



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



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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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Table of Contents

<i>Preface</i>	xiii
<i>Acknowledgements</i>	xv
<i>Committee Members</i>	xvii

Behavioral, epidemiologic and health services

Characteristics of knowledge and attitude of Indonesian professional healthcare students toward Basic Life Support (BLS) courses <i>I. Gunardi, A. Subrata, A.J. Sidharta, L.H. Andayani, W. Poedjiastoeti & S. Suebnukarn</i>	3
Bibliometric analysis of <i>imperata cylindrica</i> papers in Scopus database (2012–2021) <i>M.O. Roeslan, S. Wulansari & P. Monthanapisut</i>	9
Development and validation of Indonesian version of OHIP-49 questionnaire using Rasch model <i>F.K. Hartanto, I. Gunardi, A. Kurniawan, A.J. Sidharta & W.M.N. Ghani</i>	17
Knowledge regarding dental and oral health among pregnant women (study at Palmerah Community Health Center, West Jakarta) <i>P.A. Salsabila, L.H. Andayani & A.G. Souliissa</i>	24
The xerostomia's effect on methadone therapy program patients' oral-health-related quality of life <i>T.T. Theresia, A.N. Fitri & W. Sudhana</i>	31
The differences in work strategy and work fatigue between female and male dentists during the COVID-19 pandemic in Indonesia <i>D. Ranggaini, W. Anggraini, A.P. Ariyani, I. Sulistyowati & M.F.C. Musa</i>	42
Dental students' perceptions and behaviors concerning oral hygiene and eating habits during the COVID-19 pandemic in Indonesia <i>A. Asia, L. Astuti, T.E. Astoeti, A.S. Widyarman & W. Sudhana</i>	49
Analyzing teledentistry consultation during the pandemic Covid-19: A challenge of images in online consultation <i>M. Chandra & R. Tjandrawinata</i>	56

Conservative dentistry

Mandibular first molar with radix entomolaris: An endodontic case report <i>F. Farasdhita, W. Widyastuti & E. Fibryanto</i>	67
Walking bleach technique on endodontically treated caninus with tetracycline discoloration <i>J.D. Susanto, A.P. Dwisaptarini & S. Wulansari</i>	73

Successful management of primary periodontal lesion with secondary endodontic involvement: A case report <i>F. Katrini, W. Widyastuti & Aryadi</i>	77
Non-surgical treatment for extensive perapical lesion: A case report <i>M.P. Darmawanti, A.P. Dwisaptarini & D. Ratnasari</i>	84
Monolithic zirconia endocrown: Indirect restoration for endodontically treated teeth <i>W. Wulandari, T. Suwartini & E. Fibryanto</i>	90
Effect of air-abrasive particle and universal bonding to shear bond strength of zirconia <i>F. Witoko, M.F. Amin, D. Ratnasari & R. Tjandrawinata</i>	95
Composite as a post-obturation restorative material on a non-vital tooth with endodontically treatment: A case report <i>R. Landy, W. Widyastuti & S. Wulansari</i>	101
Caries detection effectiveness of two techniques assessed using FACE method <i>Y. Winardi & A.P. Dwisaptarini</i>	112
<i>Pluchea indica</i> less leaves extract as a root canal irrigant against <i>Enterococcus faecalis</i> Colonies: <i>Ex vivo</i> study <i>E. Fibryanto, A. Tio, J.A. Gunawan, A. Hidayat & N.Z.M. Noh</i>	116
Differences in resin polishing technique of nanofiller and nanohybrid composites <i>E.A.W. Yanti, A.P. Dwisaptarini, Elline & M.S. Jamil</i>	124
Differences in the effect of two Nickel Titanium rotary files preparation toward the changes on root canal curvature <i>A. Darkim, W. Widyastuti, S. Wulansari & E.A. Budiyaniti</i>	129
Effect of high refractive index composite resin thickness on CIELAB value <i>A.P. Dwisaptarini, D. Ratnasari, I. Hadiutomo, R. Tjandrawinata & R. Trushkowsky</i>	136
Single-visit retreatment in underfilled root canal of mandible second premolar: A case report <i>G. Jesslyn, B.O. Iskandar & T. Suwartini</i>	141
Antibiofilm effect of avocado (<i>Persea Americana</i>) seed ethanol extract on <i>Streptococcus mutans</i> and <i>Enterococcus faecalis</i> (<i>ex vivo</i>) <i>S. Wulansari, A.S. Widyarman, R.U. Nadhifa & M.J. Fatya</i>	146
Three-dimensional obturation in maxillary first molar with MB2: A case report <i>A. Sutanto, E. Fibryanto & A.E. Prahasti</i>	154
Semi-direct composite overlay restoration as an alternative restoration for endodontically treated tooth: A case report <i>N. Brians, J.A. Gunawan, A.E. Prahasti, E. Istanto & S.M. Khazin</i>	160
Comprehensive treatment of immature necrotic permanent teeth: A case report <i>A.E. Prahasti, E. Fibryanto, E. Elline & W. Widyastuti</i>	166
Diastemas management using direct composite resin restoration: The digital smile design approach <i>E. Elline, D. Ratnasari, E. Fibryanto, A.E. Prahasti & R. Iffendi</i>	173

Removal of broken file using ultrasonics at one-third apical second molar distal: A case report <i>Y. Sutjiono, B.O. Iskandar, A.E. Prahasti, A. Subrata & S.M. Khazin</i>	178
<i>Apis mellifera</i> honey and miswak (<i>Salvadora persica</i>) effect on tooth color changes <i>N.D. Iskandar, D. Ratnasari & R. Stefani</i>	182
Fiber reinforced composite in endodontically treated tooth: A case report <i>J. Setiawan, T. Ariwibowo & M.F. Amin</i>	188
The management of post-endodontic treatment using fiber-reinforced composite: A case report <i>R. Lambertus, T. Suwartini, E. Elline, A.E. Prahasti & S.A. Asman</i>	195
Management of crown-root fracture with pulp exposure: A case report <i>Y. Susanti, B. Iskandar & T. Ariwibowo</i>	201
Management of molar with C-shape root canal configuration: Case reports <i>F. Antonius, T. Suwartini & J.A. Gunawan</i>	207
Endodontic treatment on young age molar with pulp polyp and diffuse calcification finding in a radiograph <i>P. Andriani, A.P. Dwisaptarini & J.A. Gunawan</i>	214
Cyclic fatigue of three heat-treated NiTi rotary instruments after multiple autoclave sterilization: An <i>in-vitro</i> study <i>S.A. Putri, W. Widyastuti, A. Aryadi & R. Amtha</i>	221
Endodontic management of S-shaped root canal on mandibular first molar: A case report <i>N. Tanuri, M.F. Amin & S. Wulansari</i>	226
Root canal treatment on the complex case using ultrasonics: A case report <i>L.H. Wibowo, E. Elline, E. Fibryanto, A.E. Prahasti & D. Qurratuani</i>	231
Management of iatrogenic problems during root canal treatment <i>Y.N. Argosurio, M.F. Amin & E. Elline</i>	236
Non-surgical endodontic retreatment of maxillary first premolar with direct composite restoration: A case report <i>A.R. Pradhista, B.O. Iskandar & Aryadi</i>	243
 <i>Dental materials</i>	
The effect of soft drinks containing citric and phosphoric acid toward enamel hardness <i>A. Aryadi, D. Pratiwi & C. Cindy</i>	249
Microhardness of a flowable bulk-fill resin composite in immediate and 24-hour storage <i>R. Tjandrawinata, D. Pratiwi, F.L. Kurniawan & A. Cahyanto</i>	255
The effect of halogen mouthwash on the stretch distance of the synthetic elastomeric chain <i>M. Wijaya, R. Tjandrawinata & A. Cahyanto</i>	261

Synthesis and characterization of β -tricalcium phosphate from green mussel shells with sintering temperature variation <i>M.R. Kresnatri, E. Eddy, H.A. Santoso, D. Pratiwi, D.L. Margaretta & T. Suwandi</i>	267
The effect of immersion in 75% concentration tomato juice on the mechanical properties of nanohybrid composites resin <i>J. Kamad, D. Liliany & E. Eddy</i>	277
Evaluation of setting time of glass ionomer cement mixed with ethanolic extracts of propolis <i>T.S. Putri, D. Pratiwi & A.E.Z. Hasan</i>	285
The knowledge level of dental students on adequate composite resin polymerization in the COVID-19 pandemic era <i>O. Octarina & L.A.L. Ongkaruna</i>	290
<i>Dento-maxillofacial radiology</i>	
The role of dental record data in the mass disaster identification process: A case report of the Sriwijaya SJ-182 airplane crash <i>V. Utama, R. Tanjung, A. Quendangen, A. Fauzi, A. Widagdo, M.S. Haris & A.S. Hartini</i>	299
Management of postmortem dental radiography procedure in mass disaster victim identification <i>R. Tanjung & I. Farizka</i>	305
Radiomorphometric analysis of gonion angle and upper ramus breadth as a parameter for gender determination <i>I. Farizka & R. Tanjung</i>	312
<i>Medical sciences and technology</i>	
Artificial intelligence application in dentistry: Fluid behaviour of EDDY tips <i>H.H. Peeters, E.T. Judith, F.Y. Silitonga & L.R. Zuhail</i>	321
<i>MTHFR</i> C677T, A1298C*, and its interaction in nonsyndromic orofacial cleft phenotypes among Indonesian <i>S.L. Nasroen & A.M. Maskoen</i>	328
<i>Oral and maxillofacial surgery</i>	
The effectiveness of giving forest honey (<i>Apis Dorsata</i>) and livestock honey (<i>Apis Cerana</i> and <i>Trigona</i>) on the number of fibroblast in wound healing after tooth extraction (<i>in vivo</i> research in Wistar rats) <i>T.A. Arbi, I.N. Aziza & T. Hidayatullah</i>	341
Reconstruction of large post-enucleation mandibular defect with buccal fat pad <i>N.A. Anggayanti, A.D. Sastrawan & O. Shuka</i>	348
Challenge and management of dental implant during COVID-19 pandemic: Bone formation on second stage implant surgery <i>D. Pratiwi, H. Pudjowibowo & F. Sandra</i>	354

The evaluation of maxillary sinus for implant planning through CBCT <i>A.P.S. Palupi, W. Poedjiastoeti, M.N.P. Lubis, I. Farizka, B. Claresta & J. Dipankara</i>	360
The jawbone quantity assessment of dental implant sites <i>W. Poedjiastoeti, M.N.P. Lubis, Y. Ariesanti, I. Farizka, J. Dipankara & S. Inglam</i>	366
Comparative assessment of the distance between the maxillary sinus floor and maxillary alveolar ridge in dentulous and edentulous using panoramic radiography <i>A.S.D. Audrey, W. Poedjiastoeti, M.N.P. Lubis, J. Dipankara & S. Inglam</i>	372
Comparison between impacted mandibular third molar against mandibular angle and canal <i>N. Marlina, W. Poedjiastoeti, I. Farizka, J. Dipankara & S. Inglam</i>	379
<i>Oral biology</i>	
Saliva as a diagnostic tool for COVID-19: Bibliometric analysis <i>M.I. Rizal, R.A. Hayuningtyas, F. Sandra, M.S. Djamil & B.O. Roeslan</i>	387
Cytotoxicity activity of <i>Allium sativum</i> extracts against HSC-3 cells <i>I.J. Pardenas & M.O. Roeslan</i>	393
Effectiveness of probiotic lozenges in reducing salivary microorganism growth in patients with fixed orthodontic appliances: A pilot study <i>A.S. Widyarman, S. Vilita, G.C. Limarta, S.M. Sonia & F. Theodorea</i>	399
Potential anticancer properties of <i>Apium graveolens</i> Linn. against oral cancer <i>T. Hartono, F. Sandra, R.A. Hayuningtyas, S. Jauhari & J. Sudiono</i>	407
Antibacterial activity of bromelain enzyme from pineapple knob (<i>Ananas comosus</i>) against <i>Streptococcus mutans</i> <i>D. Liliany, E. Eddy & A.S. Widyarman</i>	414
<i>Elephantopus scaber</i> Linn.: Potential candidate against oral squamous cell carcinoma <i>T. Pang, F. Sandra, R.A. Hayuningtyas & M.I. Rizal</i>	424
Effectiveness of gargling with 100% coconut oil to prevent plaque accumulation and gingival bleeding <i>A.G. Soulissa, M. Juslily, M. Juliawati, S. Lestari, N.P. Ramli, Albert & A. Ismail</i>	429
Hydroxamate HDAC inhibitors potency in mediating dentine regeneration: A review <i>I. Sulistyowati, W. Anggraini, A.P. Ariyani & R.B. Khalid</i>	435
Various compounds that are used as oxidative stress inducers on fibroblast cell <i>Komariah, P. Trisfilha & R. Wahyudi</i>	443
Nano encapsulation of lemongrass leaves extract (<i>Cymbopogon citratus</i> DC) on fibroblast viability with oxidative stress <i>N. Ericka, K. Komariah, R. Wahyudi & T. Trisfilha</i>	450

Arumanis mango leaves (<i>Mangifera indica</i> L.) extract efficacy on <i>Porphyromonas gingivalis</i> biofilm <i>in-vitro</i> <i>S. Soesanto, Yasnill, A.S. Widyarman & B. Kusnoto</i>	461
A systematic review to evaluate the role of antibiotics in third molar extraction <i>R.A. Hayuningtyas, S. Soesanto, P. Natassya & S.B. Gutierrez</i>	468
Efficacy of epigallocatechin gallate gel on VEGF and MMP-9 expression on ulcerations <i>L.A. Porjo, R. Amtha & M.O. Roeslan</i>	472

Oral medicine and pathology

Salivary interleukin (IL)-6 in elderly people with stomatitis aphthous and gingivitis associated with the occurrence of cognitive impairment <i>D. Priandini, A. Asia, A.G. Souliassa, I.G.A. Ratih, T.B.W. Rahardjo & E. Hogervorst</i>	481
The uses of palm fruit (<i>Borassus flabellifer</i> L.) in dentistry <i>J. Sudiono & T.G.R. Susanto</i>	489
Endodontic irrigation solution administration induces oral mucosal deformity: A case report <i>R. Amtha, D. Agustini, N. Nadiah, F.K. Hartanto & R.B. Zain</i>	496
Profile of oral mucosa changes and perception of e-cigarettes smoker <i>R. Amtha, A.P. Rahayu, I. Gunardi, N. Nadiah & W.M.N. Ghani</i>	502
Potency of <i>Solanum betaceum</i> Cav. Peel skin ethanol extract towards TNF- α blood level (Study in vivo on inflammatory rats model) <i>J. Sudiono & M.T. Suyata</i>	508
Stomatitis venenata due to nickel as inlay materials in a 24-year-old woman: A case report <i>F. Mailiza, A. Bakar & U. Nisa</i>	518
Treatment challenge of oral lichenoid lesion associated with glass ionomer cement restoration: A case report <i>F.K. Hartanto, I. Gunardi, M.L. Raiyon, N. Nadiah & H. Hussaini</i>	526
Validity and reliability of the Indonesian version of COMDQ-26: A pilot study <i>J.V. Winarto, I. Gunardi, C.D. Marpaung, R. Amtha & W.M.N. Ghani</i>	531

Orthodontics

Interceptive orthodontic treatment needs and its relating demographic factors in Jakarta and Kepulauan Seribu <i>Y. Yusra, J. Kusnoto, H. Wijaya, T.E. Astoeti & B. Kusnoto</i>	539
Diastema closure and midline shifting treatment with standard technique (Case report) <i>H.F. Lubis & J.X. Ongko</i>	543
Intrusion and uprighting using TADs in mutilated four first permanent molar case <i>H.F. Lubis & F. Rhiyanthy</i>	548

Moringa and papaya leaf inhibit <i>Streptococcus mutans</i> and <i>Candida albicans</i> <i>H.F. Lubis & M.K. Hutapea</i>	554
Intruding upper first molar using double L-Loop in an adult patient: A retreatment case <i>H.F. Lubis & Joselin</i>	561
Profile changes in Class III malocclusion using protraction facemask in Indonesian patients (Cephalometric study) <i>H. Halim & I.A. Halim</i>	565
<i>Pediatric dentistry</i>	
Oral microbiome dysbiosis in early childhood caries (Literature review) <i>T. Putriany & H. Sutadi</i>	575
<i>Periodontology</i>	
Permanent splint using removable partial denture framework on reduced periodontium: A case report <i>V. Hartono, F.M. Tadjoedin, A. Widaryono & T.A. Mahendra</i>	587
The effect of electric smoking on the severity of chronic periodontitis <i>A.P. Fathinah & M. Louisa</i>	594
Periodontitis effects toward the extent of COVID-19 severity (Scoping review) <i>S.A. Arthur & M. Louisa</i>	603
Scaffold-based nano-hydroxyapatite for periodontal regenerative therapy <i>N.A. Harsas, Y. Soeroso, N. Natalina, E.W. Bachtiar, L.R. Amir, S. Sunarso, R. Mauludin & C. Sukotjo</i>	614
Defect management using hydroxyapatite and platelet-rich fibrin in advanced periodontitis <i>V. Wibianty, V. Paramitha & N.A. Harsas</i>	621
The relationship between age with caries status and periodontal treatment needs on visually impaired individuals <i>P. Wulandari, M.A.L. Tarigan, K. Nainggolan, M.F. Amin & J. Maharani</i>	630
Effects of COVID-19 on periodontitis (Scoping review) <i>A.R. Somawihardja & M. Louisa</i>	638
Concentrated growth factor for infrabony defect in periodontitis treatment: A review <i>F.C. Maitimu & T. Suwandi</i>	643
Subcutaneous emphysema after dental stain removal with airflow: A case report and anatomical review <i>A. Albert, W. Anggraini & W. Lestari</i>	651
Bonding agents for dentine hypersensitivity treatment: A review <i>O.N. Komala, L. Astuti & F.C. Maitimu</i>	657
Advantages and disadvantages of 2017 new classification of periodontitis (Scoping review) <i>R. Anggara & K. Yosvara</i>	668

Comparison of periodontal disease severity in COVID-19 survivors and non-COVID-19 individuals <i>M. Louisa, R.A. Putranto, O.N. Komala & W. Anggraini</i>	677
Aerosol spread simulation during ultrasonic scaling and strategies to reduce aerosol contamination <i>M. Sundjojo, V. Nursolihati & T. Suwandi</i>	685
The effect of pineapple (<i>Ananas comosus</i> L.) juice on biofilm density of streptococcus sanguinis ATCC 10556 <i>T. Suwandi & Y.V. Thionadewi</i>	689
 <i>Prosthodontics</i>	
Prevalence and risk indicators of bruxism in Indonesian children <i>C. Marpaung, I. Hanin, A. Fitryanur & M.V. Lopez</i>	697
Validity and reliability of temporomandibular disorders screening questionnaire for Indonesian children and adolescents <i>C. Marpaung, N.L.W.P. Dewi & M.V. Lopez</i>	704
Effect of submersion of alginate molds in povidone iodine concentration of 0,47 % solution toward dimensional change <i>N. Adrian & I.G.P. Panjaitan</i>	710
Effect of pure basil leaf extract on surface roughness of heat cured acrylic resin <i>I.G.P. Panjaitan & N. Adrian</i>	715
Prosthetic rehabilitation after mandibular reconstruction in young adult patient with ameloblastoma history <i>I. Hanin & I. Setiabudi</i>	720
Treatment of tooth supported magnet retained maxillary complete overdenture: Case report <i>I.G.A.R.U Mayun</i>	725
Complete denture management with torus palatinus: A case report <i>E.S.I. Sari, I.K. Julianton & G.G. Gunawan</i>	730
Management of rehabilitation for partial tooth loss with immediate removable dentures in the era of the COVID-19 pandemic: A case report <i>A. Wirahadikusumah</i>	734
Management of anterior mandibular lithium disilicate crown fracture <i>J. Handojo & L.A. Halim</i>	742
Author index	747

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

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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

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
Creptus	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 creptus 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	202	529
Adolescents	Subjective examination			
	No TMJ Pain	239	172	411
	TMJ Pain	96	144	240
		Total	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		Total
		No TMJ Sounds	TMJ Sounds	
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 under-scoring 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, *let alone* 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.

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

by Carolina Damayanti Marpaung

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

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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

Test-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

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

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 studies¹⁵⁻¹⁸ 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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