The impact of integration of a dental module into the existing integrated child development services scheme in Chennai, India

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ABSTRACT

Aim: The aim of this study was to assess the impact of reinforced oral health awareness program to the children, parents and Anganwadi workers on the oral hygiene and oral health status of the children in Anganwadi centers functioning under the Integrated Child Development Scheme (ICDS) services all around Chennai city, Tamil Nadu, India. Materials and Methods: This longitudinal study was conducted among 511 study participants. All the study participants, their parents and Anganwadi workers attended an oral health education program. Oral hygiene and the oral health status of the children were assessed using a debris and WHO Pro forma 2013 at the baseline and after 1 year. Follow-up debris score was collected after 3 weeks, 1, 3, and 6 months in all the 12 zones divided into three groups, i.e., Groups A, B, and C according to the re-intervention schedule. Results: A highly significant reduction in the debris scores of the study participants was observed between each follow-up data collection (P = 0.001) regardless of the groups. A significant reduction (P = 0.001) in terms of the prevalence of dental caries, filled with no caries, missing teeth, gingival bleeding, and oral mucosal lesions were observed in the children between the baseline and final assessment after 1 year. Conclusion: A definite paradigm shift was observed in the present study after incorporation of the dental module, which could be taken up as an example to include oral health education and oral health checkups to the existing ICDS scheme, which was lacking before.

Keywords: Child, health education, oral health, oral hygiene, parents, prevalence

Introduction

Oral health plays an intrinsic role in general health.[5] According to the WHO, “Health for all” must be focused to achieve all the sustainable development goals.[5] In India, it can be achieved by adapting the Primary Healthcare approach to counteract the social and health issues.[5]

Primary healthcare is always a pivotal strategy which always remains a mainstay for health-care service delivery.[6] The integration of dental elements into the Primary Healthcare approach necessitates oral health instructions and regular screening by dentists and community Healthcare workers.[6] A fundamental approach in primary prevention is health education. The aim of oral health education is to improve knowledge about oral health among the public. It also develops a positive attitude and favorable oral health behavior in them.[5]

Integrated Child Development Scheme (ICDS) service is one of the largest programs in the world. It is to ensure the holistic development of a child. Children age 0–6 years get benefited through the scheme.[6] The scheme was launched in India in the year 1975 on October 2 in the conduct of the national policy for children. For more than three decades, it is functioning satisfactorily.[7] This program was launched for the long term development and benefits of the community. ICDS today is one of the largest programs in the world.

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of the largest community-based outreach programs for Holistic early childhood development. It is like a pivotal link between both the disadvantaged Primary Health care and educational systems. It is for the Welfare of mother and child. ICDS integrates supplementary nutrition, immunization, health checkups, nonformal preschool education, nutrition, and health education. One thing that is missing in the scheme is oral health checkups and oral health education, which is of at most importance for the children and also the parents.

The children in Anganwadi centers are mostly from slum areas and are from poor socioeconomic status. There is a markedly lower level of awareness among the parents about their child's oral health and General Health. Parents are responsible for the oral health and General Health of children. They aid children in brushing and maintaining good oral health. Anganwadi workers form the first point of mediation between the mass and health-care system. They are the people who can help in the propagation of oral health knowledge to the population.

Oral health of today's children will predict the future of oral health. Oral health education to the parents and Anganwadi workers can help in doing this. Proper oral hygiene instructions if followed by the parents and the children can help the children to maintain good oral health. Hence, the aim of the study was to provide reinforced oral health awareness program to the children, parents, and Anganwadi workers and to assess its impact on the oral health status of the children.

Materials and Methods

A longitudinal epidemiological study was conducted in Anganwadi centers functioning under the ICDS services all around Chennai city, Tamil Nadu, India, to determine the oral hygiene and oral health status of children under ICDS services and to assess the impact of reinforced oral health awareness programs conducted to them and their parents and Anganwadi workers.

The study was conducted for 15 months from April 2018 to July 2019. The nature and purpose of the study were explained to the Institutional Review Board and Institutional Ethical Clearance was obtained from SRM Dental College with ethical approval number SRMDC/IRB/2017/MDS/NO.702.

Children, their parents and Anganwadi workers who were present on the day of the examination, children from 1 to 6 years age group and children whose parents gave informed consent were included in the study and children who are mentally challenged, hearing disability or vision impairment and who have a history of prolonged antibiotic or mouthwash usage were excluded from the study.

The sample size was determined by obtaining the total number of Anganwadi centers and the total number of children in all the centers in the Chennai district from the director office of ICDS services, Tharamani. The sample size was calculated by probability proportional to size sampling technique.

There are 12 zones under integrated child development services scheme, Chennai. Each zone is taken as one Strata

Total number of Strata (k) = 12

Total number of children in all the 12 Strata (n) = 24,663

To include the study participants in proportionate to the size of the strata in the population and to attain a larger sample size, the probability of children to be added in each zone is taken as 50,

The number of children to be included in each zone = Total number of children in each zone/50

Total sample size = 497

Owing to a 30% drop out (attrition rate) which may occur during the re-intervention and follow up, a total of 149 children will be included in the current study. This 149 was divided equally among the 12 zones.

Drop out compensation per zone = 149/12 = 12.41 =13 per zone (rounded off)

Final sample size after the addition of dropouts = 653

From each of the 12 zones in Chennai under ICDS, Specific Anganwadi center from each zone was selected. The required number of children from each zone was selected randomly. The children were included if the parents gave consent and if they fulfilled the inclusion and exclusion criteria.

All the children, their parents, and Anganwadi workers attended an oral health education program in their Anganwadi centers. All of them were educated about oral health maintenance and proper care about child’s teeth. The demonstration of the brushing technique was done with the help of a typhodont and toothbrush. Modified bass technique for adults and Fones technique for the children were demonstrated. The oral health education was given in the local vernacular language Tamil, for a better understanding of the participants.

Oral hygiene of the children was assessed and recorded in a debris pro forma designed for this study, and the oral health status was assessed using WHO Pro forma 2013 at the baseline. The debris score of the children was recorded for all the teeth present in their oral cavity by using the scoring criteria for debris index of simplified oral hygiene index (S) developed by Greene and Vermillion in 1964. The examination was carried out according to American Dental Association Type III examination, using mouth mirror, explorer, and adequate illumination. Hand scaling
was performed for children with poor oral hygiene to avoid the possible bias that could occur during the follow-up.

Follow-up data (debris score) after 3 weeks was collected in all the 12 zones. All the 12 zones were divided into three groups of 4 in each. The three groups were divided into groups A, B, and C according to the re-intervention schedule of 1 month, 3 months, and 6 months. The zones were divided randomly by the lottery method into three groups. At 1 month, Group A (zone 1, 7, 9, 12), at 3 months Group B (zone 2, 3, 6, 11) and at 6 months Group C (zone 4, 5, 8, 10) had the re-intervention program for all the participants and the follow-up debris data was collected on the same day. Children who were absent or whose parents withdrew the consent during the follow-ups were eliminated from the study sample. Final data collection, both oral health and oral hygiene status of all the children (debris and WHO pro forma) were collected after 1 year.

The data collected were transferred and tabulated into Windows Microsoft Excel (2007) for data analysis. The collected data were analyzed with IBM SPSS statistics software 23.0 version Chicago. To find the significant difference in the multivariate analysis, the one-way ANOVA with Tukey’s post hoc test was used.

## Results

A total of 646 study participants were included in the study. Following a drop out of 20.8% after the follow-ups due to absenteeism or withdrawal of consent, 511 children were followed till the final data collection and were included in the data analysis. As the drop out was <30%, the statistical analysis was proceeded. The results obtained from the analysis of data are as follows:

The distribution of the study participants according to the different groups is represented in Figure 1. 37.6% (n = 192) of the children were in Group A, 29.7% (n = 152) belonged to Group B and 32.7% (n = 167) belonged to Group C.

The mean debris scores of the study participants based on Groups A, B, and C are depicted in Figure 2. The mean debris score during the baseline assessment was 18.53 in Group A, 19.45 in Group B, and 19.92 in Group C. The graph shows that the mean debris scores in all the three groups are reducing gradually. During the final assessment after 1 year, the mean debris score of Group A reduced from 18.53 to 2.42, from 19.45 to 2.41 in Group B and from 19.92 to 2.47 in Group C. Approximately 87% reduction was observed in each group.

The mean debris scores of Groups A, B, and C during different follow-ups was assessed using one-way ANOVA [Table 1]. The results were found to be significant (P = 0.0005) for mean debris score during 3 weeks debris assessment, whereas the difference in debris scores at baseline, re-intervention, and the final assessment was not significant.

The prevalence of decayed, missing, and filled teeth during the baseline and the final assessment is represented in Figure 3. Dental caries was present in 47.9% (n = 245) of the study participants during the baseline, whereas it reduced to 22.5% (n = 115) during the final assessment after 1 year. One or more teeth were missing in 12.7% (n = 65) of children during baseline, which reduced to 4.1% (n = 21) after 1 year. Filled teeth were present only in 0.4% (n = 2) of children at the baseline, which increased to 33.3% (n = 170) in 1 year after the intervention.

The comparison of prevalence of dental diseases in all the study participants during the baseline and 1 year after intervention was done using Fisher’s exact test [Table 2]. The results were that a highly significant P value was obtained while comparing the prevalence of dental caries during the baseline and final assessment (P = 0.0005) and also in the comparison of the prevalence of oral mucosal lesions (P = 0.002). The prevalence of filled with no caries was not significant (P = 0.563). The prevalence of missing teeth (P = 0.0000), gingival bleeding (P = 0.0000) was found to be highly significant. The comparison of the prevalence of dental fluorosis, erosion, and trauma was not significant (P > 0.05).

## Discussion

Dental illnesses are viewed as one among the most pervasive conditions on the planet and are generally preventable. Oral infections limit exercises in school, at work, and even at home,
causing various school and work hours to be gone off to some distant place every year in the entire world.[13]

Primary healthcare is a mainstay for health-care service delivery. Primary healthcare is needed for the protection, maintenance, and restoration of our health on day-to-day basis. In the last six decades of independent India, many improvements are seen in the case of primary health-care infrastructure, services, and other healthcare-related indices. Despite all these, still there are many more challenges in achieving health for all.[9] The aim of oral health education is to improve knowledge about oral health. It is obvious that people with solid information about oral wellbeing show better oral consideration practice.[94] Hence, this study is aimed to provide reinforced oral health awareness program to the children, parents, and Anganwadi workers and to assess its impact on the oral health status of the children.

Postelmination of dropouts, during the 15 months follow-up of all the children, 511 children were included in the final data analysis.

There was a reduction in debris score in-between follow-ups in all the groups. However, the difference was not significant (P > 0.05) between the groups during other follow-up periods such as re-intervention and final assessments. The difference between each follow-up assessment within each of the three groups was highly significant (P < 0.001). These findings were similar to that of Raj et al.[17] study, in which there was a significant decrease in debris score from 78.3% to 54.1% during pre- and post-intervention assessment. The reason behind the reduction of debris score in all groups could be the oral health education programs to the parents, Anganwadi workers and the children, which would have instilled a positive oral health behavior among them.

Table 1: One-way ANOVA comparing mean debris scores of the study population in different time periods

| Debris scores | Groups | n  | Mean       | SD       | SE       | 95% CI for mean | Minimum | Maximum | F     | P       |
|---------------|--------|----|------------|----------|----------|----------------|---------|---------|-------|---------|
|               |        |    | Lower bound|          | Upper bound|               |         |         |       |         |
| Baseline      | Group A| 192| 18.53      | 10.642   | 0.768    | 17.02          | 20.05   | 0       | 40    | 1.030   | 0.358   |
|               | Group B| 152| 19.35      | 10.007   | 0.812    | 17.75          | 20.93   | 2       | 40    |         |         |
|               | Group C| 167| 19.93      | 6.470    | 0.501    | 18.94          | 20.92   | 4       | 40    |         |         |
|               | Total   | 511| 19.23      | 9.276    | 0.410    | 18.42          | 20.04   | 0       | 40    |         |         |
| 3 weeks       | Group A| 192| 7.70       | 3.996    | 0.288    | 7.13           | 8.27    | 0       | 22    | 9.111   | 0.0005**|
|               | Group B| 152| 7.61       | 3.399    | 0.276    | 7.06           | 8.15    | 0       | 14    |         |         |
|               | Group C| 167| 9.04       | 2.729    | 0.211    | 8.62           | 9.46    | 2       | 14    |         |         |
|               | Total   | 511| 8.11       | 3.500    | 0.155    | 7.81           | 8.41    | 0       | 22    |         |         |
| Re-intervention| Group A| 192| 4.84       | 2.608    | 0.188    | 4.47           | 5.22    | 0       | 16    | 0.865   | 0.422   |
|               | Group B| 152| 4.61       | 2.447    | 0.198    | 4.21           | 5.00    | 0       | 10    |         |         |
|               | Group C| 167| 4.95       | 2.085    | 0.161    | 4.63           | 5.27    | 0       | 8     |         |         |
|               | Total   | 511| 4.81       | 2.399    | 0.106    | 4.60           | 5.02    | 0       | 16    |         |         |
| Final (1 year)| Group A| 192| 2.43       | 1.855    | 0.134    | 2.16           | 2.69    | 0       | 8     | 0.18    | 0.898   |
|               | Group B| 152| 2.39       | 1.562    | 0.127    | 2.14           | 2.65    | 0       | 8     |         |         |
|               | Group C| 167| 2.48       | 1.443    | 0.112    | 2.26           | 2.70    | 0       | 8     |         |         |
|               | Total   | 511| 2.43       | 1.640    | 0.073    | 2.29           | 2.58    | 0       | 8     |         |         |

*aSignificant P<0.05, **Highly significant P<0.001.

CI: Confidence interval, SD: Standard deviation, SE: Standard error

Table 2: Fisher’s exact test comparing the baseline and 1 year prevalence of dental diseases in the study participants

| Dental diseases | Status     | Baseline | 1 year | P     |
|-----------------|------------|----------|--------|-------|
| Dental caries   | Present    | 245 (47.9)| 115 (22.5)| 0.0005**|
|                 | Absent     | 266 (52.1)| 396 (77.5)|         |
| Filled with caries | Present | 1 (99.8) | 2 (0.4)  | 0.563  |
|                 | Absent     | 510 (0.2) | 509 (99.6)|         |
| Filled with no caries | Present | 2 (0.4) | 170 (33.3) | 0.0000**|
|                 | Absent     | 509 (99.6) | 341 (66.7)|         |
| Missing teeth   | Present    | 65 (12.7) | 21 (4.1) | 0.0000**|
|                 | Absent     | 446 (87.3) | 490 (95.9)|         |
| Gingival bleeding | Present | 281 (55) | 132 (25.8) | 0.0005**|
|                 | Absent     | 230 (45) | 379 (74.2)|         |
| Dental fluorosis | Present | 2 (0.4) | 2 (0.4)  | 1.000   |
|                 | Absent     | 509 (99.6) | 509 (99.6)|         |
| Dental Erosion  | Present    | 1 (0.2) | 0 (0)    | 0.317   |
|                 | Absent     | 510 (99.8) | 511 (100)|         |
| Trauma          | Present    | 1 (0.2)  | 1 (0.2)  | 1.000   |
|                 | Absent     | 510 (99.8) | 510 (99.8)|         |
| Oral mucosal lesion | Present | 9 (1.8) | 0 (0)    | 0.002**|
|                 | Absent     | 502 (98.2) | 511 (100)|         |

*aSignificant P<0.05, **Highly significant P<0.001.

Figure 3: Prevalence of decayed, missing, filled teeth in the study participants before and after intervention

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them. The demonstration and teaching of proper brushing techniques to the adults and the children could have also been a reason. Similarly, in a study conducted by Cherian et al. in 2019, among Anganwadi workers reported that women who are empowered to have control over health and diseases can be key agents in health promotion.

In the total of 511 study participants in all the three groups during the baseline data collection, dental caries were present in 47.9%, which got reduced to 22.5% after 1 year, i.e., post-intervention. This finding was highly significant with \( P < 0.001 \). Similarly, in the study conducted by Dabiri et al., the pre- and post-intervention prevalence of early childhood caries reduced from 74% to 61% among 3–6-year-old children, which was statistically significant \( (P < 0.05) \). The reason behind this could be that education about fluorides and its effects in preventing dental caries brings a positive attitude to use fluoride products, thus preventing or reducing dental caries. In a study conducted by Goyal et al., the author discussed that Oral infections, predominantly dental caries, in small children can be forestalled, if Anganwadi workers and mothers are adequately enabled, instructed and persuaded to give the best oral consideration to their children which was substantiated by this study results.

In the present study, only 0.4% of children had filled teeth without caries before the intervention, which got increased to 33.3% after the intervention. One or more missing teeth were present in 12.7% of children, which decreased to 4.1% of children. These differences were found to be highly significant \( (P < 0.01) \). These findings were similar to the study conducted by Fernando et al. in which the difference between the prevalence of filled and missing teeth in the children during the pre- and post-oral hygiene education was statistically significant \( (P < 0.005) \). The reason for such a change could be the increase in the knowledge and attitude of the parents and Anganwadi workers following the oral health education, which stress mainly on the importance of missing teeth and the need for restoring primary teeth of the children.

In a study conducted by Yazdani R et al. to evaluate the effect of school-based education on oral hygiene and gingival bleeding, about 93% of the participants had gingival bleeding at the baseline. There was an improvement of 79% in the gingival bleeding following the intervention. This difference was statistically significant \( (P < 0.05) \). Same way in the present study, 55% had gingival bleeding, which reduced to 25.8% after the intervention. This difference was found to be statistically highly significant \( (P < 0.01) \). The improvement of gingival health in the children can be attributed to the improvement in the brushing behavior of the children or the parents and Anganwadi workers following the instructions, in turn improving the oral hygiene of the children.

There was a difference in terms of dental erosion; this could be due to the education of the parents and Anganwadi workers on the ill effects of consuming acidic carbonated drinks. The oral mucosal lesion was present in 1.8% of children and following the intervention, and the lesions were not present in any of the study participants. This result was highly significant, with \( P < 0.001 \). The reason to substantiate this could be the promulgation of the need for the treatment of cavitated teeth before progressing to a lesion during the oral health training program to the parents and Anganwadi workers.

A definite paradigm shift was observed in the present study after incorporation of the dental module into the ICDS, Chennai, in terms of oral hygiene and oral health of the children under the project. This could be taken up as an example to include oral health education and oral health checkups to the existing ICDS scheme, which was lacking before.

The limitations of the present study are that the various confounding factors such as body mass index, diet pattern, and sugar consumption of the children were not taken into account to analyze the relationship. The socioeconomic status of the parents was not recorded to evaluate its relationship with the oral health of the children.

Primary healthcare is a pivotal strategy that always remains a mainstay for healthcare service delivery. The integration of dental elements into the primary healthcare approach necessitates oral health instructions and regular screening by dentists and community healthcare workers. With the incorporation of a dental module into the existing ICDS, the oral health of the children was observed to be effectively improving. Proper oral health education to the children, their parents, and Anganwadi workers can not only improve their knowledge on oral health but will have a definite positive effect on the oral hygiene and oral health status of the children. A definite paradigm shift can be observed if a dental module is incorporated into ICDS.

**Conclusion**

From the present study, it can be concluded that a proper oral health education to the children, their parents and Anganwadi workers can not only improve their knowledge on oral health but has a definite positive effect on oral hygiene and oral health status of the children. Collaborative efforts and long-term oral health education programs can help to translate the knowledge into positive practice. Future studies in this regard are recommended to overcome the limitations and substantiate the results obtained in this study.

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There are no conflicts of interest.

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