Objective and Subjective Parameters of Oral Health in South Indian Children: A Cross-sectional Study

Abstract

Background: Oral health of schoolchildren is a strong predictor of their overall well-being. This study was planned to assess and compare the objective and subjective parameters of oral health of South Indian school children. Methodology: Three hundred and sixty school children participated in this cross-sectional study. Their oral hygiene status, dental caries status, and treatment needs were assessed. Two questionnaires were filled by these children, to assess their oral health-related quality of life (OHRQoL) and their knowledge on oral health. Their academic scores were collected from the schools. Statistical analysis was done using Kruskal–Wallis ANOVA test and Spearman correlation test appropriately. Results: Children with no caries had better OHRQoL ($P = 0.02$). There was a negative correlation between dental caries status and OHRQoL score ($P = 0.003$) and dental caries treatment needs and OHRQoL score ($P = 0.01$). There was a positive correlation between knowledge on oral health and OHRQoL score ($P = 0.02$). Conclusion: Children with no caries had a better OHRQoL when compared to children with caries. Children with caries had more treatment needs, poor oral hygiene, low quality of life, and performed lesser in academics. However, they had adequate knowledge on oral health. Hence, both objective and subjective parameters of oral health should be given importance while treating children.

Keywords: Child Oral Health Impact Profile scale, oral health, oral health-related quality of life, schoolchildren

Introduction

Oral health is an essential part of general health. The oral health of children is greatly influenced by their parent’s oral health-related habits.[1] As children enter school age, their oral health is also influenced by the school environment, teachers, school textbooks, friends, and peer groups.[2] In this school age, remarkable changes occur both in the physical form of their body and in their cognitive/psychosocial development. Like other diseases, oral diseases also have emotional and psychosocial consequences.[3] The World Health Organization (WHO) has shown that children with poor oral health have more missing school days and diminished quality of life (QoL).[4] Annually, more than fifty-one million school hours are lost by children, due to oral diseases in the United States of America.[5] Poor oral health leads to pain, discomfort, embarrassment, reduced self-esteem, and impairments of daily life activities.[6] Hence, oral health of schoolchildren can be considered as a strong predictor of their overall well-being.

The traditional way of assessing oral health includes objective criteria such as dental caries status and oral hygiene status using indices. They reflect the end point of the disease process and do not give any information about the impact of the disease process. The often neglected aspect includes the subjective assessment. This deal with the symptom reduction, patient’s satisfaction, and increased functional and emotional well-being. The focus is on the person’s personal experience and hence his or her QoL. Oral health-related QoL (OHRQoL) characterizes a person’s perception of how oral health influences an individual’s life quality and overall well-being.[7] Therefore, incorporating OHRQoL component in assessing oral health creates a shift from traditional assessment to the care that focuses on a person’s functioning and well-being. Hence, the present study was planned with the following aims and objectives: (i) to assess the objective and subjective components of oral health of schoolchildren and (ii) to compare the objective and subjective components of oral health of schoolchildren.

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Methodology

A cross-sectional study was planned and the protocol was approved by the Institutional Review Board and Institutional Ethical Committee (IEC-NI/14/DEC/44/80). Five private schools following similar syllabus, same medium of education, and same socioeconomic status were approached in and around Tiruchengode district, Tamil Nadu. Three schools with permission to conduct the study were included in the study. Informed consent was obtained from the school authorities and the parents to include their children in this study. Convenience sampling was done and the sampling frame included all children of grade III belonging to the academic year 2015–2016 from three schools. Children who were absent on the day of examination were excluded from the study.

Children were screened to assess their dental caries status (decayed and filled teeth index) and caries treatment needs using the WHO criteria (1997). Oral hygiene status was recorded using oral hygiene index-simplified (OHI-S). Two questionnaires were filled by the children in their respective classrooms, to assess the OHRQoL and their knowledge on oral health. The children were instructed to read the statement carefully and choose the answer that best suits them. They were also informed that there was no right or wrong answer. Each question had a translated version in the native mother tongue language also. Period given for completion of the questionnaires was 15–20 min. The academic performances of the children were collected from the school authorities.

Questionnaire 1

The knowledge questionnaire used in this study was adopted from the research work of Al-Omiri et al.[8] The questions were modified for the Indian scenario and framed in a focus group discussion with eminent pediatric dentists. The content and criterion validity of the questionnaire was pretested by a pilot trial. Corrections made were reassessed and approved in the second focus group discussion. The final closed-ended questionnaire had nine questions. The questionnaire was filled in the presence of the primary investigator.

Questionnaire 2

The OHRQoL was measured using Child Oral Health Impact Profile scale-short form (COHIP-SF). This scale was developed for school-going children by Broder in 2007. A letter of permission was obtained from the author to use this scale. This scale is unique as it measures both the positive and negative impacts of oral health. It consists of nineteen questions categorized under five domains: (a) oral health well-being, (b) functional well-being, (c) social or emotional well-being, (d) school environment, and (e) self-image. Each question has five responses with the score ranging from 0 to 4. The responses were never, almost never, sometimes, fairly often, and almost all the time. A maximum score of 76 can be obtained.

Data analysis

Data collection was done in each school separately, and they were subjected to statistical analysis using SPSS version 17 (SPSS Inc. Chicago, Illinois, USA). Comparison of the parameters based on their dental caries status was done using Kruskal–Wallis ANOVA test. The correlation between subjective and objective parameters was analyzed using Spearman correlation test. P < 0.05 was considered statistically significant.

Results

A total of 360 children from three schools were included in this study. The study population was divided into three groups based on their caries status as dft = 0, dft ≤3, and dft >3. Table 1 shows the sample distribution, OHI-S score, dental caries treatment needs, academic performance, and knowledge on oral health, based on children’s dft status. Out of 360 children, 186 children had no dental caries. As the dft score increased, the OHI-S score also increased, but it was not statistically significant (P = 0.13). A highly significant (P < 0.001) increase in dental caries treatment needs was observed as the dft score increased. There was no significant difference in the academic performance (P = 0.73) and their knowledge on oral health (P = 0.16), between the caries subgroups.

When the COHIP domains were compared within the caries subgroups [Table 2], a significant difference in the...
oral health well-being component ($P = 0.005$) and total score of COHIP ($P = 0.02$) were seen.

On analyzing the correlation between objective and subjective parameters [Table 3], there was a significant negative correlation between dental caries status and oral health well-being ($P = 0.01$) and total COHIP score ($P = 0.003$). Similarly, there was a significant negative correlation between dental caries treatment needs and oral health well-being ($P = 0.01$), functional well-being ($P = 0.05$), and total score of COHIP ($P = 0.01$). On analyzing the correlation between OHI-S scores and COHIP domain scores, there was a significant positive correlation with emotional well-being ($P = 0.004$) and total score of COHIP ($P = 0.05$). There was a statistically significant positive correlation between knowledge on oral health and functional well-being ($P = 0.001$), self-image ($P = 0.004$), and total COHIP score ($P = 0.02$).

There was no significant correlation between academic performance and dental caries status or OHI-S scores. Similarly, no significant correlation existed between the knowledge on oral health and dental caries or OHI-S scores.

**Discussion**

Advances in oral health promotion have principally headed toward the technical aspects of improving oral health rather than focusing on the patient’s perception. Comprehensive pediatric dental care should not merely reduce the negative symptoms of oral diseases but should aim at enhancing the child’s functional and emotional/social well-being. By assessing the impact of oral health on their well-being, the pediatric dentist can plan to improve their OHRQoL. Literature search showed studies that assessed the association between specific parameters such as dental caries and QoL,[10] dental caries and academic performance,[11] and QoL and academic performance.[12]

The present study, the first of its kind in Indian children, attempted to assess the correlation between most of the commonly studied objective and subjective parameters related to oral health. The objective assessment included dental caries status, its treatment needs, and OHI-S. The subjective criteria included were assessment of OHRQoL using COHIP-SF scale, knowledge on oral health and the academic performance. Third-grade children were selected for the study because of the following reasons: (a) mixed dentition stage-prone for both proximal and occlusal caries,[12] (b) concrete operational period of Piaget’s theory – cognitive development with logical thinking,[13] and (c) social environment widened includes friends, school apart from family.[14] The study population was grouped into three, based on their caries status to assess the impact of caries status on oral health and well-being.

**Dental caries status and its impact**

In this study, it was found that as the dft score increased, the oral hygiene status became poor. Chopra et al. showed that children with high OHI-S scores showed four times more risk of developing caries when compared to children with good oral hygiene.[15] Did the poor oral hygiene status cause dental caries or the presence of dental caries affect the oral hygiene status? This could be a chicken and egg dilemma. In this study population, both the conditions coexisted and this cross-sectional study could not establish the cause and effect role.

As the dft status increased, the academic performance gradually decreased. Garg et al. showed the impact of high caries on school performance.[10] They concluded that their educational experience can be improved by maintaining good oral health. Gao et al. showed that children with higher oral health knowledge scores were less likely to have dental caries.[16] However, in this study, children with and without dental caries had a similar knowledge score on oral health. All the three schools followed the same syllabus, and oral health education was a part of their school dental health programs. Hence, this study has shown that school dental health programs can enhance the knowledge on oral health in children irrespective of their oral health status.

On comparing COHIP domains within the caries subgroups, children with no dental caries scored significantly higher in their oral health well-being component than children with dental caries. As caries increased, the oral health well-being and overall OHRQoL of children gradually increased.

**Table 3: Correlation between dental caries, treatment needs, oral hygiene index-simplified scores, academic performance, and Child Oral Health Impact Profile score**

| Parameters                  | Oral health well-being | Functional well-being | Emotional well-being | School environment | Self-image | Total score |
|-----------------------------|------------------------|-----------------------|----------------------|--------------------|------------|-------------|
|                             | $\rho$ | $P^*$     | $\rho$ | $P^*$     | $\rho$ | $P^*$ | $\rho$ | $P^*$ | $\rho$ | $P^*$ | $\rho$ | $P^*$ |
| Dental caries status        | $-0.14$ | 0.01    | $-0.1$ | 0.07     | $-0.09$ | 0.08 | $-0.1$ | 0.06 | $-0.03$ | 0.61 | $-0.16$ | 0.003 |
| OHI-S                       | 0.04   | 0.42    | $-0.02$ | 0.73     | 0.15   | 0.004 | $-0.002$ | 0.97 | 0.06   | 0.24 | 0.1     | 0.05  |
| Caries treatment needs      | $-0.14$ | 0.01    | $-0.10$ | 0.05     | $-0.07$ | 0.16 | $-0.1$ | 0.06 | 0.02   | 0.72 | $-0.14$ | 0.01  |
| Academic performance        | 0.04   | 0.45    | $-0.01$ | 0.92     | $-0.03$ | 0.63 | $-0.09$ | 0.09 | 0.21   | $<0.01$ | 0.04   | 0.50  |
| Knowledge                   | 0.08   | 0.16    | 0.19   | 0.001    | 0.09   | 0.09 | $-0.10$ | 0.06 | 0.15   | 0.004 | 0.13   | 0.02  |

*Spearman correlation. OHI-S=Oral hygiene index-simplified*
decreased. Martins-Júnior et al. reported that children with dental caries showed a greater relative risk of having negative perception of oral health status than those without dental caries, regardless of gender or malocclusion.[17] It is a well-established fact that children with dental caries have a diminished QoL.

As caries status increased, its treatment needs obviously increased. As both increased, the oral health well-being score, functional well-being score, and overall OHRQoL decreased significantly. These results were in accordance with the work done by Do and Spencer[18] and Loice.[19] They found a significant correlation between high caries experience and low OHRQoL. In this study, children who had more caries treatment needs had functional problems such as difficulty in eating and sleeping. They also had more school days missed because of the symptoms caused by caries and the treatment needed for caries. These factors could have strongly influenced their OHRQoL.

Oral hygiene status and its impact

Children with good oral hygiene got high scores in the functional well-being and school environment components of COHIP scale. Children with poor oral hygiene performed poor in academics and had lesser knowledge on oral health. Guarnizo-Herreño and Wehby showed that poor oral health was significantly associated with reduced psychosocial well-being.[20] Seirawan et al. have showed that oral health affects student’s school performance.[21] Blumenshine et al. showed that children with poor general health and poor oral health were two times more likely to perform lesser in school.[22]

Academic performance/knowledge and its impact

Children who performed better in academics had a significantly higher self-image score and a better overall OHRQoL score compared to their peers. Piovesan et al. showed that children with low OHRQoL displayed poor school performance.[11] Children with good knowledge on oral health had a significantly higher functional well-being score, self-image score, and overall OHRQoL score.

Controversial results

The present study had two controversial results. First, children with poor oral hygiene had better scores on the emotional well-being component and overall OHRQoL. This could have happened because of the following probable reasons: (1) children might not have been aware of the presence of plaque and its consequence on oral health or (2) they would not have considered the presence of plaque as an important factor influencing their overall well-being. This clearly indicated that children considered only symptoms such as dental pain and bleeding gums to affect their QoL. Second, children with high caries status also seemed to have adequate knowledge about oral health. This showed that knowledge on oral health had not been reflected in their practice behavior of maintaining good oral health. The only limitation of the present study was its design. This cross-sectional study could not establish the association between disease and its outcomes.

Conclusion

Comparison of the objective and subjective parameters of oral health yielded the following conclusions: (a) children with no caries had a better OHRQoL when compared to children with caries and (b) children with caries had more treatment needs and poor oral hygiene and showed poor academic performance compared to children without caries.

Future dental health education programs should work on both the objective and subjective parameters of oral health with special focus to enhance not only the knowledge but also their attitude and practice behavior, thereby improving the overall QoL of children.

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Conflicts of interest

There are no conflicts of interest.

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