Orofacial pain and symptoms of temporomandibular disorders in Finnish and Thai populations

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ABSTRACT

Objective: Cultural or ethnic factors may play an important role in subjects' pain reports. The aim of the study was to compare the prevalence of orofacial pain symptoms between Finnish and Thai populations.

Material and methods: The Finnish study population comprised the Northern Finland Birth Cohort 1966, of which 5,696 subjects participated in the present study. The Thai sample consisted of 1,501 randomly selected people living in 10 different districts in Bangkok. Data on orofacial pain was collected based on questionnaires.

Results: After adjusting for age, gender and education, the logistic regression analysis showed that Thai subjects had an increased risk for reporting oral pain (OR 4.5, 95% CI 3.7-5.4), tooth pain (OR 2.0, 95% CI 1.8-2.4) and pain in the face (OR 1.5, 95% CI 1.2-1.7).

Conclusions: It can be concluded that Thai people report more orofacial pain symptoms than Finnish subjects. Cross-cultural factors exist in the background of reporting pain symptoms in the oral and facial area.

Key words: cross-cultural comparison, orofacial pain, prevalence studies, temporomandibular disorders

INTRODUCTION

Chronic orofacial pain is a prevalent problem that encompasses numerous disorders with diverse causes and symptoms. In dentistry, the most usual conditions concerned are chronic orofacial pain, temporomandibular disorders (TMD) and dental pain.[1] TMD consist of functional problems concerning the temporomandibular joints (TMJs) and the masticatory muscles. [2] Typical signs and symptoms include facial pain, clicking or crepitus of the TMJs, limited jaw opening capacity, and deviation in the movement patterns of the mandible. [2] The most common cause for pain in the oral cavity is dental caries with its consequences [3,4].

The prevalence levels of orofacial pain across countries vary from 10% to 66%. [5-13] Compared with men, women of reproductive age suffer more frequently from orofacial pain as well as other chronic pain disorders. [12,14] Younger subjects and those from lower socio-economic groups are more likely to report pain. [10]

Besides gender and age of the individuals, their cultural or ethnic background may also play an important role in the reported pain. [15-16] The experience of pain in general has been shown to be linked with sociocultural factors such as ethnic background and culture-specific attitudes. [17] It has also been shown that Asian subjects have a significantly lower sensory and pain threshold concerning self-reported pain than Caucasian subjects. [18-19] Besides sensory and pain

responses, ethnic differences also exist regarding motoric reflex responses in the trigeminal region. [19] Furthermore, in a recent study [20], the prevalence of TMD pain was higher among Asian than European people.

Based on the previous studies, we hypothesize that the prevalence of self-reported orofacial pain symptoms is higher among Asian than European population. The aim of the study was to compare the prevalences of orofacial pain symptoms between Finnish and Thai populations.

MATERIAL AND METHODS

Finnish study population

The Finnish study population comprised the Northern Finland Birth Cohort 1966. The original sample was collected from a geographically defined area of the two northernmost provinces of Finland. It consisted of an unselected, general population-based birth cohort of 12,058 live births with expected date on delivery in 1966, representing 96.3% of all such births. [21]

In 1997, at the age of 31 years, 8,463 of those members of the cohort who were living in northern Finland or in the capital area were sent an invitation to a clinical examination. Of them, 5,696 subjects, representing 67.3% of those who were invited to the clinical examination in the cohort study, participated in the present study. The subjects received a postal invitation to come and answer a computer-aided questionnaire where, among other aspects concerning health and well-being of the subjects, data on orofacial pain were reported. A postal questionnaire containing the same questions was sent to those who did not show up at the computer-aided questionnaire session. Questions on orofacial pain symptoms were asked with the following questions:

1) Have you had pain or ache during the last year in the following regions? no/ yes (now and then/ fairly often/ often or continuously) –face, jaws
2) Have you had pain or ache in the mucosa of the mouth or the tongue during the last year? no/ yes (now and then/ fairly often/ often or continuously)
3) Have you had pain or ache in the teeth, during the last year? no/ yes (now and then/ fairly often/ often or continuously)

Information about education level was obtained from the postal questionnaire. Education was divided into two classes: high school graduate/ no high school diploma.

Thai study population

A descriptive, cross-sectional survey of 1,501 randomly selected people living in 10 different districts in Bangkok was carried out. The randomization process was performed by the National Statistical Office of Thailand. Subjects were selected by a three-stage random sampling procedure as follows:

1. Randomly selected 10 districts out of 50 districts in Bangkok.
2. Randomly selected 5 blocks in each district.
3. Randomly selected 30 households per block.

Ten surveyors from the National Statistical Office were informed about the inclusion and exclusion criteria of subjects in this study

Inclusion criteria:

1. Thai people who could read and write Thai language.
2. Age at least 18 years old.
3. The subject was willing to complete the questionnaire.

The subjects were informed about the objective of the study. After reviewing the objectives of the study, if subjects wanted to enroll in the study, they were asked to sign the informed consent forms.

Exclusion criteria:

1. People who lived in condominiums
2. People who lived outside Bangkok territory

The questionnaire was designed to collect information on current and past experiences about orofacial pain in the past six months. The questionnaire was composed of three parts. Sociodemographic data including age, gender and educational level were obtained from the questionnaire. The alternatives for education level were “lower than bachelor degree” and “higher than bachelor degree”.

Orofacial pain was inquired as follows:

1. In the past six months, did you have an aching pain across your face or cheek?
2. In the past six months, did you have painful sores or irritations around the lips or on the tongue, cheeks or gums?
3. In the past six months, did you have toothache?

The response alternatives were “yes”, “no”, and “don’t know”. The education level, age and gender were obtained from the questionnaire. The Thai IRB number for the study is MU-DT/PY_IRB 2012/004.0202

Statistical analysis

Reference periods for the pain-related items were different in Finland and Thailand and may be a source of bias. Thus we first conducted a re-analysis on our cross-over data originally collected to compare the concordance between one-versus 12-month reference period responses on OHIP-14. [22] The analysis was conducted on four single-item questions, *i.e.,* OHIP-pain item, facial pain, jaw pain and dental pain. The concordance between responses to items using one- versus 12-month reference period was assessed with percentage agreement and kappa statistics. The percentage agreements were 85, 88, 88 and 79 for OHIP-pain item, facial pain, jaw pain and dental pain, respectively. The corresponding kappa-values were 0.695, 0.633, 0.747 ad 0.555, suggesting substantial agreement for all items expect dental pain for which the agreement was moderate.

Bivariate associations between orofacial pain symptoms and country of residence were evaluated using chi-square tests. Between the groups the difference was considered statistically significant at p levels < 0.05. Logistic regression analysis was used to assess the associations between orofacial pain symptoms and country of residence when adjusting for gender, age and education level. The associations were described by

Odds ratios (OR) and their 95% confidence intervals (CI 95%).

RESULTS

The basic characteristics of the study population are presented in Table 1. Half of the Finnish and 62% of the Thai study subjects were female. Nearly one half of the Finnish subjects and nearly two thirds of the Thai subjects reported toothache (OR 2.0, 95% CI 1.7-2.3). The amount of self-reported oral pain was more than two-fold among Thai subjects compared to Finnish subjects (OR 3.8, 95% CI 3.3-4.4). Thai subjects reported also significantly more pain in the face as compared to Finnish subjects (OR 1.5, 95% CI 1.3-1.7). (Table 1)

Even after adjusting for age, gender and education, the logistic regression analysis showed that Thai subjects had an increased risk for reporting oral pain (OR 4.5, 95% CI 3.7-5.4), tooth pain (OR 2.0, 95% CI 1.8-2.4) and pain in the face (OR 1.5, 95% CI 1.2-1.7).

DISCUSSION

The results of the present study showed that subjects living in Thailand had 1.5-4.5 fold risk for reporting orofacial pain symptoms compared to Finnish subjects, which supports our hypothesis.

The present findings are supported by the previous studies that have found cross-cultural differences in pain reporting between Asian and Caucasian subjects. For example, higher consultation rates for musculoskeletal pain have been reported in South Asian people than in the UK. [23-24] Asian people have also shown to report more acute postoperative pain compared to black American, European or Latino subjects. [25]

It should be noted that the variables on orofacial pain are based on self-report, not on clinical examination. The differences in self-report of pain may reflect differences between actual clinical conditions (diagnoses) causing pain, or differences in reporting or perceiving pain. For example, in the diagnosis of TMD cross-cultural differences between Asian and European populations have been investigated. A recent study by Wu and Hirsch [20] assessed the prevalence of TMD according to the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) in 1,058 adolescents (including 561 German and 497 Chinese) and found obvious differences in the prevalence of TMD between the two different ethnic groups. The prevalence of disc displacements was lower in China than in Germany, whereas the

prevalence of RDC/TMD pain diagnoses was higher in China. These results correspond with the results from another study from the Netherlands in which TMD patients from different ethnic groups differed particularly with regard to pain-related impairment. [26]

Studies have shown that the cross-cultural differences appear especially in population-based studies, whereas Asian and European patient populations are generally more alike. [27-28] When using the RDC/TMD criteria, Axis I and Axis II findings from Asian TMD patients have been found to be generally similar to those of Swedish and American patients. [27]

There are some differences in dental health between Thai and Finnish populations, which may partly explain the differences in dental pain reports. The oral health among Finnish adults has improved between the early 1980s [29] and 2000s [30]. In the Health 2000 Survey it was reported that the mean number of remaining teeth among Finnish subjects was 22.9, of which 13.5 had treatment history or dental caries, and the mean D (number of decayed teeth) value was 0.8. Among Finnish adult population aged > 30 one third had dental caries lesions, men more often than women (39% vs. 23%) and subjects aged 30–44 less often than the elderly (26% vs. 39%). [31] The data from a Thai national survey in the age group 35-44 years indicated that 93 percent of this population had a history of tooth decay, tooth filling or extraction, the average number of affected teeth being 5.4 – 6.5 per person. [32]

The cross-cultural differences may be explained by racial differences in pain perception. Possible explanations have been suggested to be especially in social learning. [25] According to experimental studies, ethnicity has been demonstrated to be an important variable in determining response to painful stimuli [18-19, 33-34], so that Asian people have lower pain thresholds and higher pain reporting when compared to Caucasians. Studies have also demonstrated that pain unpleasantness is sensitive to race or cultural effects. [35-36] These differences have been demonstrated even among babies at 2 months of age. [37] Ethnic differences could thus be at least partly explained by genetic influences. A study by Kim et al [34] has demonstrated the influence on experimental pain sensitivity of the TRPV1 and OPRD1 genes, occurring through interaction with gender, ethnicity and personal temperament.

The strongest association of place of residence was found with the self-reported oral pain. It should be noted that the differences may partly be due to the differences in question formats. The Thai subjects were inquired about more pain areas (*i.e.,* lips, cheek, tongue and gums) whereas the Finnish questionnaire comprised the oral mucosa and tongue. This may lead to differences in the interpretations of the questions. The difference in the reference periods (6 vs. 12 months) used in this study was not likely to cause bias as the use of a shorter reference period does not appear to influence responses in population surveys. [22] Our re-analysis of the same data on four similar single-item questions confirmed this suggestion, as the agreement was substantial for three

items. Even though the agreement for the fourth item (dental pain) was moderate the actual difference in this study was of such magnitude that the result would still be significant when taking into account possible bias. Additionally, our re-analysis was conducted comparing one- versus 12- month reference periods as in this study the difference was between 6 and 12 months, which is even less likely to cause bias, especially as the reference period was shorter among the Thai than the Finnish population. Thus, the difference might be even greater if the reference periods had been similar.

It has been suggested that the greater the level of acculturation, the less likely it is that cultural and ethnic factors explain differences between immigrants and individuals born in the host country. [38] The inclusion criteria of the Finnish cohort ensured that the Finnish participants were culturally representative; all were born in the country of origin. However, our definition of ethnicity was broad with respect to the South Asians who had a greater variety than their Finnish counterparts regarding the place of birth, first language and religion; yet this was not asked. The population of Bangkok is composed of people with origins from each region of Thailand. Although the majority of Bangkokians are of Thai ethnic background, centuries of migration and invasion have resulted in mixing of many other ethnicities, as has subsequent integration of immigrants from South and Southeast Asia as well as Europe. More recently, intermarriages of Thais with Caucasian, Japanese, Chinese, and Middle East people have become more common.

As a result, the ethnic background of Bangkokians is continually evolving. [39]

Based on this population-based study, it can be concluded that Thai people report more orofacial pain symptoms than Finnish subjects. Cross-cultural factors exist in the background of reporting pain symptoms in the oral and facial area.

Ethical approvals: The Northern Finland Birth Cohort 1966 study has been approved by the Ethical Committee of Northern Ostrobothnia District. The Thai prevalence study of orofacial pain has been approved form IRB of Faculty of Dentistry and Faculty of Pharmacy Mahidol University (IRB # MU-DT/PY_IRB 2012/004.0202)

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REFERENCES

[1] Feinmann C. The mouth, the face and the mind. Oxford: Oxford University Press; 1999: 37-60.

[2] Okeson JP. Management of temporomandibular disorders and occlusion. St Louis, Missouri: Mosby; 2013.

[3] Petersen PE, Bourgeois D, Ogawa H, Estupinan-Day S, Ndiaye C. The global burden of oral diseases and risks to oral health. Bull World Health Organ 2005;83:661-9.

[4] Boeira GF, Correa MB, Peres KG, Peres MA, Santos IS, Matijasevich A, Barros AJ, Demarco FF. Caries is the main cause for dental pain in childhood: findings from a birth cohort. Caries Res 2012;46:488-95.

[5] Locker D, Grushka M. Prevalence of oral and facial pain and discomfort. Community Dent Oral Epidemiol 1987;15:169-72.

[6] Lipton JA, Ship JA, Larach-Robinson D. Estimated prevalence and distribution of reported orofacial pain in the United States. J Am Dent Assoc 1993;124:115-21.

[7] Rauhala K, Oikarinen KS, Järvelin M, Raustia AM. Facial pain and temporomandibular disorders: an epidemiological study of the Northern Finland 1966 Birth Cohort. J Craniomandib Pract 2000;18: 40-6.

[8] Macfarlane TV, Glenny AM, Worthington HV. Systematic review of population-based epidemiological studies of oro-facial pain. J Dent 2001; 29:451-67.

[9] Macfarlane TV, Blinkhorn AS, Davies RM, Kincey J, Worthington HV. Orofacial pain in the community: prevalence and associated impact. Community Dent. Oral Epidemiol 2002;30:52-60.

[10] Pau AK, Croucher R, Marcenes W. Prevalence estimates and associated factors for dental pain: a review. Oral Health Prev Dent 2003; 1: 209-20.

[11] McMillan AS, Wong M, Cheng J, Lam CL. Prevalence of orofacial pain and treatment seeking in Hong Kong Chinese. J Orofac Pain 2006; 20: 218-25.

[12] Gonçalves DA, Dal Fabbro AL, Campos JA, Bigal ME, Speciali JG. Symptoms of temporomandibular disorders in the population: an epidemiological study. J Orofac Pain 2010; 24: 270-8.

[13] de Siqueira SR, Vilela TT, Florindo AA. Prevalence of headache and orofacial pain in adults and elders in a Brazilian community: an epidemiological study. Gerodontology 2013. In press.

[14] Shinal RM, Fillingim RB. Overview of orofacial pain: epidemiology and gender differences in orofacial pain. Dent Clin North Am 2007;51: 1-18.

[15] Hernandez A, Sachs-Ericsson N. Ethnic differences in pain reports and the moderating role of depression in a community sample of Hispanic and Caucasian participants with serious health problems. Psychosom Med 2006;68:121-8.

[16] Vlaar AP, ten Klooster PM, Taal E, Gheith RE, El-Garf AK, Rasker JJ, van de Laar MA. A cross-cultural study of pain intensity in

Egyptian and Dutch women with rheumatoid arthritis. J Pain 2007;8:730-6.

[17] Bates MS. Ethnicity and pain: a biocultural model. Soc Sci Med 1987;24:47-50.

[18] Watson PJ, Latif RK, Rowbotham DJ. Ethnic differences in thermal pain responses: a comparison of South Asian and White British healthy males. Pain 2005;118:194-200.

[19] Komiyama O, Wang K, Svensson P, Arendt-Nielsen L, Kawara M, De Laat A. Ethnic differences regarding sensory, pain, and reflex responses in the trigeminal region. Clin Neurophysiol 2009;120:384-89.

[20] Wu N, Hirsch C. Temporomandibular disorders in German and Chinese adolescents. J Orofac Orthop 2010;71:187-98.

[21] Rantakallio P. The longitudinal study of the northern Finland birth cohort 1966. Paediatr Perinat Epidemiol 1988;2:59-88.

[22] Sutinen S, Lahti S, Nuttall NM, Sanders AE, Steele JG, Allen PF, Slade GD. Effect of a 1-month vs. a 12-month reference period on responses to the 14-item Oral Health Impact Profile. Eur J Oral Sci 2007;115:246-9.

[23] Gillam SJ, Jarman B, White P, Law R. Ethnic differences in consultation rates in urban general practice. BMJ 1989;299:953-7.

[24] Allison TR, Symmons DP, Brammah T, Haynes P, Rogers A, Roxby M, Urwin M. Musculoskeletal pain is more generalised among people from ethnic minorities than among white people in Greater Manchester. Ann Rheum Dis 2002;61:151-6.

[25] Faucett J, Gordon N, Levine J. Differences in postoperative pain severity among four ethnic groups. J Pain Symptom Manage 1994;9: 383-9.

[26] Van der Meulen MJ, Lobbezoo F, Aartman IH, Naeije M.Ethnic background as a factor in temporomandibular disorder complaints. J Orofac Pain 2009;23:38-46.

[27] Yap AU, Dworkin SF, Chua EK, List T, Tan KB, Tan HH. Prevalence of temporomandibular disorder subtypes, psychologic distress, and psychosocial dysfunction in Asian patients. J Orofac Pain 2003;17:21-8.

[28] Barbosa T de S, Miyakoda LS, Pocztaruk Rde L, et al. Temporomandibular disorders and bruxism in childhood and adolescence: review of the literature. Int J Pediatr Otorhinolaryngol 2008;72:299–314.

[29] Mini-Finland - survey. Publications of National Public Health Institute; 1985.

[30] Suominen-Taipale L, Norblad A, Vehkalahti M, Aromaa A, eds. Oral health in the Finnish adult population. Health 2000 Survey. Publications of the National Public Health Institute, B25/2008. Helsinki: Hakapaino; 2008. http://www.terveys2000.fi/julkaisut/oral_health.pdf

[31] Tseveenjav B, Suominen AL, Hausen H, Vehkalahti MM. The role of sugar, xylitol, tooth brushing frequency, and use of fluoride toothpaste in maintenance of adults' dental health: findings from the Finnish National Health 2000 Survey. Eur J Oral Sci 2011;119:40-7.

[32] http://advisor.anamai.moph.go.th/tamra/env/env105.html

[33] Zatzick DF, Dimsdale JE. Cultural variations in response to painful stimuli. Psychosom Med 1990;52:544-57.

[34] Kim H, Neubert JK, San Miguel A, Xu K, Krishnaraju RK, Iadarola MJ, Goldman D, Dionne RA. Genetic influence on variability in human acute experimental pain sensitivity associated with gender, ethnicity and psychological temperament. Pain 2004;109:488-96.

[35] Riley JL 3rd, Wade JB, Myers CD, Sheffield D, Papas RK, Price DD. Racial/ethnic differences in the experience of chronic pain. Pain 2002;100:291-8.

[36] Sheffield D, Biles PL, Orom H, Maixner W, Sheps DS. Race and sex differences in cutaneous pain perception. Psychosom Med 2000;62:517-23.

[37] Rosmus C, Johnston CC, Chan-Yip A, Yang F. Pain response in Chinese and non-Chinese Canadian infants: is there a difference? Soc Sci Med 2000;51:175-84.

[38] Deyo RA, Diehl AK, Hazuda H, Stern MP. A simple language-based acculturation scale for Mexican Americans: validation and application to health care research. Am J Public Health 1985;75:51-5.

[39] Manopatanakul S, Watanawirun N. Comprehensive intermaxillary tooth width proportion of Bangkok residents. Braz Oral Res 2011;25:122-7.

Table 1. Mean ages and percentual distributions of sociodemographic factors and orofacial pain symptoms in 5,073 Finnish subjects included in the Northern Finland Birth Cohort and 824 randomly selected subjects living in 10 different districts in Bangkok.

	Finnish	Thai	p
Age/yrs mean (SD)	31.2 (0.4)	40.7 (13.9)	<0.001
Gender (females)	50.7	61.9	<0.001
Education (<bachelor)	89.0	88.5	0.662
Toothache	47.7	64.7	<0.001
Oral pain	22.0	51.3	<0.001
Pain in face*	23.1	31.0	<0.001

p-values for chi-square tests

*pain in face or jaw