A Simplified Tool for Screening the Patients with Temporomandibular Disorders: A Pilot Study
เครื่องมืออย่างง่ายเพื่อตรวจคัดกรองผู้ป่วยที่มีความผิดปกติบริเวณขมับ-ขากรรไกร: การศึกษานำร่อง

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ABSTRACT

The purpose of this study was to fabricate a Thai questionnaire for screening the patients with temporomandibular disorder (TMD). The questionnaire was used among sixty subjects and evaluated for validity. Indices of item-objective congruence were ranged from 0.67 to 1.00. Its sensitivity and specificity for correctly classifying those with and without TMD were 73% and 70%, respectively. The results illustrated the present questionnaire's usefulness for the utilizations by Thai dentists, despite the need of some further study for heightening its validity and reliability.

บทคัดย่อ

การศึกษานี้มีวัตถุประสงค์เพื่อสร้างแบบสอบถามภาษาไทย สำหรับการตรวจคัดกรองผู้ป่วยที่มีความผิดปกติ บริเวณขมับ-ขากรรไกร (ทีเอ็มดี) แบบสอบถามถูกนำมาใช้กับผู้รับการทดลอง 60 รายและถูกประเมินความถูกต้อง ดัชนีความสอดคล้องระหว่างคำถามรายข้อกับวัตถุประสงค์ มีค่าระหว่าง 0.67-1.00 แบบสอบถามมีความไวและ ความจำเพาะสำหรับการจำแนกรายที่มีกับที่ปราศจากทีเอ็มดี เท่ากับร้อยละ 73 และร้อยละ 70 ตามลำดับ ผลการศึกษา แสดงประโยชน์ของแบบสอบถามนี้ เพื่อการนำไปใช้โดยทันตแพทย์ไทย แม้ว่าจำเป็นต้องศึกษาต่อไปเพื่อเพิ่มความ ถูกต้องและความเชื่อถือได้ของแบบสอบถาม

Keywords: Screening, Questionnaire, Temporomandibular disorder (TMD)

คำสำคัญ: การตรวจคัดกรอง แบบสอบถาม ความผิดปกติบริเวณขมับ-ขากรรไกร (ทีเอ็มดี)

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Introduction

National Institute of Dental and Craniofacial Research (2018) has documented that temporomandibular disorder (TMD) is the most common cause of non-dental pain in the orofacial region, affects approximately 5-12% of population, causes dysfunction of and recurrent or chronic pain in the jaw joints, as well as their associated muscles and supporting tissues, and pain-related TMD impacts an individual's daily activities, psychosocial functions, and quality of life. With its multifactorial causes (such as emotional stress, occlusal interferences, dental malposition or loss, postural changes, masticatory muscle and adjacent structure dysfunctions, TMJ structures' intrinsic and extrinsic changes, and a combination of the mentioned ones), TMD has been clinically associated with temporomandibular joint (TMJ) and masticatory muscle pain, joint sounds, and abnormal jaw movements (Chandak et al., 2017).

An assessment of TMD includes an interview of the patient's history, a comprehensive clinical examination, TMJ radiography, and some additional tests, if necessary. A general dental practitioner has been recommended to refer a patient with some TMJ abnormality to a TMD specialist for a proper management (Conti et al., 2007). Due to the shortage of awareness on their disorders and/or failure to visit a hospital with a TMD specialist, many patients with TMD might not obtain an appropriate treatment (Nishiyama et al., 2014). To address such issues, some screening tools applicable for initial TMD screening procedures are needed. A successful one would help a general dental practitioner to decide whether some more comprehensive evaluation is necessary for a definitive diagnosis (Gonzalez et al., 2011).

With its benefits of low cost, simplicity, and prompt, a self-administered questionnaire makes epidemiological surveys and treatment follow-up more feasible (Nomura et al., 2007). Since a validated TMD screening questionnaire in Thai has never been proposed, a successful one would give some light to Thai dentists' perceptions on TMD signs and symptoms.

Objective of the study

The aim of this study was to fabricate a Thai questionnaire for screening the patients with TMD.

Methodology

This study was approved by Naresuan University Ethical Committee, Phitsanulok, Thailand (IRB Number 0395/2018).

Subjects

The subjects, regardless of their ages, either with or without symptoms of jaw and/or temporal areas coming to Oral Diagnosis Clinic at Naresuan University Dental Hospital between July and November 2018 and willing to participate in this study were selected. Sixty subjects (24 men and 36 women) with an age between 13-54 years old were then included.

Questionnaire

Firstly developed in the Thai language (Figure 1), this study's questionnaire for screening TMD pain was reviewed and translated into English (Figure 2) by a dentist with a Board Certification in Occlusion and Orofacial Pain by Royal College of Dental Surgeons of Thailand (RCDS Thailand). It was divided into two parts (five items per part),

that is, Part I concerning about TMD pain or dysfunctions and Part II TMD-related some limitations of daily functions and pain intensity by using a pain numeric rating scale.

In Part I, either "Yes" or "No" in each item had to be chosen. In case that "Yes" was chosen, an additional selection of "Left" and/or "Right" was asked to specify the symptom's side. With a minimum of a "Yes" answer in Part I, the subjects had to proceed to Part II, where their pain in the 0- (no pain) to 10- (extremely pain) level of a rating scale needed to be selected. Post-answering Part II of the questionnaire, all subjects were subjected to an examination for screening TMD pain by the dentist stated previously.

To check the questionnaire's content validity, all of its items were evaluated by two dentists with a Board Certification in Orthodontics by RCDS Thailand and by that stated above. Each item was scored by either +1 for that with a clear measurability, 0 an unclear content, or -1 a clear non-measurability.

Each subject's past history was interviewed and pain level, masticatory muscles and TMJ were clinically examined for screening the TMD by a dentist with a Board Certification in Occlusion and Orofacial Pain by RCDS Thailand. The data were recorded in a screening form (Figure 3).

Determined by correctly identifying a proportion of the actual TMD subjects (in whom the test-result was positive), sensitivity has been used to measure a proportion of the actual TMD subjects. Determined by correctly identifying a proportion of the actual non-TMD subjects (in whom the test-result was negative), specificity has been used to measure a proportion of the actual non-TMD patients.

Statistical analyses of the data

All data were analyzed by using a Statistical Program for Social Sciences 23.0. Each question's content validity was evaluated by using indices of item-objective congruence (IOC). An index of IOC higher than 0.5 was considered an acceptable content validity. Any item with an index value lower than 0.5 was subjected to revision.

Results

Twenty four males (40%) and 36 females (60%) were included in this study and their ages were between 13 and 54 years old (mean±standard deviation = 23.98±7.45 years old). Thirty (50%) of them possessed TMD, whereas the rest (30 subjects; 50%) no TMD.

The indices of IOC were ranged from 0.67 to 1.00, the highest (1.00) of which was detectable in seven among eleven items. By using a method modified from that described by Black et al. (1999), analyses of the sensitivity and specificity were conducted. The questionnaire's sensitivity and specificity were 73% and 70%, respectively (Table 1).

Subject no. _____

แบบสอบถามคัดกรองความผิดปกติบริเวณขมับ-ขากรรไกร (ทีเอ็มดี)

กรุณา X ช่องที่ตรงกับความเป็นจริงของท่านมากที่สุด

ส่วนที่ 1 คัดกรองความผิดปกติบริเวณขมับ-ขากรรไกร (ทีเอ็มดี)

ในช่วง 30 วันที่ผ่านมา ท่านมีอาการเหล่านี้หรือไม่	มีอาการ		ไม่มีอาการ
ปวดขากรรไกร และ/หรือ ขมับ	ซ้าย	ขวา	
ปวดหน้าหู	ซ้าย	ขวา	
ติดขัดบริเวณขากรรไกร	ซ้าย	ขวา	
มีเสียงคลิก ครืดคราด หรือกึกกักบริเวณหน้าหู ขณะอ้าปาก หุบปาก ยื่น หรือเยื้องขากรรไกร	ซ้าย	ขวา	
อ้าปาก ยื่น หรือเยื้องขากรรไกรได้น้อยลง	ซ้าย	ขวา	

ด้านขวาของท่าน   ด้านซ้ายของท่าน
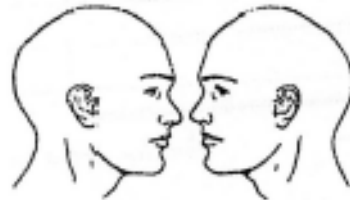
กรุณาทำเครื่องหมาย X ลงในรูปบริเวณที่ท่านมีอาการ

หากท่านตอบว่า "มีอาการ" ในส่วนที่ 1 เพียงหนึ่งช่อง ให้ทำแบบสอบถาม ส่วนที่ 2 ต่อ
หากท่านตอบว่า "ไม่มีอาการ" ให้สิ้นสุดการทำแบบสอบถาม

ส่วนที่ 2 ประเมินระดับความรุนแรงของความผิดปกติบริเวณขมับ-ขากรรไกร (ทีเอ็มดี)

ในช่วง 30 วันที่ผ่านมา กิจกรรมเหล่านี้ส่งผลต่ออาการปวดบริเวณดังกล่าวหรือไม่ ถ้ามี โปรดระบุความรุนแรงของอาการปวด โดย 0 = ไม่ปวด 10 = ปวดมากที่สุด	มีผล	ไม่มีผล
การเคี้ยวอาหารแข็ง และ/หรือ เหนียว	0 1 2 3 4 5 6 7 8 9 10	
การอ้าปาก และ/หรือ การเยื้องยื่นขากรรไกรไปมา	0 1 2 3 4 5 6 7 8 9 10	
การกัดฟันแน่น และ/หรือ การขบเน้นฟัน	0 1 2 3 4 5 6 7 8 9 10	
การถูฟันไปมา	0 1 2 3 4 5 6 7 8 9 10	
การอ้าปาก การพูด หรือ การหาว	0 1 2 3 4 5 6 7 8 9 10	

สิ้นสุดการทำแบบสอบถาม

Figure 1 The questionnaire to be filled out by the subjects in this study

A Questionnaire for Screening Those with Temporomandibular Disorder (TMD)

Please mark an X in the provided space(s) which best describe(s) your symptoms

Part I: Screening the TMD

During the past 30 days, did you have any of the following symptoms?	Yes		No
Feeling pain at your jaw(s) or temple(s)	Left	Right	
Feeling pain at the area in front of your ear(s)	Left	Right	
Stiffness or getting stuck when moving your lower jaw	Left	Right	
Hearing a clicking, a grating, or a popping sound at the area in front of your ear(s), during opening, closing, advancing, or moving your lower jaw to the side.	Left	Right	
Some limitation(s) during opening your mouth, during moving your lower jaw forward, or during moving your lower jaw to the side.	Left	Right	

Your right side   Your left side
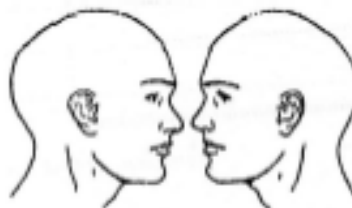
In the figure(s), please mark an "X" at the area(s) corresponding to
the site(s) relevant to your answer(s) with "Yes" in Part I.

If any item in Part I has been marked with "Yes", please proceed to Part II.

If all items in Part I have been marked with "No", please stop answering this questionnaire.

Part II: Evaluating the severity of TMD

If your answer is "Yes", please identify the level of pain affected by such activity in the scale provided.

Your pain level is from 0 to 10, with 0 = no pain and 10 = maximal pain.

During the past 30 days, did the following activities affect your painful symptom(s) at the site(s) you answered in Part I?	Yes	No
Chewing hard and/or sticky food	0 1 2 3 4 5 6 7 8 9 10	
Opening your mouth and/or moving your lower jaw to the left and right sides	0 1 2 3 4 5 6 7 8 9 10	
Tightly biting and/or clenching your upper and lower teeth	0 1 2 3 4 5 6 7 8 9 10	
Moving your teeth to the left and right sides, while grinding your upper and lower teeth	0 1 2 3 4 5 6 7 8 9 10	
Opening your mouth, speaking, or yawning	0 1 2 3 4 5 6 7 8 9 10	

Figure 2 The questionnaire reviewed and translated into English

Screening form

Subject no. _____ Age _____ Sex _____

Past history

Trauma or accident _____

Orthodontic treatment _____

TMD treatment _____

Parafunctional habits

☐ Awake bruxism

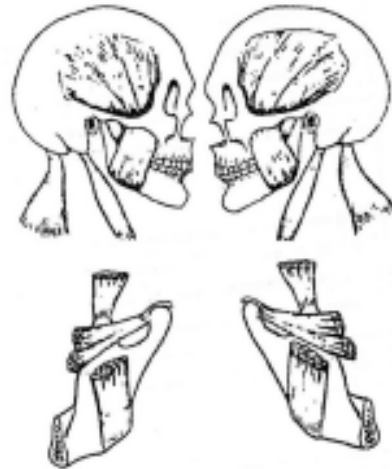☐ Sleep bruxism

☐ Others_____

Pain severity (NRS 0-10)_____

Muscles palpated

Jaw motion

	Pain			Range
	R	L	No	(mm)
Maximum opening				
Lateral excursion: L				
Lateral excursion: R				
Protrusion				

TMJ symptoms

	R	L
Negative		
Painful on function		
Painful on palpation		
Clicking		
Popping		
Crepitus		
Ear ringing		
Hypomobility		
Hypermobility		

Areas of orofacial pain
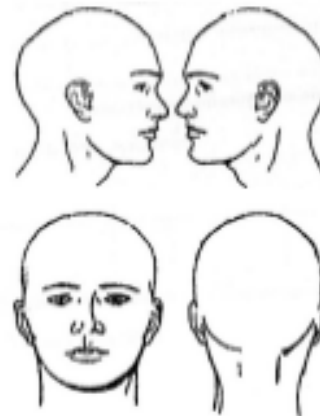
Diagnosis: ☐ TMD ☐ not TMD

Severity: ☐ mild ☐ moderate ☐ severe

_____ signature

(Dr. Jittima Pumklin)

(__/__/__)

Figure 3 The screening form to be filled out by the dentists in this study

Table 1 Analyses of the questionnaire's sensitivity and specificity. Parenthesized alphabets represent true positive (a), false positive (b), false negative (c), and true negative (d).

		Clinical evaluations by a specialist in Occlusion and Orofacial Pain		Total
		TMD	Non-TMD	
Questionnaire	Positive	22 (a)	9 (b)	31 (a+b)
	Negative	8 (c)	21 (d)	29 (c+d)
	Total	30 (a+c)	30 (b+d)	60 (a+b+c+d)

$$\text{Sensitivity} = \frac{a}{a+c} = \frac{22}{22+8} = 0.73; \quad \text{Specificity} = \frac{d}{b+d} = \frac{21}{9+21} = 0.70$$

Discussion

Prior to an extensive usage, a newly developed questionnaire should be pilot tested and validated (Kazi and Khalid, 2012). Wording of questions is critical and should be taken into consideration. Since the questionnaire in this study had been designed as a self-administered one, complete answers by subjects without the researcher's interventions were required. Hence, there was an attempt at using the language understandable by subjects at any age, educational level, and culture.

The indices of IOC were calculated by the summation of scores from each expert and divided by the number of experts (three) in this study. Based on the interpretations by Cantero-Téllez et al. (2015), the questionnaire's IOC index range (0.67-1.00) indicated good content validities in seven among eleven items, leaving four items to be revised for an improvement of their clarities.

If a questionnaire will be used for screening TMD patients, it should present a 70% sensitivity and 75-95% specificity (Franco-Micheloni et al., 2014). The sensitivity and specificity of this questionnaire were 73% and 70%, respectively. Hence, our questionnaire presented a sensitivity, but not specificity, applicable for such objective.

Some limitations were existed in this study. Firstly, some words in the questionnaire could be interpreted differently among subjects, resulting in their misunderstanding and some incorrect answers. Secondly, TMD severity could not be interpreted, because of its small sample size. Based on the subjects' convenience, neither did the recruitment represent the level of pain-related TMD nor were the test-retest procedures performed on the questionnaire. In further research, those with TMD should be divided into mild, moderate, and severe pain subgroups. In addition, a Kappa statistic should be conducted, in case that the collected data would be in a nominal level, to analyze the questionnaire's internal consistency reliability. Thirdly, the pain scores were obtained by using a visual analog scale, similarly to those by an interview with a specialist. The scale was an abstract thinking of patient and its interpretation was subjected to some bias. Other actual pain-assessment tools were recommended for an evaluation of the subjects' pain intensity.

Conclusions

This questionnaire has an acceptable sensitivity for screening patients with pain-related TMD. Patient's history taking, clinical examination, and other investigations should be done for a definitive diagnosis of TMD. A larger sample size is recommended to improve the questionnaire's effectiveness, causing it to be a simple, fast, and reliable instrument for primary care providers, general dentists, and orthodontist to evaluate the patients with pain-related TMD.

Acknowledgement

References

Black ER, Panzer RJ, Mayewski RJ, Griner PF. Characteristics of diagnostic tests and principles for their use in quantitative decision making. In: Black ER, Bordley DR, Tape TG, Panzer RJ, editors. Diagnostic strategies for common medical problems. 2nd ed. Philadelphia: American College of Physicians; 1999: 1-16.

Cantero-Téllez R, Porqueres MI, Piñel I, Orza JG. Cross-cultural adaptation, internal consistency and validity of the handwriting proficiency screening questionnaire (HPSQ) for Spanish primary school-age children. J Nov Physiother 2015; 5(278): 1-6.

Chandak RM, Pandhripande RM, Sonule SS, Chandak MG, Rawlani SS. To assess the prevalence of signs and symptoms of temporomandibular disorders in Vidarbha population by Fonseca's questionnaire. J Oral Res Rev 2017; 9(2): 62-6.

Conti ACDCF, Oltramari PVP, Navarro RDL, Almeida MRD. Examination of temporomandibular disorders in the orthodontic patient: a clinical guide. J Appl Oral Sci 2007; 15(1): 77-82.

Franco-Micheloni AL, Fernandes G, GonÇalves DADG, Camparis CM. Temporomandibular disorders among Brazilian adolescents: reliability and validity of a screening questionnaire. J Appl Oral Sci 2014; 22(4): 314-22.

Gonzalez YM, Schiffman E, Gordon SM, Seago B, Truelove EL, Slade G, et al. Development of a brief and effective temporomandibular disorder pain screening questionnaire: reliability and validity. J Am Dent Assoc 2011; 142(10): 1183-91.

Kazi AM, Khalid W. Questionnaire designing and validation. J Pak Med Assoc 2012; 62(5): 514-6.

National Institute of Dental and Craniofacial Research. Facial pain. Research Data & Statistics [Serial Online]. Jul 2018 [cited 2018 Nov 24]. Available from: https://www.nidcr.nih.gov/research/data-statistics/facial-pain.

Nishiyama A, Otomo N, Tsukagoshi K, Tobe S, Kino K. The true-positive rate of a screening questionnaire for temporomandibular disorders. Open Dent J 2014; 8: 236-40.

Nomura K, Vitti M, Oliveira ASD, Chaves TC, Semprini M, Siéssere S, et al. Use of the Fonseca's questionnaire to assess the prevalence and severity of temporomandibular disorders in Brazilian dental undergraduates. Braz Dent J 2007; 18(2): 163-7.