lived in Australia. In each regression model, place of birth and socio-demographic covariates were the independent variables and CDRI score was the dependent variable. A test for trend between years lived in Australia and CDRI score (using the median value for each category of years lived in Australia: <10; 10–19; 20–29; 30–39; ≥40 years) was used for each region of birth.

Analyses were performed using SAS 9.3.

Results

266,848 participants completed the baseline questionnaire. 22 (0.008%) of these were excluded for being <45 years old. A further