Asian Journal of Dental Sciences

3(1): 1-8, 2020; Article no.AJDS.54272

Perception of Malocclusion by Children of Different Age Groups and Its Effects on their Oral Health Related Quality of Life as Assessed by Video Recording

B. N. Shruti[1*], S. N. Basavaraj[2], G. Meher Kiranmayi[2], Tuga Hamed[1] and Mohanad Hassan[1]

[1]College of Dental Sciences, Mustaqbal University, Al Qassim Region, Kingdom of Saudi Arabia.
[2]Agmal Ebtsama Dental Clinics, Buraidah, Al Qassim Region, Kingdom of Saudi Arabia.

Authors' contributions

This work was carried out in collaboration among all authors. Author BNS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors SNB and GMK managed the analyses of the study. Authors TH and MH managed the literature searches. All authors read and approved the final manuscript.

Article Information

Editor(s):
(1) Dr. José Francisco Gómez Clavel, Professor, Facultad de Estudios Superiores Iztacala UNAM, Universidad Nacional Autónoma de México, México.
Reviewers:
(1) Dorina Lauritano, University of Milan-Bicocca, Italy.
(2) Cristina Grippaudo, Università Cattolica del Sacro Cuore, Italy.
(3) Anahita Punj, Kaloji Narayana Rao University of Health Sciences, India.
Complete Peer review History: http://www.sdiarticle4.com/review-history/54272

Original Research Article

Received 16 November 2019
Accepted 21 January 2020
Published 13 February 2020

ABSTRACT

Aims: The aim of the study was to assess the perception of malocclusion by various age groups of children and its effect on their Oral Health Related Quality of life.
Study Design: Randomized controlled hospital based study.
Place and Duration of Study: The study was conducted at the Department of Pedodontics and Preventive Dentistry in K.L.E's Institute of Dental Sciences Bangalore, Karnataka India, between June 2010 and July 2013.
Methodology: 62 children of the age 5-15 years of both gender were selected for the study and categorized into Malocclusion group and Control group. These groups were further divided into age

**Corresponding author: Email: pedoshruti@gmail.com, mail2shurti@gmail.com, mail2shurthi@gmail.com;*

groups of 5-7 years, 8-10 years and 11-14 years. Oral examination of all children was done to include in study groups. Children and parents participating in the study responded to two separate Oral Health Related Quality of Life (OHRQL) questionnaires. The children were asked to watch a funny cartoon show and a video was made. The video was cropped into still images at 25 predetermined points. Width and openness of the children's mouth and number of teeth shown were measured during the taped sessions to assess the children's video – based smiling patterns.
Results: There existed a negative correlation between the width of smile and number of teeth shown and the severity of malocclusion as measured by the Dental Aesthetic Index.
Conclusion: Children of the age group 8-10 years and 11-15 years suffering from malocclusion had more effects on the emotions, the self-confidence and social interaction than children of the age group 5-7 years and children belonging to the control group.

Keywords: Malocclusion; dental aesthetic index; oral health related quality of life; self-perception.

1. INTRODUCTION

A person's appearance can have a big effect on how they feel about themselves, which has an effect on their quality of life. The importance of quality of life has received wide spread acceptance in medical field. Oral health related quality of life (OHRQL) is that aspect of dentistry which looks into the patient's own perception of his or her oral health status and its impact upon his or her quality of life which includes social wellbeing and emotional wellbeing [1]. Oral diseases are highly prevalent and give raise to not only physical but also economic, social and psychological problems. They impair quality of life significantly and may affect various aspects of life including function, appearance and interpersonal relationships in a large number of individuals. This may be particularly true for children and adolescents with poor teeth or unattractive occlusal traits, who can become targets for teasing, name-calling and harassment from other children.

Malocclusion differs from the majority of medical and dental conditions in that it is 'a set of dental deviations' rather than a disease [2]. Malocclusion is not a disease per say but rather a departure from an aesthetic norm in a society. In any case subjective perceptions play a key role in defining malocclusion. In contrast to the considerable subjective focus on malocclusion measures, the research has traditionally focused on clinician driven outcome measures at the expense of more subjective patient driven measures. In various studies it is seen that malocclusion severely impacts the psychological activities such as smiling, emotions and social contacts in children with mild to severe malocclusion as measured by the dental aesthetic index (DAI) [3]. The present study was conducted with aim to study the correlation between malocclusion and oral health related quality of life in 5 to 15 years old children from Bangalore city [4]. The objectives of the study were to evaluate the relationship between the objectively determined oral health related quality of life and children's smile related aspect of OHRQL and to assess the perception of malocclusion by children in various developmental stages of primary, mixed and permanent dentition.

2. MATERIALS AND METHODS

A randomized controlled hospital based study was conducted in the Department of Pedodontics and Preventive Dentistry, KLE'S Institute of Dental Sciences, Bengaluru to assess the impact of malocclusion on the oral health status, oral health related quality of life based on the child's perception, parent perception and the correlation between the child's oral health status with their smiling pattern in 62 children in the age group of 5–15 years in Bengaluru city. The inclusion criteria for children to be selected in the study group was that they must have malocclusion in the anterior teeth which is visible on smiling. The children in the study group were healthy children and cooperative children without developmental delay aged between 5–15 years [4]. Special children, Children on long term medication, Children below 5 years and children undergoing orthodontic treatment were excluded from the study. The present study group consisted of 62 subjects which was divided into malocclusion group of 31 subjects and control group of 31 subjects across 3 age groups of 5-7 years, 8-10 years and 11-15 years.

Children in the malocclusion group were examined for all types of malocclusions like crowding, bimaxillary protrusion, cross bites, generalised spacing in dentition, midline

diastema and angle's class ii and class iii malocclusion using Dental Aesthetic Index. The selected subjects and their parents were informed regarding the study and they were asked to sign on. Consent form after which the parents responded to survey concerning their children's oral health related quality of life and smiling patterns. Similarly, children with normal occlusion were selected for the control group and their parents were informed regarding the study and they were asked to sign on consent form after which the parents responded to survey concerning their children's oral health related quality of life and smiling patterns.

2.1 Child Perception Questionnaire

Child survey was conducted by using Michigan's Oral Health Related Quality of Life Scale - Child Version [5]. The children answered these questions with a simple yes / no. The sum of yes answers was used as an indicator of children's self-evaluation of their smiles.

2.2 Parent Perception Questionnaire and Proxy Questionnaire

The participating parents were asked to fill the questionnaire based on Michigan's Oral Health related quality of life scale - parent version [6]. The questions were divided into 4 indices while calculating the parent perception score. Index 1 was for the parents 'proxy assessment' of their children's satisfaction with their smiles. The questions included in this index were "my child likes his/ her smile", "my child is happy with his/ her teeth". Index 2 represented the parent's perception of their children's smile with an "impact score ". The questions included in this index were "How much do you think that the health of your child's teeth affect the way your child smiles?" And how much do you think the condition of your child's teeth affect the way your child feels about herself / himself? Likert's type rating scale was used for index 1 and 2 while index 3 and 4 were the numbers of positive and number of negative adjectives selected to describe their children's smile out of the nine adjectives like 'happy', 'reserved', 'wide smile', 'shows teeth', 'hides teeth', 'hesitant', 'shy', 'open mouth' and 'closed mouth'. The number of positive items and number of negative items were calculated by adding 1 point each for checking the adjectives [4].

Selection of cartoon films: cartoon watching is one of the favourite hobbies of children these days. It has been observed that cartoon network is the favourite channel among 68% children between the age group of 2 to 17 years. It was also observed that Tom and Jerry was ranked as best cartoon among these children [7]. The cartoon films of Tom and Jerry and chip and dale of 4 min 30 seconds were carefully selected based on the subject's age. In the present study for subjects of 5 to 7 years of age, the cartoon films that were funny, easy to understand and had no script were selected while subjects of 8 to 10 years and 11 to 15 years were shown funny Tom and Jerry cartoons with scripts.

2.3 Video Based Smile Assessment

The selected subjects were asked to watch a short cartoon film in a room by themselves. While they watched the video, their faces were being videotaped with an in built webcam in Lenovo laptop model 550 using the windows live movie maker software. The camera of the laptop was set approximately 25 cm away from the sitting subject. The subjects were instructed to hold their head in natural head position by looking straight into the laptop screen. If position required correction the researcher helped the subject into natural head orientation. The camera was adjusted and focused on to the subjects face. The subjects were asked to wear the eye gear with the attached ruler with millimetre markings while watching the video (Fig. 1). The recording was started as soon as the funny cartoon film started.

After watching the cartoon, the children answered questions concerning their oral health and smiling patterns. The digital recordings were downloaded to the system. A segment of these tapes starting at a certain point in the movie that was 5 seconds before a funny sequence began and lasting for 2 minutes and 30 seconds was cropped for smile analysis and uploaded to the wonder share video editor software program and converted into 25 jpeg still frames and then renamed with Microsoft windows 7 with appropriate subject number (Fig. 2).

2.4 Measurements on Smile Frame

Each file was opened in adobe Photoshop with a resolution of 320 x 240 pixels. The ruler function was selected on the adobe Photoshop and set to millimetre scale. The measurement obtained were entered into Microsoft excel. The first measurement was a base line measurement 6 seconds before the beginning of the funny

segment of the video. The next 25 measurements were spaced every 6seconds from the time this funny sequence started. For each measurement point, three measurements were made namely – the child's smile width in mm (outer commissural width), the child's smile height in mm (inter labial height at smile), and the visible maxillary dental width (number of maxillary incisor display) (Fig. 3). These three indicators were chosen based on consideration concerning the measured of facial expressions.

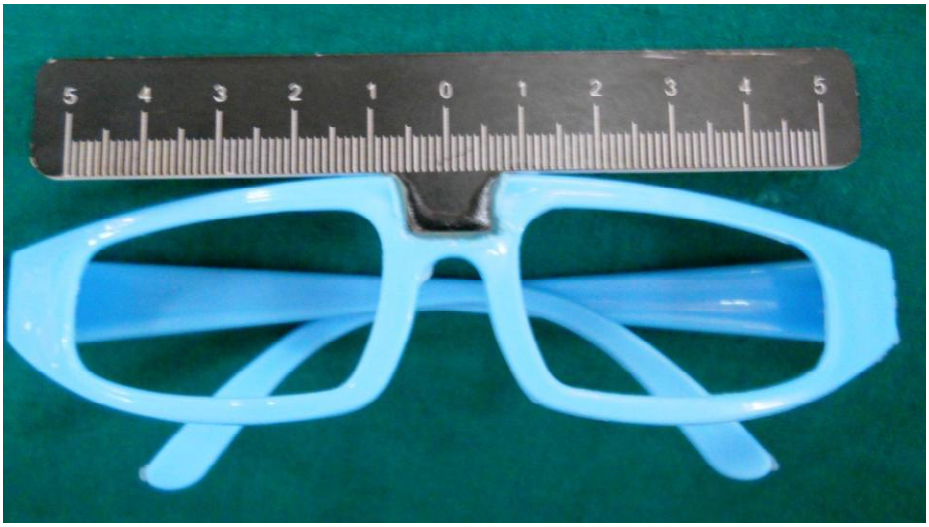

Fig. 1. Smile measurement scale

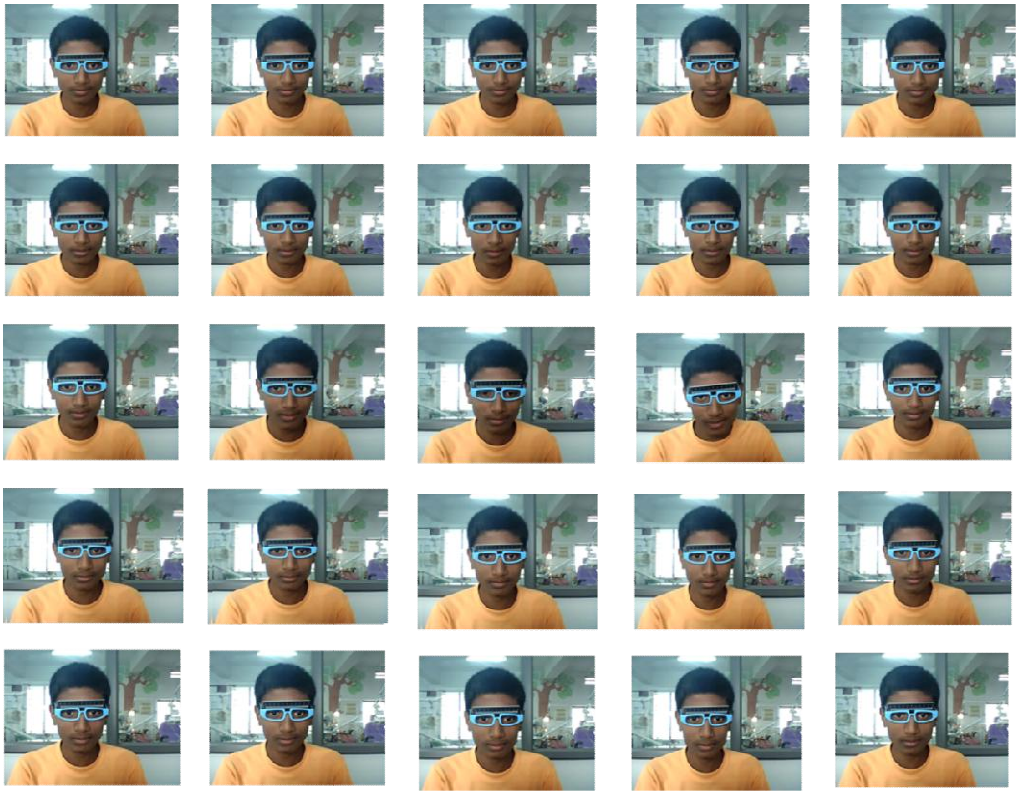

Fig. 2. 25 Still images after cropping the smile recording using wondershare video editor software

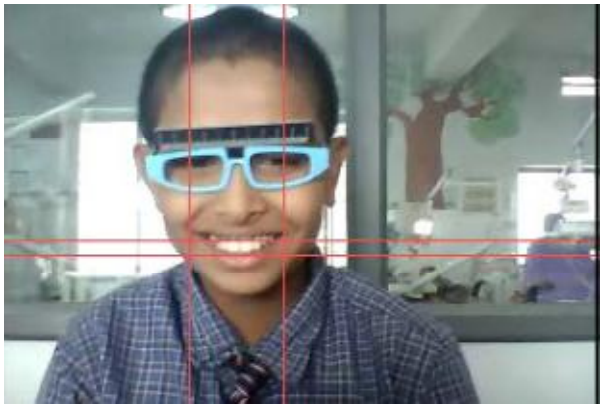

Fig. 3. Smile measurement done using adobe Photoshop CS Version 8 soft ware

Smile index (ratio of smile width and smile height) was determined by standardizing each of the 25 width measurements by dividing it with the child's base line smile measurement before the funny sequence of the movies started. These 25 standardized scores were averaged. A score of "1" would indicate that the child's mouth width at baseline and when watching the movie did not change, while a score of <1 would indicate that the child's mouth was narrower when watching the funny movie and a score >1 that is wider was given.

3. RESULTS

The present study group consisted of 62 subjects which was divided into malocclusion group of 31 subjects (18 boys and 13 girls) and control group of 31 subjects (14 boys and 17 girls) across 3 age groups of 5-7 years, 8-10 years and 11-15 years.

When the self-assessment scores were compared among the three age groups it was seen that group 3 i.e. children of the age 11-15 years were more conscious about their teeth and smile (Table 1).

When dental aesthetic index was co related with mean width of smile, there existed a moderate negative correlation between the degree of malocclusion and the width of the smile. When Dental Aesthetic Index and mean number of teeth shown during smiling were co related, it was seen that there existed a weak negative correlation between the degree of malocclusion and mean width of the smile and number of teeth shown during smiling (Table 2).

4. DISCUSSION

While the definition of health is broad and encompasses physical, psychological and social dimensions that people feel are important, health care in over whelming reactive in nature responding to diseases that are departures from the norm according to the professional perception. Malocclusion is not a disease per say but rather a departure from an aesthetic norm in a society. In any case subjective perceptions play a key role in defining malocclusion.

Table 1. Comparison of self-assessment scores among the three age groups

Age Group	Self-Assessment Score (SAS)					
	5	**7**	**9**	**13**	**21**	**25**
5-7 Years	1 (1.6)	1 (1.6)	5 (8.06)	2 (3.22)	1 (1.6)	7 (11.2)
8-10 Years	0	2 (3.22)	2 (3.22)	5 (8.06)	1 (1.6)	9 (14.5)
11-15 Years	5 (8.06)	8 (12.9)	0	0	0	13 (20.9)

Table 2. Correlation of oral health indicators, self-evaluation by children, parents' evaluations and video based assessment of children's smiles

	Mean teeth seen during smile	Mean width of smile
Severity of mal-occlusion	R =-0.455, P<0.001	R =-0.556; P<0.001

In contrast to the considerable subjective focus on malocclusion measures, the research has traditionally focused on clinician driven outcome measures at the expense of more subjective patient driven measures.

The impact of malocclusions and OHRQoL might be dissimilar in children compared to adults as they deal with deformities, psychosocial and emotional factors differently [4]. In various studies it is seen that malocclusion severely impacted the psychological activities such as smiling, emotions and social contacts in children with mild to severe malocclusion as measured by the Dental Aesthetic Index (DAI). DAI is an orthodontic treatment need index based on socially define aesthetic standards [3].

In the present study we attempted to correlate the width of smile and number of teeth shown and the severity of malocclusion (Table 2). It was seen that there existed a moderate negative correlation between the width of smile and severity of malocclusion. Similarly there existed a weak negative co relation between number of teeth shown and the severity of malocclusion as measured by the dental aesthetic index (DAI). A positive correlation existed between parents of children with malocclusion and their desire to seek orthodontic treatment. Children with malocclusion also reported that they were teased by other kids for their dental appearance and they didn't show their teeth when they smiled.

Thus the study proved that poor oral health related quality of life and desire for orthodontic treatment co-existed. This was in accordance to the study by Paula DF et al that proved the excessive anterior teeth display during smiling potentially influences the self-perceived psychosocial impacts of malocclusion in adolescents, depending on the severity levels of malocclusion and self-reported satisfaction with dental appearance [8].

Age of children have foremost influence on the connotation between malocclusion and OHRQOL. It is seen that children entering their teens i.e. age of 11 to 14 go through major physical, mental and hormonal development due to which they become vulnerable to the thoughts of the way they smile and the way they appear. Similarly many studies have reported no co relation between malocclusion and OHRQOL in age groups younger than 8 years [9].

Our results indicated that when the self-assessment scores were compared among the three age groups it was seen that group 3 i.e. children of the age 11-15 years were more conscious about their teeth and smile the children of the age group of 5-7 years had indicated more positive smiles irrespective of the presence of malocclusion in primary dentition and transient malocclusion in mixed dentition (Table 2). Interestingly, the children's self-report negatively correlated with parent's perception but it did correlate with the proxy perception. The more positive the children were about their smiles the negative adjectives the parent had chosen to describe the child's smile. The possible explanation for this disparity is that structure of children's self-perception and heath cognition is age dependent as a result of their continuous cognitive, emotional, social and language development. The age differences in cognitive emotional functional and behavioural characteristics must be accommodated with the child questionnaire. According to the child development psychology the age of 6 marks the beginning of abstract thinking and self-concept. Children start to compare their physical features and personal traits with other children or against the norm. The ability for evaluative judgments of their appearance gradually develops through middle childhood (6-10 years). The age of 11-12 years they have a clear understanding of their complex emotions. Because of this developmental difference a single standardized self-report health status measure for children of age 6-14 cannot be developed. Instead age specific questionnaires are required [10].

In the present study it was seen that there existed no association between gender and OHRQOL. There was no statistically significant difference between mean self-assessment scores of males and females when analysed. This finding was in agreement with other studies [11,12]. This finding can be explained by the datum that children in the scrutinised age groups professed the psychosocial effect of malocclusion in a homogeneous manner.

5. SMILE ANALYSIS

From the data obtained from 8-10 year old group through the 11- 14 years, it was seen that there was a negative correlation between the oral health indicators and the smile parameters. The parental evaluation and parent's proxy assessment of their children's smile evaluation and the number of negative adjectives used to describe the child's smile were consistent with the child's self-evaluation [4]. The statistically

significant results confirmed the finding from the previous research by Bernabe E and Paula DF [7,13].

Malocclusion has a more of emotional and social impact compared to the oral symptoms and functional limitations whereas diseases like dental caries and periodontal problems have more impact on the oral symptoms and functional limitations unlike malocclusion [14,15].

6. CONCLUSION

Oral health is important to the physical, mental and social well – being of children. Ohrqol is a patient – testified result analysed by questionnaire to quantify the psychosomatic impact of dentition. Malocclusion affects children's smiling patterns and as a consequence their social interactions, communication with others, mood and self-perceptions. As children grow they become more conscious about their appearance as it was seen that children of the age group 8-10 years and 11-15 years suffering from malocclusion had more effects on the emotions, the self-confidence and social interaction than children of the age group 5-7 years and children belonging to the control group.

CONSENT

As per international standard, written consent from every parents of children have been collected and preserved by the author(s).

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Bendo CB, Paiva SM, Torres CS, Oliveira AC, Goursand D, Pordeus IA, Vale MP. Association between treated/untreated traumatic dental injuries and impact on quality of life of Brazilian school children. Health and Quality of Life Outcomes. 2010; 8:114-122.
2. O'Brien C, Benson PE, Marshman Z. Evaluation of a quality of life measure for children with malocclusion. J Orthod. 2007; 34:185–193.
3. Poonacha KS, Deshpande SD, Shigli Anand L. Dental Aesthetic Index: Applicability in indian population: A retrospective study. J Indian Soc Pedod Dent. 2010;1:28.
4. Golai S, Nimbeni B, Patil SD, Baali P, Kumar H. Impact of untreated traumatic injuries to anterior teeth on the oral health related quality of life as assessed by video based smiling patterns in children. Journal of Clinical and Diagnostic Research: JCDR. 2015;9(6):ZC16.
5. Jokovic A, Locker D, Stephens M, Kenny D, Tompson B, Guyatt G. Validity and reliability of a questionnaire for measuring child oral-health-related quality of life. J Dent Res. 2002;8:459-63.
6. Filstrup SL, Briskie D, da Fonseca M, Lawrence L, Wandera A, Inglehart MR. Early childhood caries and quality of life – child and parent perspectives. Pediatr Dent. 2003;25:431–40.
7. Hassan A, Daniyal M. Cartoon network and its Impact on behavior of school going children: A Case Study of Bahawalpur, Pakistan. International Journal of Management, Economics and Social Sciences. 2013;2(1):6–11.
8. Delcides Ferreira Paula Jr, Erica Tatiane Silva, Ana Cristina Viana Campos, Margaret Olivera Nunez, Claudio Rodrigues Leles. Effect of anterior teeth display during smiling on the self-perceived impacts of malocclusion in adolescents. Angle Orthod. 2011;(81)3: 540-5.
9. Kragt L, Dhamo B, Wolvius EB, Ongkosuwito EM. The impact of malocclusions on oral health-related quality of life in children-a systematic review and meta-analysis. Clin Oral Investig. 2016;20(8):1881–1894.
10. Locker D. Concepts of oral health, disease and the quality of life. In: Measuring oral and quality of life. Edited by: Slade GD. Chapel Hill: University of North Carolina: Dental Ecology. 1988;11-24.
11. Feldens CA, Nakamura EK, Tessarollo FR, Closs LQ. Desire for orthodontic treatment and associated factors among adolescents in Southern Brazil. Angle Orthod. 2015; 85(2):224-32.
12. Guimarães Soraia Pimenta de Araújo, Jorge Kelly Oliva, Fontes Maria Jussara Fernandes, Ramos-Jorge Maria Letícia, Araújo Cíntia Tereza Pimenta, Ferreira Efigênia Ferreira et al. Impact of

malocclusion on oral health-related quality of life among schoolchildren. Braz. Oral Res. [Internet]. 2018;32:e95.

13. Eduardo Bernabé, Carlos Flores-Mir, Aubrey Sheiham. Prevalence, intensity and extent of Oral Impacts on Daily Performances associated with self-perceived malocclusion in 11-12-year-old children. BMC Oral Health. 2007;7:6.
14. Bhatia R, Winnier JJ, Mehta N. Impact of malocclusion on oral health-related quality of life in 10–14-year-old children of Mumbai, India. Contemp Clin Dent. 2016; 7:445-50.
15. Roberto Cuchiara Simões, Marília Leão Goettems, Helena Silveira Schuch, Dione Dias Torriani1, Flávio Fernando Demarco. Impact of Malocclusion on oral health-related quality of life of 8-12 years old school children in Southern Brazil. Brazilian Dental Journal. 2017;28(1):105-112.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/54272