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Social inequalities in clustering of oral health related behaviors in a national sample of British adults

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ABSTRACT

Objectives.
1. To assess clustering of oral health related behaviors among a sample of British adults.
2. To determine the variation in clustering of oral health related behaviors by socioeconomic position.

Method. We used secondary analysis of the Adult Dental Health Survey 2009 data. Health behaviors referred to smoking, tooth brushing frequency, dental visits and sugar consumption. Clustering was assessed by pairwise correlations, counts of clustering of health compromising behaviors and comparison of observed/expected ratios. Logistic regression was used to assess variation in clustering of oral health related behaviors by socioeconomic position crudely and adjusted for age, gender and self-rated oral health.

Results. There were weak correlations between four health behaviors. Very low prevalence of clustering was reported. Higher observed to expected ratio was observed for clustering patterns with lower prevalence. Multivariate logistic regression showed clear, strong and significant educational gradients in associations between different clustering patterns of health compromising behaviors and educational attainment. These educational gradients remained significant after adjusting for age, gender and self-reported oral health.

Conclusion. Very clear and strong educational gradients were observed throughout patterns of clustering of oral health compromising behaviors, suggesting chances of having detrimental behavioral clustering are lower in more educated groups in population.

Introduction

Health related behaviors have an important role in the causation and prevention of chronic diseases. Excessive alcohol consumption, smoking, physical inactivity and unhealthy diets have been established as detrimental behaviors causing morbidity and mortality (Danaei et al., 2009; Holman et al., 1996; Katzmarzyk et al., 2003; Mokdad et al., 2004; Murray and Lopez, 1997). Unfavorable health related behaviors also carry an inverse relationship with oral health (Sanders et al., 2006a; Sheiham and Watt, 2000; Wamala et al., 2006). Key oral health related behaviors include dietary habits, oral hygiene practices, dental attendance and smoking (Sheiham and Watt, 2000).

Behaviors do not occur in isolation but instead tend to occur in clusters or bundles (Spring et al., 2012). Clustering of health related behaviors have been reported in previously conducted studies (Alzahrani, 2012; Chiolero et al., 2006; Conry et al., 2011; De-Vries et al., 2008a; De-Vries et al., 2008b; Ebrahim et al., 2004; Heroux et al., 2012; Raitakari et al., 1995; Sanders et al., 2005; Schuit et al., 2002; Van Nieuwenhuijzen et al., 2009). These clusters of health related behaviors, whether health protecting or health compromising are not randomly distributed in populations (Conry et al., 2011). Thus, there are underlying factors, which determine clustering of behaviors. Previously conducted studies have explored socioeconomic positions (SEP), gender, age, psychosocial factors, ethnicity and chronic diseases as determinants of clustering of behaviors. However, not much is documented about the clustering of health related behaviors and their associations with socio-demographic factors, as most studies focus on the demographic characteristics of specific behaviors but not on clustering (Ottevaere et al., 2011).

Studies conducted among adults have shown that individuals from lower socioeconomic positions tend to have higher degree of clustering of multiple risk factors than those in higher socioeconomic positions (Fine et al., 2004; Lakshman et al., 2011; Pronk et al., 2004; Schuit et al., 2002; Shankar et al., 2010). Similarly, it is also evident that chronic diseases associated with unhealthy clusters are common in lower social class groups (Poortinga, 2007; Stringhini et al., 2010). A recent study in Brazil reported similar results with men having black skin color, living without a partner, poor and being less educated had more simultaneous occurrence of two or more risk behaviors for chronic non communicable diseases (Silva et al., 2013). Most of previously reported studies on clustering were centered around biological risk factors but not about clustering of health related behaviors (Schuit et al., 2002).

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The aim of the study was to assess variation in clustering of oral health related behaviors by SEP using data from Adult Dental Health Survey conducted in 2009. The objectives of the study were to observe and explore extent of clustering in British dentate adults and to assess the variation in clustering of oral health related behaviors according to socioeconomic positions, crudely and adjusted for age, gender and self-reported oral health.

Methodology

Study participants and study settings

The study conducted a secondary analysis of data from the Adult Dental Health Survey 2009 (O'Sullivan et al., 2011). Study participants were adults from England, Wales and Northern Ireland. However, Scotland did not participate in this survey. Two stage cluster sampling technique was used for the survey comprising of 253 primary sampling units (PSU) in England and Wales and along with it 15 primary sampling units (PSU) in Northern Ireland. Every primary sampling unit was comprised of two postcode sectors with 25 addresses sampled adding up to the total sample of 13,400 addresses. A total number of 11,380 individuals participated from 13,400 households. Edentate participants were further excluded from the study.

Measurements

An aggregate variable of total count of clustering of health compromising behaviors was the primary outcome of the study. The four individual oral health related behaviors assessed were frequency of tooth brushing, smoking, sugar intake and dental attendance. Tooth brushing is the commonest oral hygiene procedure (Brothwell et al., 1998). The question asked about tooth brushing frequency was "How often do you clean your teeth nowadays?" and the answers were more than twice a day, twice a day, once a day, less than once a day and never. The variable was further dichotomized as evidence in the literature suggests tooth brushing at least twice a day is recommended for better oral health (Loe, 2000; Marinho et al., 2003).

Smoking is associated with diabetes, cancer, cardiovascular diseases, respiratory diseases and periodontal diseases (Doll and Peto, 1978; Ojima et al., 2007; Sheiham and Watt, 2000). Two questions were asked regarding smoking status of the participant in the survey "Have you ever smoked a cigarette, a cigar, or a pipe?" for history of smoking and "Do you smoke cigarettes at all nowadays?" for current smoking. Smoking was dichotomized into current smoking or non smoking.

There is overwhelming scientific evidence confirming the association between sugar intake and dental caries (Moynihan, 2005; Sheiham and Watt, 2000). The following questions were asked about sugar intake: 'How often, on average, do you eat a serving of cakes, biscuits, puddings or pastries?', 'How often, on average, do you eat sweets or chocolate?', 'How often, on average do you have fizzy drinks, fruit juice, or soft drinks like squash, excluding diet or sugar-free drinks?' and 'Do you usually have sugar in hot drinks like tea and coffee?'. These four questions were used to derive to a composite variable in order to dichotomize them into high sugar and low sugar users. Adults reporting consumption of cakes, sweets, or fizzy drinks six or more times a week were grouped in the "high sugar intake" group and those that did not were categorized as lower sugar intake consumers (Chadwick et al., 2011).

The questions asked about symptomatic dental attendance referred to time since last visit and regularity of dental attendance. Since previous studies have reported that asymptomatic dental attendance is associated with better oral health (Bullock et al., 2001; Crocombe et al., 2012; Sanders et al., 2006b; Sheiham et al., 1985), we dichotomized the sample into those that attended the dentist 'regularly or occasionally' vs. those that attended 'only when in trouble or never'.

We used educational attainment to measure SEP through the following questions: "Do you have any educational qualifications for which you received a certificate?", "Do you have any professional, vocational or other work-related qualifications for which you received a certificate?" and "Was your highest qualification: at degree-level or above or another kind of qualification?" (O'Sullivan et al., 2011). The other covariates chosen for the analysis were socio-demographic characteristics (age, sex) and self-reported oral health, which is a broad measure of health.

Statistical analysis

Data were analyzed on STATA version 11.0 (STATA Corp, College Station, Texas, USA) using the survey command and appropriate weights to reduce bias induced due to sampling design. The characteristics of the study sample according to socio-demographic variables such as age, gender, marital status and ethnicity were assessed using descriptive statistics. The association between the four oral health related behaviors and the variables for SEP was checked by conducting Chi squared tests. Presence of clustering of health related behaviors was identified by three methods, pairwise correlations of health compromising behaviors, count of health compromising behavior clustering and identification of clustering patterns of health related behaviors among adults (observed/expected ratio). To assess the association between different clustering patterns of behaviors and socioeconomic position, the patterns of the clustering behaviors were dichotomized into 0 = No and 1 = Yes for each particular pattern of clustering. Only the clustering patterns with observed/expected ratio more than 1.20 were included. A logistic regression was run for each pattern of clustering with educational attainment to estimate the crude associations. Then the models were adjusted for age and gender and the final model was adjusted for age, gender and self-reported oral health. To check for Goodness-of-fit, tests appropriate for the survey command were conducted for the 24 logistic regression models using the svylogitgof command in Stata.

Results

13,400 households participated in the Adult Dental Health Survey 2009. The total number of individuals who responded was 11,380. Household interview response rate was 60%. Out of 11,380 individuals; 10,567 reported that they were dentate and were included in the study. The socio-demographic profile of the participants is described in Table 1. Good behavioral pattern was predominantly followed by the sample. The prevalence of three health compromising behaviors smoking, tooth brushing less than twice a day and symptomatic dental attendance varied significantly with educational attainment and was lower for each higher educated group. However, this pattern was not observed with sugar consumption and an overall high prevalence of excessive sugar consumption was observed in all educational groups (Table 2).

All four health-compromising behaviors were significantly correlated with each other with the exception of the correlation between sugar consumption and dental attendance. The coefficients show that the correlations were weak or very weak, ranging from 0.02 to 0.19 (Table 3). The majority of the participants had clustering of two behaviors (24.28%) followed by three behaviors (9.70%) and four behaviors (2.40%).

Table 4 shows observed/expected ratios and prevalence for the different clusters of health compromising behaviors. The observed/expected ratios ranged from 0.96 to 2.82. Highest observed/expected ratio was observed for the clustering of all four health-compromising behaviors. This cluster had also the lowest prevalence compared to all other clusters. No clustering was observed between smoking and high sugar consumption.

A strong and clear gradient was observed in the association between clustering of two health-compromising behaviors (i.e. smoking and tooth brushing less than twice a day, smoking with symptomatic dental attendance, and tooth brushing less than twice a day with symptomatic dental attendance) and educational attainment. The odds of clustering of two health compromising behaviors were lower for each consecutively higher education group. The educational gradient remained significant even after adjustment for age, gender and self-reported oral health (Table 5).

The odds of clustering of three health-compromising behaviors decreased with each consecutively higher level of educational qualification. The strong and clear educational gradient remained significant even after adjustment for age, gender and self-reported oral health, except for the association between smoking, tooth brushing less