

Prevalence of Symptoms Associated with Temporomandibular Disorders in Hong Kong Chinese

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Aims: To estimate the prevalence of self-reported symptoms associated with temporomandibular disorders (TMD) and treatment-seeking in adult Chinese in Hong Kong. **Methods:** A telephone survey technique was used to identify 1,526 randomly selected Cantonese-speaking individuals aged 18 years or over. Standard questions were asked about joint and jaw muscle pain, jaw opening, and joint sounds. In addition, questions on tooth grinding and clenching, sleep patterns, and treatment-seeking behavior were posed. **Results:** Jaw pain was reported by 33% of the population. Only 5% of them had frequent pain, with two thirds of this subgroup having moderate to severe symptoms. The prevalence of frequent problems with jaw opening and joint clicking was 0.3% and 1.8%, respectively. There were no gender-related differences in the reporting of TMD symptoms or related conditions. **Conclusion:** One percent of the Hong Kong Chinese population had TMD-related jaw pain that was of moderate or severe intensity and occurred frequently; 0.6% of the population had sought treatment for jaw pain, impaired jaw opening, or joint clicking that occurred often in the previous year.

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There is still uncertainty about the prevalence of temporomandibular disorders (TMD) in the general population.^{1,2} One reason has been the absence of clearly defined diagnostic criteria, although there has been considerable headway by the development of a rational classification scheme and research diagnostic criteria.^{1,3,4} Another problem has been the inappropriate design of epidemiologic studies of TMD,² particularly in the use of non-representative groups taken from biased general practice or hospital-based situations. More recently, carefully designed studies have taken place in North America and Scandinavia with random sampling from the general population and have revealed more meaningful prevalence data.^{1,2,5,6}

Patients seeking treatment for symptoms associated with TMD represent a small proportion (approximately 2%) of the general population.^{1,7} Jaw pain, restricted jaw opening, and jaw clicking are the most common presenting symptoms and are often associated with significant morbidity and loss of productivity.^{8,9} More women than men appear to seek treatment for TMD symptoms and are predominantly between 18 and 45 years old.^{1,8,9}

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| 1. Would you say that you feel pain in your jaw muscles or in your jaw joints?
If yes, would you say that you feel pain in your jaw muscles or in your jaw joints very often, quite often, sometimes, or rarely?
a) Usually, would you say the pain intensity is mild, moderate, or severe?
b) Usually, would you say the pain is mainly present upon awakening, in the morning, the afternoon, or in the evening? | Yes/No |
| 2. Would you say that you have difficulty in opening your mouth as wide as you wish because of jaw pain or because the joint locks?
If yes, would you say that you have difficulty in opening your mouth as wide as you wish because of jaw pain or because the joint locks very often, quite often, sometimes, or rarely? | Yes/No |
| 3. Would you say that your jaw joint clicks or pops when you eat or open your mouth wide?
If yes, would you say that your jaw joint clicks or pops very often, quite often, sometimes, or rarely when you eat or open your mouth wide? | Yes/No |
| 4. Would you say that you grind or clamp your teeth together?
If yes, would you say that you grind or clamp your teeth together very often, quite often, sometimes, rarely?
Would you say that it usually occurs a) during the day , or b) when sleeping? | Yes/No |
| 5. Overall, after you have slept, would you say you feel very well rested, well rested, poorly rested, or not at all rested?
If poorly or not at all rested: Usually, would you say that you sleep poorly or not at all because a) you do not sleep for long enough , b) you take medications , c) you have pain , d) because you are distressed or anxious? | |
| 6. In the last year, have you been treated for jaw pain, difficulty in jaw opening, or jaw joint clicking or popping? | Yes/No |

Fig 1 Survey questions asked of the study population (English version).

In many countries, specialist practices and centers deal with TMD patients in addition to those patients managed in a general practice environment. However, to our knowledge, in Hong Kong there are no specialist TMD treatment centers. This suggests that the prevalence of TMD and/or the need for treatment may be lower than in other countries. Therefore, this study aimed to estimate (1) the prevalence of self-reported symptoms associated with TMD, and (2) treatment-seeking behavior in adult, Cantonese-speaking Chinese in Hong Kong. Putative associations between symptoms associated with TMD, tooth grinding, and sleep problems were also explored.

Materials and Methods

Data were compiled by a telephone survey method.¹⁰ A sample of Cantonese-speaking Chinese age 18 years or over living in Hong Kong was drawn up for the survey by a random digit-dialing technique at the Telephone Survey Unit at the Social Sciences Research Centre, University of Hong Kong. The survey took place on 4 consecutive days in July 1999. Interviews were conducted by trained staff who used a standard approach. Potential participants were informed that the survey was orga-

nized by staff at the Faculty of Dentistry at the University of Hong Kong. When there was more than 1 potential participant in a household, 1 was randomly selected to take part in the study.²

Interviews were conducted in a standardized sequence, ie, the research questionnaire, followed by 4 sociodemographic questions (age, gender, educational level, and monthly income). A Chinese questionnaire was used that was based on TMD screening methods published previously by Goulet et al¹ and Locker and Slade.² The questionnaire was translated into colloquial Cantonese, then back-translated into English. It was then pilot-tested on patients attending Prince Philip Dental Hospital, Hong Kong. Feedback was evaluated, and the precise wording of the questionnaire was determined prior to implementation (Fig 1). Participants were asked questions about joint and jaw muscle pain, limitation of jaw opening, joint sounds, and tooth grinding and clenching. For positive responses, additional questions were asked about intensity (mild, moderate, or severe) and frequency (rarely, sometimes, quite often, or very often). Sleep patterns and treatment seeking were also explored. Apart from question 6 (treatment seeking), no specific time period was used in the wording of the questions.

Response Pattern

A total of 7,671 randomly dialed calls were made. Of these, 1,417 calls were non-domestic numbers, 2,183 calls were not answered, and on 301 occasions the line was busy. Four hundred seventy-four households had no qualified respondents, and 661 had language problems (could not speak or understand Cantonese). A total of 1,526 households with 1 person aged 18 or over willing to participate were identified, giving a response rate of 58%.

The sociodemographic characteristics of the sample are described in Table 1. The distribution of the study sample was very close to the data described in the Hong Kong By-Census.¹¹

Table 1 Sociodemographic Features of the Survey Sample (n = 1,526) and General Population of Hong Kong

	Survey sample (%)	General population (%)
Gender		
Male	50.4	49.5
Female	49.6	50.5
Age (y)		
18–34	36.8	37.4
35–54	40.1	38.7
≥ 55	23.1	23.9
Educational attainment		
Primary or below	26.2	32.1
Secondary	55.2	52.7
Tertiary	17.7	15.2
Refused to answer	0.9	—
Personal income/month (HK\$)		
0–14,999	70.2	74.3
15,000–24,999	12.5	15.3
25,000–39,999	4.2	5.7
≥ 40,000	2.9	4.7
Uncertain	3.3	—
Refused to answer	6.9	—

Data Analysis

Data from the questionnaires were entered into a computer with SPSS software (SPSS Inc). Statistical analyses were performed with the chi-square test. Where multiple tests were involved, *P* values were adjusted by Bonferroni's correction method. A 5% confidence level was used for all tests.

Results

Prevalence of Jaw Pain

The overall prevalence of positive reports of jaw pain was 33% (95% confidence interval [CI], 30.6% to 35.4%) (Table 2). Within this group, only 5% had pain occurring very often or quite often. No statistically significant gender-related differences in pain reports were observed overall or in the subgroup with pain occurring very/quite often. However, there was a significant trend (*P* < .03) toward fewer pain reports in respondents over 55 years of age (Table 2).

Thirty-three percent of subjects who reported jaw pain described it as moderate or severe. Within this group, there were no gender-related differences in pain intensity. There was, however, a significant trend in the oldest age group toward pain episodes of severe intensity (*P* < .01), with more than 3 times as many occurrences in this group (Table 3). Sixty-four percent of subjects with symptoms occurring often or very often experienced jaw pain of moderate to severe intensity, compared with 36.8% who reported that pain occurred only sometimes.

It was difficult to discern definitive trends in pain patterns throughout the day, because more than 50% of subjects were unsure when the pain was experienced (Table 4). However, more subjects reported experiencing the worst pain during

Table 2 Percent of Affirmative Responses to Questions About Symptoms, by Gender and Age Group

Symptom	Overall (n = 1,526)	Gender		Age		
		Males (n = 769)	Females (n = 757)	18–34 (n = 562)	35–54 (n = 612)	≥ 55 (n = 352)
Jaw pain	33.0	33.4	32.5	35.1	34.8	26.4*
Difficulty opening	8.2	7.5	8.9	10.0	8.5	4.8*
Clicking	29.9	30.2	29.7	39.3	31.0	13.1 [†]
Tooth grinding/clenching	24.6	25.1	24.0	31.1	26.3	11.1 [†]
Poorly rested	18.9	19.1	18.5	24.5	18.2	10.8 [†]
Sought treatment	3.3	3.4	3.2	3.2	2.8	4.3

**P* < .03; [†]*P* < .01 (chi-square test).

Table 3 Pain Intensity Among Respondents Reporting Jaw Pain (n = 503) by Gender and Age Group

Respondents	Pain intensity (%)			
	Mild	Moderate	Severe	Uncertain
Overall	64.6	24.9	7.6	3.0
Male	65.4	25.7	5.8	3.1
Female	63.8	24.0	9.3	2.8
18–34 years	68.5	25.9	4.6	1.0
35–54 years	64.8	24.9	5.6	4.7
≥ 55 years	55.9	22.6	18.3*	3.2

* $P < .01$ (chi-square test).**Table 4** Pattern of Jaw Pain by Gender, Age Group, and Pain Intensity

Jaw pain	n	Pain pattern (%)				
		Awakening	Morning	Afternoon	Evening	Uncertain
Overall	503	6.4	11.3	8.3	13.9	60.0
Gender						
Male	257	6.6	12.5	9.3	16.3	55.3
Female	246	6.1	10.2	7.3	11.4	65.0
Age group						
18–34 years	197	8.6	11.2	8.6	15.2	56.3
35–54 years	213	6.1	10.8	7.0	15.5	60.6
≥ 55 years	93	2.2	12.9	10.8	7.5	66.7
Intensity						
Mild	325	5.8	11.4	8.3	13.2	61.2
Moderate	125	8.8	12.8	10.4	14.4	53.6
Severe	38	5.3	10.5	5.3	18.4	60.5

the evening and morning than in the afternoon or when awakening.

Jaw Opening and Clicking

The overall prevalence of difficulty in jaw opening was 8.2% (95% CI, 6.8% to 9.6%), with 4% of these subjects reporting the occurrence as very often or quite often. Jaw clicking was reported by almost 30% of respondents (95% CI, 27.6% to 32.2%), but only 6% of these found it occurred very/quite often. No significant gender-related differences in either symptom were found (Table 2). In the oldest group of respondents, the prevalence of difficulty in jaw opening decreased by half ($P < .03$), and jaw clicking decreased threefold ($P < .01$).

Tooth Grinding/Clenching and Sleep Patterns

Tooth grinding and clenching were reported by 24.6% of the sample (95% CI, 22.4% to 26.8%); this occurred very/quite often in 8% of these sub-

jects and more often at night (54.4%). The proportion of subjects in the oldest age group describing tooth grinding and clenching was less than half that of the younger subjects ($P < .01$) (Table 2). Approximately 19% of the population found themselves poorly rested after sleeping. The main reason cited was not sleeping long enough. There were significantly fewer poorly rested subjects in the older age group ($P < .01$). There were no gender-related differences in prevalence of either condition.

Associations Between TMD Symptoms, Tooth Grinding/Clenching, and Sleeping Patterns

Overall, 3.4% of respondents reported that 1 or more of the 3 TMD symptoms described in the questionnaire occurred frequently: 3% reported 1 symptom, 0.4% reported 2 symptoms, and no respondents reported 3 symptoms. Subjects with jaw pain were more likely to experience other TMD symptoms and related conditions. Significant associations were found between jaw

Table 5 Associations Between TMD Symptoms, Tooth Grinding and Clenching, Sleeping Patterns, and Treatment Seeking

Variable	Difficulty opening	Clicking	Tooth grinding/ clenching	Poorly rested	Sought treatment
Jaw pain	$P < .01$	$P < .01$	$P < .01$	$P < .01$	$P < .01$
Difficulty opening	—	$P < .01$	NS	NS	$P < .01$
Clicking	—	—	$P < .01$	$P < .01$	$P < .05$
Tooth grinding/clenching	—	—	—	$P < .01$	NS
Poorly rested	—	—	—	—	NS

*Statistically significant, chi-square test, $P < .05$; NS = not significant. Adjusted (Bonferroni's correlation) P values shown.

Table 6 Reports of TMD Symptoms (Occurring Quite Often or Very Often) in the Overall Sample and Among Treatment-Seekers

Symptoms	Overall (%)	Treatment-seekers (%)
Jaw pain/difficulty opening	0.2	2.0
Jaw pain/joint clicking	0.1	2.0
Difficulty opening/joint clicking	0.1	0.0
Jaw pain/difficulty opening/ joint clicking	0.0	0.0

pain and difficulty in jaw opening, jaw clicking, tooth grinding, and a poorly rested condition ($P < .01$) (Table 5). Difficulty in jaw opening was associated with jaw clicking ($P < .01$). Jaw clicking was associated with tooth grinding and a poorly rested state ($P < .01$). Tooth grinding was associated with a poorly rested state ($P < .01$).

Treatment-Seeking Behavior

Overall, 3.3% (95% CI, 2.4% to 4.2%) of respondents had sought treatment for 1 or more symptoms associated with TMD in the preceding year. Within this group, only a small proportion experienced symptoms frequently: jaw pain (12%), difficulty in jaw opening (2%), or jaw clicking (8%). Half of those with jaw pain described it as moderate to severe. Only 4% of those who sought treatment had more than 1 symptom that occurred frequently: 1 case of jaw pain and difficulty in jaw opening and 1 case of jaw pain and joint clicking (Table 6). There were no statistically significant gender-related differences in treatment seeking or between age groups.

Discussion

This is the first community-based survey of the prevalence of symptoms associated with TMD in Hong Kong, a predominantly ethnic Chinese, Cantonese-speaking, urban community. We obtained a representative sample of the population, as demonstrated by the strong similarity with demographic data obtained in the 1996 Hong Kong population census. The response rate to the telephone survey (58%) was similar to that seen in telephone-based TMD studies conducted previously in Canada and Finland.^{1,2,5}

The present survey provides a population perspective on symptoms associated with TMD in Hong Kong. However, it must be acknowledged that no clinical examinations or face-to-face interviews were involved. Thus, there is always the issue of reliability of data obtained by telephone interview. Nonetheless, in a comparison of health and illness data acquired by telephone and face-to-face interviews in the General Household Survey undertaken by the Census and Statistics Department of the Hong Kong Government, Lam et al¹² noted that the outcomes were highly correlated.

The survey approach was similar to that described previously by Goulet et al¹ and to aspects of the telephone study by Locker and Slade,² so some meaningful comparisons could be made. The overall prevalence of jaw pain in the Hong Kong population was 33%, which is similar to the findings (30%) of Goulet et al.¹ Pain intensity was greater in those experiencing frequent pain, as also noted by Goulet et al.¹ However, fewer Chinese respondents had frequent pain or experienced moderate or severe symptoms. Based on the definition of clinically significant TMD-related jaw pain as "frequent jaw pain of moderate to severe intensity," only 1% of the Hong Kong population had this problem, compared with 5% of the Quebec, Canada, population.¹ The prevalence of jaw pain was lowest in the oldest age group (those over 55 years of age) and similar to that of Locker and Slade,² whereas no obvious trend in age-related differences was reported by Goulet et al.¹ However, there was a similar tendency toward a greater frequency of severe pain in the oldest age group. It was difficult to establish a clear-cut impression of jaw pain patterns throughout the day because more than half the respondents could not remember at what time the pain occurred. Feine et al¹³ have observed that patients' recollections of past pain experiences in the orofacial region are often inaccurate.

The prevalence of difficulty in jaw opening was considerably lower in Hong Kong Chinese (8%) than in the population of Quebec (16%), although the prevalence of jaw clicking was similar (30%). However, the prevalence of frequent occurrences of both symptoms was significantly lower (0.4% for jaw opening and 1.9% for jaw clicking). There was a trend toward decreased frequency of symptoms with age, as noted by Goulet et al¹ and Locker and Slade.²

A notable feature of the Hong Kong population was the absence of gender differences in overall pain prevalence, pain intensity, and frequency, in contrast to most studies of jaw pain associated with TMD.^{9,14} Likewise, there were no gender differences in the prevalence of the other 2 TMD symptoms investigated, or in tooth grinding or sleep problems. Most previous epidemiologic studies of TMD symptoms and associated conditions have been conducted in North America and Europe.⁹ A significant female bias in symptom reporting and severity was routinely observed, although a less compelling gender difference was noted by Locker and Slade² in a population in Canada and by Helkimo¹⁵ in a group of Lapps in Northern Finland. However, in a study of TMD

symptoms in young adult Chinese in Taiwan by Shiau and Chang,⁷ symptom reporting was only slightly higher in women. Likewise, in an adult population in an urbanized community in Japan, there were only modest differences in the gender distribution of jaw pain, impaired jaw opening, and joint sounds.¹⁶ Thus, there is some evidence to suggest that a true gender-related difference in symptom presentation may exist in populations in Western countries but not in Asian countries.

In general, the Hong Kong population did not experience multiple TMD symptoms frequently (0.4%). Goulet et al¹ noted a similar situation in Quebec, where only 1% to 3% of their sample experienced more than 1 TMD symptom often. The small number of Chinese who had multiple symptoms also reported more instances of tooth grinding and clenching and impaired sleeping, although the magnitude of these putative associations could not easily be discerned because of the small number of subjects involved.

As expected by the low prevalence of clinically significant symptoms of TMD, treatment seeking was low and related to jaw pain, jaw opening, and clicking. Unlike previous studies, no gender bias was observed, although this probably relates to the lack of gender differences in symptom reporting by the Hong Kong Chinese population generally.

Our original contention was that symptoms associated with TMD were less prevalent in southern Hong Kong Chinese. The present survey supports this contention. Whether the lower prevalence is a result of ethnic or environmental factors is still unclear. Hong Kong is highly urbanized and very crowded and may be considered a stressful community to live in; therefore, a priori, it would be reasonable to anticipate that symptoms of TMD would be common.¹⁷ Life stress has often been proposed as a possible risk factor for TMD (see review by LeResche⁹). However, cultural differences in the perception and reporting of symptoms may have accounted, at least in part, for the reduced prevalence.

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