QUALITY IMPROVEMENT IN DENTAL AND MEDICAL KNOWLEDGE, RESEARCH, SKILLS AND ETHICS FACING GLOBAL CHALLENGES

Edited by
Armelia Sari Widyarman, Muhammad Ihsan Rizal,
Moehammad Orliando Roeslan & Carolina Damayanti Marpaung

CRC Press
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The proceedings of FORIL XIII 2022 Scientific Forum Usakti conjunction with International Conference on Technology of Dental and Medical Sciences (ICTDMS) include selected full papers that have been peer-reviewed and satisfy the conference's criteria. All studies on health, ethics, and social issues in the field of dentistry and medicine have been presented at the conference alongside clinical and technical presentations. The twelve primary themes that make up its framework include the following: behavioral epidemiologic, and health services, conservative dentistry, dental materials, dento-maxillofacial radiology, medical sciences and technology, oral and maxillofacial surgery, oral biology, oral medicine and pathology, orthodontics, pediatrics dentistry, periodontology, and prosthodontics. This proceeding will be beneficial in keeping dental and medical professionals apprised of the most recent scientific developments.

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PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON TECHNOLOGY OF DENTAL AND MEDICAL SCIENCES (ICTDMS 2022), JAKARTA, INDONESIA, 8–10 DECEMBER 2022

Quality Improvement in Dental and Medical Knowledge, Research, Skills and Ethics Facing Global Challenges

Edited by

Armelia Sari Widyarman, Muhammad Ihsan Rizal, Moehammad Orliando Roeslan and Carolina Damayanti Marpaung
Universitas Trisakti, Indonesia

CRC Press
Taylor & Francis Group
Boca Raton London New York Leiden

CRC Press is an imprint of the
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A BALKEMA BOOK

First published 2023
by CRC Press/Balkema
4 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN

and by CRC Press/Balkema
2385 NW Executive Center Drive, Suite 320, Boca Raton FL 33431

CRC Press/Balkema is an imprint of the Taylor & Francis Group, an informa business

British Library Cataloguing-in-Publication Data
A catalogue record for this book is available from the British Library

Library of Congress Cataloging-in-Publication Data
A catalog record has been requested for this book

ISBN: 978-1-032-51441-3 (hbk)
ISBN: 978-1-032-51466-6 (pbk)
ISBN: 978-1-003-40237-4 (ebk)

DOI: 10.1201/9781003402374

Typeset in Times New Roman
by MPS Limited, Chennai, India

Quality Improvement in Dental and Medical Knowledge, Research, Skills and Ethics Facing Global Challenges – Widyarman et al. (Eds)
© 2024 The Editor(s), ISBN 978-1-032-51441-3

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Preface

Faculty of Dentistry Universitas Trisakti (Usakti) presents FORIL XIII 2022 Scientific Forum Usakti conjunction with International Conference on Technology of Dental and Medical Sciences (ICTDMS) on December 8th–10th 2022. The theme of the conference is "Quality Improvement in Dental and Medical Knowledge, Research, Skills and Ethics Facing Global Challenges".

The triennial conference has served as a meeting place for technical and clinical studies on health, ethical, and social issues in field medical and dentistry. It is organized around 12 major themes, including behavioral, epidemiologic, and health services, conservative dentistry, dental materials, dento-maxillofacial radiology, medical sciences and technology, oral and maxillofacial surgery, oral biology, oral medicine and pathology, orthodontics, pediatrics dentistry, periodontology, and prosthodontics.

The most recent findings in fundamental and clinical sciences related to medical and dental research will be presented in the conference that will be published as part of the conference proceeding. This proceeding will be useful for keeping dental and medical professionals up to date on the latest scientific developments.

Dr. Aryadi Subrata
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Acknowledgements

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Validity and reliability of temporomandibular disorders screening questionnaire for Indonesian children and adolescents

C. Marpaung & N.L.W.P. Dewi
Department of Prosthodontics, Faculty of Dentistry, Universitas Trisakti, Jakarta, Indonesia

M.V. Lopez
Clinica Dental Rocabayera, Cunit, Tarragona, Spain

ABSTRACT: Collecting data through subjective examination is a method of choice for large-scale epidemiological studies. To this date, there is no standardized tool for Temporomandibular Disorders (TMD) screening for Indonesian children and adolescents. The sensitivity and Specificity of the TMD screening tool were calculated, with clinical examination as the gold standard. Reliability was assessed with test-retest correlation analysis in children (aged 6–12 years) and adolescents (aged 13–18 years) group. The specificity of TMD pain question was 63.7% in children and 58.2% in adolescents. The sensitivity was 44.4% and 60%, respectively. The TMJ sounds question showed a specificity of 92.9% in children and 80.8% in adolescents. The sensitivity was 19.4% and 24.8%, correspondingly. All the TMD screening questions yielded fair to good reliability. The study showed that question items used in TMD screening tool, especially for TMJ sounds, have a low chance of false positives. While it is beneficial for screening purposes, caution must be taken when using it for prevalence data.

1 BACKGROUNDS

Temporomandibular disorders (TMDs) are a group of clinical problems that involve masticatory muscles, temporomandibular joints, and the associated structures (AAOP 2008). The symptoms may include masticatory muscle pain, joint sounds, and jaw movement limitations (de Leeuw et al. 2018) Excessive oral activities, which are common in children, such as bruxism, nail-biting, and nonnutritive sucking, are regarded as contributory factors for TMD manifestations (Marpaung *et al.* 1999; Vanderas 1994).

It was first presumed that the TMDs only affect adults; however, epidemiology studies showed that the young population was negatively impacted by the disorders (Nilsson et al. 2013). The prevalence of TMDs in the young population is reported from 0.7% to 68% (Marpaung et al. 2018, 2019). One of the possible reasons for such a wide prevalence range was the different examination procedures in data collection. Large-scale study on TMD is important to know the weight of the disorders in the community. A validity study comparing functional studies to magnetic resonance imaging (MRI) has shown that clinical examination can be considered a benchmark in TMD recognition (Marpaung et al. 2014). However, comprehensive examinations and tests are time-consuming and expensive; thus, they are rarely feasible in large-scale epidemiologic studies. Questionnaires are handy to be used in a large epidemiological study, though there is a chance of over- or underscoring the conditions due to their subjective nature (Lobbezoo et al. 2013). The available questionnaire that can be used for TMD screening is available for adult subjects (Schiffman et al. 2014). Up to this

DOI: 10.1201/9781003402374-101

moment, there is not any standardized TMD screening questionnaire available for children and adolescent populations. The aim of this study was then to assess the validity (i.e., specificity and sensitivity) of the newly adapted TMD screening questionnaire for children and adolescents versus clinical examination to detect TMD. Reliability of those questionnaire items was also investigated.

2 METHODS

Pilot study was first conducted to obtain the examiners' reliability. The clinical examination data collection was done by 3 examiners, and their Inter-rater agreement (Cohen's Kappa) was assessed by having each examine 50 high school students. The screening questionnaire being studied was adapted from the standardized diagnostic criteria for TMD (DC/TMD) (Schiffman et al. 2014). Two items for TMD pain and TMJ sounds from DC/TMD were used and adapted for self-report in adolescents and parental reports in children (Table 1).

Table 1. Inter-rater agreement of 3 observers.

Items	Description	Kappa
ADD/Hypermobile click	A distinct singular click that occurs during the opening or closing of the mouth.	0.87
Crepitus	A continuous grating sound that occurs over a period of jaw movement	-*
Temporalis palpation pain	Pain on 1 kg of palpation pressure on 3 zones of temporalis muscle	1
Masseter palpation pain	Pain on 1 kg of palpation pressure on 3 zones of masseter muscle	0.88
TMJ palpation pain	Pain on 0.5 kg of palpation pressure on lateral pole of TMJ	-*
Pain on maximum mouth opening	Pain that occurs during maximal mouth opening	0.98

Notes
*Analysis cannot be done since too few subjects with crepitus and pain on TMJ palpation

The questionnaire's test-retest reliability was estimated for each question by calculating intraclass correlation coefficients (ICC) using absolute agreement. For adolescents (aged 13–18), the questionnaire was distributed to over 75 high school students. The items in the questionnaire consist of questions about orofacial pain and joint sounds (Table 2).

Table 2. The number of officially reported plague cases in the world.

Items	Children		Adolescents	
	Question	ICC	Question	ICC
TMD pain	Does your child have pain at the location of his/her temples, face, in front of the ear, or in the ear?	0.76	Have you had pain in the face, jaw, temple, in front of the ear, or in the ear?	0.64
Joint sound	Does your child make a clicking or popping sound from the jaw when opening/closing the mouth, or when eating?	1.0	Does your jaw make a clicking or popping sound when you open/close your mouth or when you're eating?	0.68

Subjects fill in either yes, no, or don't know as their answer for each question. The test-retest reliability of the questionnaire, completed by children (aged 6–12), was assessed by distributing the questionnaires to 50 parents or legal representatives. The adults were instructed to read the explanation page and fill in the questionnaire together with their children. This procedure was repeated after 10 days. The ICC scores were then interpreted according to Fleiss: ICCs < 0.4 were considered poor; 0.4–0.75 as fair to good; and >0.75 as excellent.

The sensitivity and specificity of subjective examination were carried out at schools in rural and urban areas in the greater Jakarta area. To make sure that data represents Indonesian children and adolescents, schools of high and low socio-economic levels were included in the study. A representative sample size was proportionally estimated for each school, based on the number of 6- to 18-year-old schoolchildren. Questionnaires, informed consent, and a brief introduction of items in the questionnaires were given 1 day before the clinical data collection. A total of 1378 students completed the questionnaire and continued to undergo clinical examination. The clinical data collection was done in the school clinic during daytime class hours by 3 dentists who passed the reliability study. During the examination, the examiners sat in front of the child. Operators calibrated their palpation strength after every 10 clinical examinations using a digital kitchen scale (the protocol of the clinical examination is described elsewhere). Based on the number of cases based on the subjective examination compared to clinical examination, sensitivity and specificity were calculated.

3 RESULTS

Test-retest reliability using intraclass correlation scores of items in the questionnaire were considered fair to good according to Fleiss. A similar result was found in ICC's clinical examination (Tables 3 and 4).

Table 3. Number of subjects with TMJ pain was recognized by the questionnaire as subjective examination and clinical examination.

		Clinical examination		
		No TMJ Pain	TMJ Pain	Total
Children	Subjective examination			
	No TMJ Pain	258	147	405
	TMJ Pain	69	55	124
	Total	327	202	529
Adolescents	Subjective examination			
	No TMJ Pain	239	172	411
	TMJ Pain	96	144	240
	Total	335	316	651

With clinical examination as the gold standard, the TMD pain question showed specificities of 63.7% in children and 58.2% in adolescents. The specificity for TMJ sounds showed a higher score of 92.9% for children and 80.8% for adolescents. The sensitivity for TMD pain questions is 44.4% for children and 60% for adolescents. TMJ sounds questions showed lower score of 19.4% for children and 24.6% for adolescents.

Table 4. Number of subjects with TMJ pain was recognized by the questionnaire as subjective examination and clinical examination.

		Clinical examination		
		No TMJ Sounds	TMJ Sounds	Total
Children	Subjective examination			
	No TMJ Sounds	444	34	478
	TMJ Sounds	54	13	67
	Total	498	47	545
Adolescents	Subjective examination			
	No TMJ Sounds	489	116	605
	TMJ Sounds	156	51	207
	Total	645	167	812

4 DISCUSSION

The main objective of this study was to assess the validity and reliability of subjective reports and clinical findings of TMD in large community of children and adolescents. For TMJ sounds question in children, high specificity was found when the clinical examination was used as the gold standard. This implies that the chance of having a false-positive of TMJ sounds in that age group is low.

It has been a protocol in the field of medicine to have patient reconfirm his or her complaint in the clinical examination. The lack of time to do subjective data confirmation in clinical examination makes researchers need to opt for the most appropriate method of data collection with the least false findings. A questionnaire or interview is often the method of choice, especially in large-scale studies, though its subjectivity nature risks over or underscoring the condition. However, symptom detection solely through clinical examination, especially in children, is difficult since they may exhibit a desire to please according to what they believe of an adult's expectations (Ross & Ross 1984).

In the pilot study, the reliability of the questionnaire and examination protocol that was being used was found to be high. Test-retest reliability analysis of the questionnaire was done by having subjects fill in the same questionnaire 10 days apart. The amount of time was considered sufficient as a "washout period", where a subject would be unlikely to remember his/her initial answer. The high reliability of the questionnaire items was likely due to the simple question formulation, and clear explanation of the questions. Similar findings were found in other studies on the young population (Nilsson 2007; Wahlund 2003). Fair to excellent agreement of observers was also found in the pilot study. The high agreement was mainly due to the strict examination protocol which dictated examiners to match the intra-oral signs in the subjects with pictures in the protocol form, along with the other clear instructions in the DC/TMD axis I form.

In pain symptom detection, subjective report is still preferred when no symptom confirmation is performed. Pain is a subjective entity; thus, it is what the individual who suffers from pain says it is (McCaffery 1994). The potential bias in children in this study was overcome by having parents fill in the questionnaire together with their children. In non-pain TMD symptoms, such as joint click, clinical examination was chosen by most studies (Bonjardim et al. 2005; Huddleston Slater et al. 2007; Isberg et al.1998; Keeling et al. 1994) since awareness of a non-pain condition is assumed to be low.

Low to moderate sensitivity and specificity in TMD pain question found in this study was below the target validity as set by the international orofacial pain interest group (Schiffman et al. 2014). Other studies that observe similar sensitivity also showed higher validity (Lövgren et al. 2016; Nilsson 2007). However, the two mentioned studies were done in the

patient population or subjects seeking TMD treatment. Therefore, the result cannot be directly applied to the non-patient population where the disorder does not necessarily cause subjects' complaints. The general nature of TMD pain question used in this study might not be specific enough to direct the subject to the masticatory muscle and temporomandibular joint area. The high incidence of ear infections and headache complaints in children might also distract subjects' understanding of orofacial pain (Karunanayake et al. 2016; Nieswand et al. 2020).

The high specificity of the TMJ sounds question indicates that the chance of having a false positive is low. In this study, the presence of TMJ sounds was clinically examined based on three probable diagnoses, namely anterior disc displacement, hypermobility joint, and degenerative disorders. The first two conditions generate distinct singular TMJ sounds, while the latter produces continuous grating sounds. However, since the sounds rarely cause major discomfort, patients are often unaware, l*et al*one complain about the condition (Adrian Ujin Yap et al. 2022; Kalaykova et al. 2010; Yap & Marpaung 2021). This might contribute to the low sensitivity found in TMJ sounds questions. However, previous studies showed that specificity is more important than sensitivity for joint sounds cases to prevent overtreatment for such low morbid conditions (Marpaung et al. 2014).

5 CONCLUSION

Information on the validity of TMD screening questionnaires in children and adolescents is needed for TMD detection and prevention. This study showed that the adapted TMD screening questionnaire derived from DC/TMD had a high specificity for TMJ sounds. This study brings forth the need for a more detailed question on TMD pain for screening purposes.

ACKNOWLEDGMENT

The authors would like to thank the Faculty of Dentistry Universitas Trisakti for the technical support of this study.

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Validity and Reliability of Temporomandibular Disorders Screening Questionnaire for Indonesian Children and Adolescents

by Carolina Damayanti Marpaung

Submission date: 25-Jul-2025 01:53PM (UTC+0700)
Submission ID: 2720280054
File name: VALIDITY_and_RELIABILITY_of_TMD_questionnaire.docx (58.84K)
Word count: 2593
Character count: 14807

Validity and Reliability of Temporomandibular Disorders Screening Questionnaire for Indonesian Children and Adolescents

Carolina Marpaung*, Ni Luh Widya P Dewi*, Maria Valiente Lopez[¥]

*Department of Prosthodontics, Faculty of Dentistry, Universitas Trisakti, Jakarta, Indonesia
[¥]Clinica Dental Rocabayera, Cunit, Tarragona, Spain.

*Corresponding author email: carolina@trisakti.ac.id

ABSTRACT

Objective: Collecting data through subjective examination is a method of choice for large-scale epidemiological studies. To this date, there is no standardized tool for Temporomandibular Disorders (TMD) screening for Indonesian children and adolescents. The study assesses the validity and reliability of question items for TMD screening to be used in the Indonesian young population.

Methods: The sensitivity and Specificity of the TMD screening tool were calculated, with clinical examination as the gold standard. Reliability was assessed with test-retest correlation analysis in children (aged 6-12 years) and adolescents (aged 13-18 years) group.

Results: The specificity of TMD pain question was 63.7% in children and 58.2% in adolescents. The sensitivity was 44.4% and 60%, respectively. The TMJ sounds question showed a specificity of 92.9% in children and 80.8% in adolescents. The sensitivity was 19.4% and 24.8%, correspondingly. All the TMD screening questions yielded fair to good reliability.

Conclusion: The study showed that question items used in TMD screening tool, especially for TMJ sounds, have a low chance of false positives. While it is beneficial for a screening purpose, caution must be taken when using it for prevalence data.

Keywords: Temporomandibular Disorders, Children, Adolescents, Validity, Reliability

INTRODUCTION

Temporomandibular disorders (TMDs) is a group of clinical problems that involve masticatory muscles, temporomandibular joints, and the associated structures.[1] The symptoms may include masticatory muscle pain, joint sounds, and jaw movement limitations.[2] Excessive oral activities, which are common in children, such as: bruxism, nail biting, nonnutritive sucking, are regarded as contributory factors for TMD manifestations. [3-5]

It was first presumed that the TMDs only affect adults; however, epidemiology studies showed that the young population was negatively impacted by the disorders.[6] The prevalence of TMDs in the young population is reported from 0.7% to 68%.[7, 8] One of the possible reasons of such a wide prevalence range was the different examination procedures in data collection.

Large scale study on TMD is important to know the weight of the disorders in the community. A validity study comparing functional study to magnetic resonance imaging (MRI) has shown that clinical examination can be considered a benchmark in TMD recognition.[9] However, comprehensive examinations and tests are time-consuming and expensive; thus they are rarely feasible in large-scale epidemiologic studies. Questionnaires are handy to be used in a large epidemiological study, though there is a chance of over- or underscoring the conditions due to their subjective nature.[10] The aim of this study was then to assess the validity (i.e specificity and sensitivity) of items in the questionnaire versus clinical examination to detect TMD. Reliability of those questionnaire items were also investigated.

MATERIAL and METHOD

Pilot study was first conducted to obtain the examiners' reliability. The clinical examination data collection was done by 3 examiners, and their Inter-rater agreement (cohen's kappa) was assessed by having each examining 50 high school students. The questionnaire's test-retest reliability was estimated for each question by calculating intraclass correlation coefficients (ICC) using absolute agreement. For adolescents (aged 13-18), the questionnaire was distributed over 75 high school students. The items in the questionnaire consist of questions about orofacial pain and joint sounds (Table 2). Subjects fill in either yes, no, or don't know as their answer for each question. The test-retest reliability of the questionnaire, completed by children (aged 6-12), was assessed by distributing the questionnaires to 50 parents or legal representatives. The adults were instructed to read the explanation page and fill in the questionnaire together with their children. This procedure was repeated after 10 days. The ICC scores were then interpreted according to Fleiss: ICCs < 0.4 were considered poor; 0.4-0.75 as fair to good; and >0.75 as excellent.

The sensitivity and specificity of subjective examination was carried out at schools of rural and urban area in greater Jakarta area. To make sure that data represents Indonesian children and adolescents, schools of high and low socio-economic level were included in the study. A representative sample size was proportionally estimated for each school, based on the number of 6 to 18 year-old-schoolchildren. Questionnaires, informed consent and a brief introduction of items in the questionnaires were given 1 day before the clinical data collection.

1378 students completed the questionnaire and continued to undergo clinical examination. The clinical data collection was done in the school clinic during daytime class hours by 3 dentists who passed the reliability study. During the examination, the examiners sat in front of the child. Operators calibrated their palpation strength after every 10 clinical examinations using a digital kitchen scale (Protocol of the clinical examination is described elsewhere). Based on the number of cases based on subjective examination compared to clinical examination, sensitivity and specificity were calculated.

RESULTS

Tes-retest reliability using intraclass correlation scores of items in the questionnaire were considered fair to good according to fleiss. The similar result was found in ICC's of clinical examination (Table 2).

Table 1. Inter-rater agreement of 3 observers.

Items	Description	Kappa
ADD / Hypermobile click	A distinct singular click, which occurs during opening or closing of the mouth.	0.87
Crepitus	A continuous grating sound which occurs over a period of jaw movement	-*
Temporalis palpation pain	Pain on 1 kg of palpation pressure on 3 zones of temporalis muscle	1
Masseter palpation pain	Pain on 1 kg of palpation pressure on 3 zones of masseter muscle	0.88
TMJ palpation pain	Pain on 0.5 kg of palpation pressure on lateral pole of TMJ	-*
Pain on maximum mouth opening	Pain which occurs during maximal mouth opening	0.98

*Analysis cannot be done since too little subject with crepitus and pain on TMJ palpation

Table 2. Test-retest reliability analysis of items used in the questionnaires of children and adolescents

	Children		Adolescents	
Items	Question	ICC	Question	ICC

TMD pain	Does your child have pain at the location of his/her temples, face, in front of the ear, or in the ear?	0.76	Have you had pain in the face, jaw, temple, in front of the ear, or in the ear?	0.64
Joint sound	Does your child make a clicking or popping sound from the jaw when opening/closing the mouth, or when eating?	1.0	Does your jaw make a clicking or popping sound when you open/close your mouth or when you're eating?	0.68

With clinical examination as the gold standard, the TMD pain question showed specificities of 63.7% for children and 58.2% in adolescents. The specificity for TMJ sounds showed higher score of 92.9% for children and 80.8% for adolescents. The sensitivity for TMD pain question is 44.4% for children and 60% for adolescents. TMJ sounds questions showed lower score of 19.4% for children and 24.6% for adolescents.

Table 3. Number of subjects with TMJ pain recognized by questionnaire as subjective examination and clinical examination.

		Clinical examination		
		No TMJ Pain	TMJ Pain	Total
Children	Subjective examination			
	No TMJ Pain	258	147	405
	TMJ Pain	69	55	124
	Total	327	202	529
Adolescents	Subjective examination			
	No TMJ Pain	239	172	411
	TMJ Pain	96	144	240
	Total	335	316	651

Table 4. Number of subjects with TMJ sounds recognized by questionnaire as subjective examination and clinical examination.

		Clinical examination		
		No TMJ Sounds	TMJ Sounds	Total
Children	Subjective examination			
	No TMJ Sounds	444	34	478
	TMJ Sounds	54	13	67
	Total	498	47	545
Adolescents	Subjective examination			
	No TMJ Sounds	489	116	605
	TMJ Sounds	156	51	207
	Total	645	167	812

DISCUSSION

The main objective of this study was to assess the validity and reliability of subjective report and clinical findings of TMD in large community of children and adolescents. For TMJ sounds question in children, a high specificity was found when clinical examination was used as the gold standard. This implies that the chance of having a false-positive of TMJ sounds in that age group is low.

It has been a protocol in the field of medicine to have patient reconfirm his or her complaint in the clinical examination. The lack of time to do subjective data confirmation in clinical examination makes researches need to opt for the most appropriate method of data collection with the least false findings. Questionnaire or interview is often the method of choice, especially in large scale studies, though its subjectivity nature risks over or underscoring the condition. However, symptom detection solely through clinical examination, especially in children, is difficult since they may exhibit a desire to please according to what they believe of an adult's expectations.[11]

On the pilot study, the reliability of the questionnaire and examination protocol that were being used was found to be high. Test-retest reliability analysis of the questionnaire was done by having subjects fill in the same questionnaire 10 days apart. The amount of time was considered sufficient as a "washout period", where a subject would be unlikely to remember his/her initial answer. The high reliability of the questionnaire items was likely due to the simple question formulation, and clear explanation of the questions. Similar findings were found in other studies in young population.[12, 13] Fair to excellent agreement of observers were also found in the pilot study. The high agreement was mainly due to the strict examination protocol which dictated examiners to match the intra oral signs in the subjects with pictures in the protocol form, along with the other clear instructions in the DC/TMD axis 1 form.

In pain symptoms detection, subjective report is still preferred when no symptom confirmation is performed. Pain is a subjective entity; thus, it is what the individual who suffers from pain says it is.[14] The potential bias in children in this study was overcome by having parents fill in the questionnaire together with their children. In non-pain TMD symptoms, such as joint click, clinical examination was chosen by most studies [15-18] since awareness of a non-pain condition is assumed to be low.

Low to moderate sensitivity and specificity in TMD pain question found in this study was below the target validity as set by the international orofacial pain interest group.[19] Other

studies that observe similar sensitivity also showed higher validity.[12, 20] However, the two mentioned studies were done in the patient population or subjects seeking for TMD treatment. Therefore, the result cannot be directly applied to the non-patient population where the disorder does not necessarily cause subjects' complaints. The general nature of TMD pain question used in this study might not be specific enough to direct subject to the masticatory muscle and temporomandibular joint area. The high incidence of ear infections and headache complaints in children might also distract subjects' understanding of orofacial pain.[21, 22]

The high specificity of the TMJ sounds question gives an indication that the chance of having a false positive is low. In this study, the presence of TMJ sounds was clinically examined based on three probable diagnoses, namely anterior disc displacement, hypermobility joint, and degenerative disorders. The first two conditions generate distinct singular TMJ sounds, while the latter produces continuous grating sound. However, since the sounds rarely cause major discomfort, patients are often unaware, let alone complain about the condition.[23-25] This might contribute to the low sensitivity found in TMJ sounds question. However, previous study showed that specificity is more important than sensitivity for joint sounds cases to prevent overtreatment for such low morbid condition.[9]

CONCLUSION

This study brings forth the need for a more detailed question on TMD pain for screening purposes. TMJ sounds question showed high specificity for both age groups, and can serve as screening tool for TMD research in young population.

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