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Original Research Article

Validation of a Turkish version of COHIP-SF 19 in children with molar-incisor hypomineralization

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ABSTRACT

Background: Molar Incisor Hypomineralization (MIH) is a prevalent developmental condition that significantly impairs children's oral health and quality of life. Although the Child Oral Health Impact Profile-Short Form 19 (COHIP-SF 19) is a well-established tool for assessing oral health-related quality of life in children, a validated Turkish version did not exist. This study aimed to fill this gap by cross-culturally adapting the COHIP-SF 19 to Turkish and evaluating its validity and reliability for children with MIH.
Methods: The Turkish version of the COHIP-SF 19 was developed with forward-backward translation method. Psychometric properties of the scale were evaluated through floor and ceiling effects, construct validity (convergent and discriminant validity), internal consistency and test-retest reliability among 8-15 aged 295 children with MIH.
Results: COHIP-SF 19 was successfully translated and cross-culturally adapted to Turkish language. Construct validity analyses showed that lower COHIP-SF 19 scores were found for children with self- perceived poor (or fair) general health and oral health ($p<0.0001$) and dental treatment need ($p<0.0001$) and positive rank correlations between COHIP-SF 19 overall and sub-dimensions scores and children's satisfaction with their oral health and appearance related to oral cavity ($p<0.0001$) The internal consistency was good for the overall COHIP-SF 19 score with a Chronbach's alpha of 0.823 and the test-retest reliability was excellent with the 0.959 ICC.
Conclusions: Turkish version of COHIP-SF 19 has been shown to be a valid and reliable measurement tool to evaluate the oral health related quality of life children with MIH.

Keywords: Child oral health impact profile, Dental public health, Epidemiology, Quality of life, Molar incisor hypomineralization, Validity and reliability

INTRODUCTION

In the literature, it has been reported that the developmental defects of enamel can cause both aesthetic and the functional concerns. Molar Incisor Hypomineralization (MIH) can cause rapid development of caries, failures of the restorations, sensitivity and aesthetic problem which make the treatment process demanding for both the clinicians and the patients.[1-3] These factors may also affect the daily lives of individuals and lead to negative effects on oral health related quality of life (OHRQoL).[4]

The concept of health related quality of life started to be in 1948 soon after World Health Organization (WHO) defined health as "not only the absence of disease but a state of complete physical, social and mental well-being".[5] In recent years, there has been a transition to an approach that focuses on the assessment of the social-emotional states and physical functions of individuals rather than their traditional criterias in evaluating the

goals and outcomes of the treatment in health services and policies. Considering oral health as an integral part of general health and well-being, it is not suprising to see an increase in the number of OHRQoL studies made in dental literatüre.[6] In this context, Child Oral Health Impact Profile (COHIP) was developed by Broder et al, stands out with its wide age range (8-15 years old) and addressing of both positive and negative aspects of quality of life.[7] A short version of the scale (COHIP-SF 19) was later developed.[8]

The scale was originally developed in English, needs to be cross culturally adapted and evaluated for its psychometric properties in order to be used in different languages and cultures. Although there were published researches on cross-culturally adaption and validation of the instrument to several cultures, to the authors' knowlegde no attempt had been made for the Turkish version.[9,10,11] This study was administrated to cross culturally adapt the original English version to the Turkish culture and to assess its reliability and validity in a group of Turkish children with MIH.

METHODS

Data collection and clinical examination

The validity and reliability analysis of the Turkish version of the COHIP-SF 19 was performed on patients aged 8-15 years diagnosed with MIH based on the criteria established by the European Academy of Paediatric Dentistry (EAPD) policy document.[12] This was a cross-sectional validation study. Participants were selected from those who visited the Department of Pediatrics at the University of Marmara, Turkey, between December 2018 and December 2019, provided they did not require emergency dental care and were sufficiently proficient in reading and writing Turkish. Children with other enamel defects or communication disabilities were excluded from the study. A total of 300 children were asked to complete the scale. For test-retest reliability assessment, a subset of 61 children from the sample completed the scale again two weeks after the initial administration.

The socio-demographic characteristics of the children were collected using a scale that included the children's gender and age, as well as their general health status. Each child was asked to self-rate their general and oral health status with response options of 0=good, 1=poor, and 2=fair, and to indicate their perceived dental treatment need as 0=no or 1=yes. Considering the participants' age, the Facial Image Scale (FIS) was used to evaluate children's satisfaction with their oral health and appearance related to the oral cavity.[13] Clinical dental examinations assessed dental caries experience using the DMFT index and oral hygiene status using the Simplified Oral Hygiene Index (OHI-S).[14] A full mouth inspection of cleaned and wet teeth was charted using the EAPD criteria for the diagnosis of MIH.[12,15] Children were also classified according to the severity of MIH.[16] The demarcated opacities seen on permanent incisors were recorded according to color shades of white or yellow/brown, and sensitivity of MIH-diagnosed teeth was tested with a dental air syringe for 5 seconds.[17,18]

Scale administration

The COHIP-SF 19 comprises 19 questions that assess how frequently a child experiences oral impacts related to their teeth, mouth, or face, distributed across three sub-dimensions: oral health (5 items), functional well-being (4 items), and social-emotional well-being (10 items). Each item is rated on a 5-point Likert scale ('never' = 0, 'almost never' = 1, 'sometimes' = 2, 'fairly often' = 3, and 'almost all of the time' = 4). The total COHIP-SF 19 score is calculated by summing the scores for each item, resulting in a range from 0 to 76, with the 17 negatively worded items being reverse-scored. Therefore, a higher COHIP-SF 19 score indicates better oral health-related quality of life (OHRQoL). During the first appointment, dental examinations were completed and demographic characteristics were recorded, and a second appointment was scheduled to complete the scale. Children were asked to fill out the scale independently, with the researcher present in the clinic to assist younger children with any questions. The response time for the COHIP-SF 19 scale was found to be a maximum of 10 minutes.

Translation and cross-cultural adaption of COHIP-SF 19

The translation and cross-cultural adaptation process was conducted according to the methodology proposed by Guillemin et al.[19] Prior to the beginning of the research, permission was granted by Dr. Hillary Broder in April 2018 via mail. The COHIP-SF 19 was translated into Turkish using a comprehensive forward-backward translation process as follows:

1. The scale was translated into Turkish by two bilingual native Turkish speakers: an English teacher with no medical background and a pediatric dentist.
2. The two different Turkish translations (T1 and T2) were evaluated and synthesized by a committee composed of the translators and two researchers conducting the study. A consensus was reached on a single Turkish version (T12).
3. Two translators, whose mother tongue was English and who were naive to the research area, produced two independent back translations of the Turkish version (T12) into English (BT1 and BT2).
4. The two back-translated versions (BT1 and BT2) were reviewed to create a single English version (BT12).
5. All translated versions and the original scale were evaluated for semantic, idiomatic, experiential, and conceptual equivalence by an expert committee consisting of two researchers, translators, a public

health specialist, a language professional, and the scale developer, Dr. Hillary Broder.

6. After minor modifications suggested by the expert committee, the pre-final version of the Turkish COHIP-SF 19 was ready to be tested on a sample representing the target population.

Testing of the pre-final version and measurement of content validity

To test the clarity and suitability of each item, the instructions, and the response format, 10 children diagnosed with MIH from the target population were recruited to complete the pre-final version of the scale. After making minor modifications based on the children's feedback, an expert panel of six members (comprising four pediatric dentists, one orthodontist, and one English lecturer) who were not involved in the previous translation stages of the scale was convened. The overall content validity index (CVI) was then calculated.[20] Following this step, the final version of the COHIP-SF 19 was produced. The Turkish translation of the COHIP-SF 19 used in this study is available as Supplementary Material (Figure S1).

Statistical analysis

All analyses were performed using the Statistical Package for Social Sciences (SPSS 22 for Windows, SPSS Inc., Chicago, Illinois, USA). For the psychometric assessment, construct validity was analyzed using discriminant and convergent validity, while the reliability of the scale was determined by internal consistency and test-retest reliability.

For convergent validity, the associations between the overall and sub-dimension COHIP-SF 19 scores and self-perceived health/oral health ratings, dental treatment need, and children's satisfaction with their oral health and appearance related to the oral cavity were assessed. Discriminant validity was evaluated by comparing the overall and sub-dimension COHIP-SF 19 scores with DMF-T scores, the severity of demarcated opacities on the permanent incisors, and the presence or absence of sensitivity in MIH-diagnosed teeth. For reliability, internal consistency was tested using Cronbach's alpha for the overall scale and its sub-dimensions, with an acceptable level set at ≥0.60.[21] Additionally, the scale was administered to 61 children two weeks after the initial application to evaluate test-retest reliability. During this period, no dental procedures were performed on the children. Test-retest reliability was assessed using intra-class correlation (ICC), with an acceptable level of 0.70, and paired samples t-tests to compare the scores of the repeated measures.[22] Floor and ceiling effects of the scale were calculated by the percentage frequency of the lowest or highest possible score achieved by respondents, with frequencies greater than 15% considered significant.

RESULTS

The translation and cross-cultural adaptation process of COHIP-SF 19

During the translation process, no significant alterations were made to the content or meanings of the items, and the most suitable Turkish equivalents were employed. Minor modifications were implemented between the English and Turkish versions of the scale to account for cultural differences. The content validity index score, based on the expert panel's evaluations, was found to be satisfactory, ranging from 0.83 to 1.00.

Psychometric properties and validity

Table 1 presents the comparisons of Turkish COHIP-SF 19 and subscale scores based on children's self-perceived general health, oral health, and dental treatment needs, findings on the Internal Consistency of the COHIP-SF 19 Scale and test-retest reliability findings of the COHIP-SF 19 scale.

Table 1: Reliability, validity, and comparative analysis of Turkish COHIP-SF 19 scores.

	COHIP-SF 19 total	COHIP-SF 19 oral health	COHIP-SF 19 functional well-being	COHIP-SF 19 socio-emotional well-being
Test-retest reliability				
Test 1 (Mean±SD) (n=61)	53.18±14.29	11.54±4.51	12.70±3.56	28.93±8.48
Test 2 (Mean±SD) (n=61)	52.79±12.86	11.08±4.69	12.44±3.46	29.26±7.18
ICC	0.959**	0.923**	0.962**	0.939**
P value	0.573*	0.15*	0.135*	0.499*
Internal consistency				
Mean score (Mean±SD)	51.49±12.24	10.95±4.15	12.14±3.34	28.40±7.36
Reliability Coefficient Cronbach Alpha	0.823	0.522	0.632	0.768
Self-perceived general health				
Good (n=185)	53.47±12.23	11.55±4.24	12.45±3.35	29.48±6.95
Poor (n=19)	42.89±11.34	8.63±4.21	10.58±3.62	23.68±7.76
Fair (n=91)	49.25±11.37	10.22±3.70	11.85±3.17	27.19±7.60
p value	0.0001*	0.0001*	0.0001*	0.0001*

Continued.

	COHIP-SF 19 total	COHIP-SF 19 oral health	COHIP-SF 19 functional well-being	COHIP-SF 19 socio-emotional well-being
Self-perceived oral health				
Good (n=51)	60.71±9.50	13.63±4.09	14.29±1.91	32.78±5.33
Poor (n=145)	46.21±12.47	9.83±3.66	10.94±3.78	25.45±7.98
Fair (n=99)	56.46±8.97	11.21±4.23	12.80±2.37	30.45±5.24
p value	0.0001*	0.0001*	0.0001*	0.0001*
Self-perceived dental treatment need				
Yes (n=266)	50.18±11.90	10.62±3.99	11.86±3.37	27.70±7.29
No (n=69)	63.75±8.21	14.32±4.16	14.82±1.24	34.61±4.52
p value	0.0001**	0.0001**	0.0001**	0.0001**

SD:Standard Deviation, ICC: Intraclass Correlation Coefficient, with ** indicating a high level of reliability, paired sample t-test; *One-way ANOVA p<0,05 **Independent T-test p<0,05

Lower COHIP-SF 19 scores were observed among children who perceived their general and oral health as poor (or fair) and who had dental treatment needs (p-value <0.0001). The internal consistency for the overall COHIP-SF 19 score was good, with a Cronbach's alpha of 0.823. It was acceptable for the socio-emotional well-being sub-dimension (0.768), and poor for the other two sub-dimensions (oral health well-being 0.522; functional well-being 0.632). For test-retest reliability, the ICC was 0.959 for overall COHIP-SF 19; 0.923 for oral health well-being; 0.962 for functional well-being; and 0.939 for social-emotional well-being sub-dimensions (Table 1).

Regarding demarcated opacities, a statistically significant difference was observed between the severity of the opacities and the overall, oral health well-being, and social-emotional well-being COHIP-SF 19 sub-dimension scores, except for the functional well-being sub-dimension (overall score p=0.035; oral health well-being p=0.006; functional well-being p=0.824; social-emotional well-being p=0.021). Post-hoc analyses revealed that children with yellow-brown opacities had lower overall, oral health well-being, and social-emotional well-being COHIP-SF 19 scores. A significant relationship was also found between the presence of sensitivity and overall COHIP-SF 19 and sub-dimension scores. Children experiencing sensitivity due to MIH had lower overall COHIP-SF 19 and sub-dimension scores (overall score p=0.0001; oral health well-being p=0.0001; functional well-being p=0.0001; social-emotional well-being p=0.002) (Tablo 4). A statistically significant negative correlation was identified between COHIP-SF 19 scores and children's satisfaction with their oral health and appearance related to the oral cavity for both overall and all sub-dimension scores. Additionally, a significant negative correlation was noted between DMFT scores and overall COHIP-SF 19, oral health well-being, and social-emotional well-being sub-dimensions scores (overall score r=-0.213, p=0.0001; oral well-being r=-0.183, p=0.002; functional well-being r=-0.200, p=0.001). Children with higher DMFT scores exhibited lower overall, oral health well-being, and social-emotional well-being sub-dimension scores (Table 2).

Table 2: Correlations between COHIP-SF 19 scores and dental conditions.

	COHIP-SF 19 total	COHIP-SF 19 oral health	COHIP-SF 19 functional well-being	COHIP-SF 19 socio-emotional well-being
DMF-T	r = -0.213*	r = -0.183*	r = -0.110*	r = -0.200*
P value	0.0001**	0.002**	0.06	0.001**
Severity of opacity in permanent incisors				
None (n=74)	54.31±11.83	12.22±3.99	11.93±3.39	30.16±6.65
White-cream (n=112)	51.51±12.13	10.81±4.21	12.21±3.11	28.49±7.42
Yellow-Brown (n=109)	49.55±12.35	10.23±4.05	12.22±3.55	27.10±7.57
p value	0.035*	0.006*	0.824	0.021*
Sensitivity				
Present (n=179)	48.71±12.42	10.17±4.15	11.26±3.40	27.33±7.54
Absent (n=116)	55.09±10.72	12.15±3.88	13.50±2.75	30.04±6.79
p value	0.0001*	0.0001*	0.0001*	0.002*

r: Pearson correlation coefficient, **p<0.01 is considered statistically significant; ,*p<0.05, One-Way ANOVA test; *p<0.05, Independent Sample T-test

Evaluating COHIP-SF 19 total scores, it was observed that no child received a base score (0), while only 2 (0.6%) children received a maximum score. These data indicate that there was no floor-ceiling effect in the COHIP-SF 19 scale.

DISCUSSION

The validation of the Turkish version of the Child Oral Health Impact Profile-Short Form 19 (COHIP-SF 19) presents encouraging results, indicating its reliability and validity for assessing oral health-related quality of life among Turkish children. This study's findings align well with previous validation studies conducted in other languages, thereby reinforcing the robustness of the COHIP-SF 19 across diverse cultural contexts.[8-11] In addition, considering the prevalence of MIH up to 40% (2), we believe that this study will be beneficial in terms of determining the needs of children in the early stages of the disease and using them in preventive dentistry policies and practice.

Choosing a scale suitable for the purpose of the study, the level of analysis, and the age group is crucial in evaluating quality of life.[24,25] In this context, COHIP-SF 19 appears appropriate for exploring the impact of MIH-related demarcated opacities, particularly with its second item, which addresses tooth discoloration. Additionally, the age range of the scale is well-suited for the diagnosis and follow-up of MIH patients.

The translation process adhered to established guidelines for cross-cultural adaptation of health-related quality of life instruments. Minor modifications were made to address cultural nuances, ensuring conceptual equivalence to the original items. This approach is consistent with the methodology employed in other COHIP-SF 19 validation studies, such as the Dutch and Chinese versions, which also reported the need for minor cultural adjustments without compromising the original meaning of the items.[7,9]

The Turkish COHIP-SF 19 showed satisfactory content validity. However, it is worth noting that the researchers observed children were more likely to describe the severity of the impact rather than the frequency in response to the item questioning how often they were affected by discolorations or spots on their teeth. Furthermore, it was observed that children exhibited timid behaviors when answering the item "felt that you were attractive (good looking) because of your teeth, mouth, or face," possibly due to cultural differences between Asian and Western cultures.[26]

The Turkish version of COHIP-SF 19 demonstrated satisfactory internal consistency and test-retest reliability. Cronbach's alpha for the overall scale indicated good homogeneity of the items (0.823), which was acceptable for the socio-emotional well-being sub-dimensions (0.768) but poor for the oral health well-being (0.522) and functional well-being (0.632) sub-dimensions. These findings are similar to those reported in subsequent validations of the scale, where Cronbach's alpha ranged from 0.56 to 0.81 in China and from 0.64 to 0.85 in Libya.[11,12] Broder et al stated that the acceptable level of internal consistency for the overall scale is 0.80 during the development and validation of the original form.[7] The Cronbach alpha coefficient is generally related to the number of items.[21] In our study, we believe that the lower Cronbach alpha coefficients, especially in the oral and functional health sub-dimensions, are related to the low number of items in these sub-dimensions. For test-retest reliability, the total and sub-dimension scores showed ICC values ≥0.9, indicating excellent reproducibility, which is higher than the results observed in the Chinese and Arabic versions of COHIP-SF 19 (0.77 and 0.76, respectively).[9,10]

The convergent validity of the Turkish COHIP-SF 19 revealed statistically significant associations and correlations between COHIP-SF 19 scores and global health, oral health ratings, self-perceived dental treatment need, and children's satisfaction with their oral health and appearance related to the oral cavity. These findings are consistent with previous studies.[9,10,27,28] One unanticipated finding was that the responses to the questions in which the children rated their oral health showed a much stronger relationship with the overall score and sub-dimension mean scores of the COHIP-SF 19 scale than did global health ratings. This highlights the benefits of using specific OHRQoL scales rather than general health-related quality of life scales to assess the impact of oral health conditions on children.[7]

The Turkish version of COHIP-SF 19 was found to be effective in discriminating MIH patients with different clinical outcomes. Consistent with previous studies, children with lower DMF-T scores had higher OHRQoL scores.[27,28] Lower COHIP-SF 19 scores were also observed among those with yellow-brown demarcated opacities and sensitivity due to MIH. Large et al. reported that opacities seen in permanent incisors caused aesthetic concerns and resulted in lower COHIP scores.[29]

The absence of a floor-ceiling effect in the Turkish COHIP-SF 19 indicates its capability to distinguish between different levels of oral health-related quality of life among children. This characteristic was similarly observed in the Korean and Portuguese versions, enhancing the scale's utility in diverse populations.[27,30]

A limitation of the current study was the unbalanced sample of MIH patients. While developing the COHIP-SF 19, Broder et al aimed to create a scale that could distinguish among a broad range of children with different clinical conditions and among children with the same clinical conditions of varying severity.[7] In this study, MIH was classified according to the colors of the opacities and the presence of sensitivity to evaluate the discriminant validity of the scale. However, when the children were classified according to the severity of MIH, it was evident that the majority of the study sample consisted of severe cases. This imbalance occurred because the study was conducted in a hospital setting. Consequently, it was not possible to perform discriminant

validity analyses based on severity due to the lack of a balanced distribution.

CONCLUSION

The Turkish version of COHIP-SF 19 is a valid and reliable instrument for assessing oral health-related quality of life in Turkish children. Its performance is comparable to other language versions, supporting its cross-cultural applicability. Future studies should focus on further refining the oral health well-being and functional well-being sub-dimensions to enhance the scale's overall reliability and applicability among different severity levels of MIH. To reduce the negative effects of clinical difficulties and frequent treatment processes on the OHRQoL of children with MIH and to indirectly increase parental and patient awareness, it is important to conduct more studies using these non-clinical measurements.

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Annexure-I: Turkish translation of Child Oral Health Impact Profile-Short Form 19 (COHIP-SF19).

Lütfen her soruyu dikkatlice oku ve DİŞLERİNİ, AĞZINI VEYA YÜZÜNÜ DÜŞÜNEREK GEÇTİĞİMİZ 3 AYDA seni en iyi anlatan cevabı seç.
Ağız Sağlığı (5 Madde)
Geçtiğimiz 3 ayda hangi sıklıkla meydana geldi ?
1- Dişlerinde ağrı oldu mu?
2- Dişlerinde renklenme-beyaz veya kahverengi lekelenmeler fark ettin mi?
3- Dişlerinde çapraşıklık veya aralıklar fark ettin mi ?
4- Ağız kokusu şikayetin oldu mu?
5- Dişetlerinde kanama oldu mu?
Fonksiyonel Sağlık (4 Madde)
Geçtiğimiz 3 ayda hangi sıklıkla meydana geldi ?
1- Dişlerin, ağzın veya yüzün nedeniyle sevdiğin yiyecekleri yemede zorluk çektin mi?
2- Dişlerin, ağzın veya yüzün nedeniyle uyku problemi yaşadın mı?
3- Dişlerin, ağzın veya yüzün nedeniyle bazı sözcükleri söylerken zorluk çektin mi?
4- Dişlerin, ağzın veya yüzün nedeniyle dişlerini temizlemede zorluk çektin mi?
Sosyal-Duygusal İyi Oluş (10 Madde)
Geçtiğimiz 3 ayda hangi sıklıkla meydana geldi ?
10- Dişlerin, ağzın veya yüzün nedeniyle mutsuz veya üzgün oldun mu?
11- Dişlerin, ağzın veya yüzün nedeniyle kaygılı veya huzursuz hissettin mi?
12- Dişlerin, ağzın veya yüzün nedeniyle diğer çocukların yanında gülümsemekten veya kahkaha atmaktan çekindin mi?
13- Dişlerin, ağzın veya yüzün nedeniyle farklı göründüğünü hissettin mi?
14- Dişlerin, ağzın veya yüzün hakkında diğer insanların ne düşündükleri konusunda endişelendin mi?
15- Dişlerin, ağzın veya yüzün nedeniyle diğer çocuklar tarafından alay edildiğin, sataşıldığın veya isim takıldığın oldu mu?
16- Dişlerin, ağzın veya yüzündeki herhangi bir problemden dolayı okula devamsızlık yaptın mı?
17- Dişlerin, ağzın veya yüzün nedeniyle sınıfta yüksek sesle konuşmak veya okumak istemediğin oldu mu?
18- Dişlerin, ağzın veya yüzün nedeniyle kendine güvenir misin?
19- Dişlerin, ağzın veya yüzün nedeniyle kendini güzel / yakışıklı buluyor musun?
Ölçek soruları için cevap seçenekleri Hiç/ Bir iki kez/ Bazen/ Sık sık/ Her zaman