

Association between Nutritional Status and Dental Caries among School Children Attending out Reach Program:- Retrospective Study

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Abstract

Background and objectives: Malnutrition and dental caries is major public health problem in India among the children. The objective of this study was to find association between nutritional status and dental health among school children attending outreach program.

Material and methods: This is retrospective observational study. This study was conducted among the school children aged 5-15 years who attending outreach program conducted by M.R.Ambedkar dental college and hospital from the year 2010 to 2018. A total of 1231 participants were included in this study. The dental caries was measured based on the WHO diagnostic criteria for caries. Age and height measurement was also recorded for the children. The nutritional status was measured using the Gomez's classification for under weight, Waterlow's classification for stunting and wasting. Statistical analysis was carried out using SPSS version 24.

Result: A total of 1231 participants were there of which female-628, male-603, and were in the age group 5-10years-813, 11-15years-418. Prevalence of dental caries was 67.2%, prevalence of underweight, wasting and stunting is 46.8%, 15.1% and 32.9% respectively. Significant association was found between dental caries and stunting, dental caries and wasting. No association was found between dental caries and underweight. Mean number of dental caries was found to be significantly associated with underweight, wasting and stunting.

Conclusion: There was high prevalence of dental caries and malnutrition among the school children attending the outreach program. Outreach programs can be used as an effective measure to provide education regarding health, providing treatment in the area inaccessible to the health services.

Introduction

Nutrition is an essential component in human growth, development and maintenance of healthy life [1]. Nutritional status is the balance between food intake and utilization of nutrients from the foods to meet the body physiological needs and metabolic integrity [2]. Pediatric malnutrition is defined as an imbalance between nutrient requirements and intake that results in cumulative deficits of energy, protein, or micronutrients that may negatively affect growth, development, and other relevant outcomes [3]. The National Family Health Survey (NFHS) data show that 53% of children in rural areas are underweight, and this varies across states. The percentage of underweight children in the country was 53.4 in 1992; it decreased to 45.8 in 1998 and rose again to 47 in 2006 [4]. The recent report published by UNICEF states that a third of worlds burden for stunting resides in India approximately 46.6 million children in India are stunted and 25.5 million children are wasted [5].

Dental caries is an irreversible microbiologic disease of calcified tissues of teeth characterized by demineralization of inorganic portion and destruction of the organic substance of the tooth which often leads to cavitation [6]. Dental decay is the most common childhood disease worldwide, and most of the decay remains untreated particularly in developing countries [7,8] thus affecting the growth and wellbeing of millions of children [9]. In India, the data of National oral Health Survey conducted in 2011 showed 50% of the 5-year old children, 52.5% of the 12-year-old children, and 61.4% of the 15years-old children were affected by dental caries [10].

Evidence on the association between untreated dental caries and children's growth remains scanty, controversial and non conclusive [11]. while some study have suggested that the relationship between being underweight and dental caries is confounded by inadequate nutritional Intake [12,13] some studies have shown increased primary dentition caries levels in stunted children [14-16] It is essential to educate and motivate school children regarding healthy eating habits. This needs to be explained by teacher, parents and dentist. This is not being achieved due to lack of resources, lack of knowledge and due to cultural belief. The community-based dental outreach programs play a very crucial role in declining discovery-delivery disconnect by introducing awareness through health education and dental adumbrating services to the community members. These programs are

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found to be very effective for diminishing health unevenness [17]. An outreach program is complete entanglement between the community and the health institution or organizations. It is an attempt by the organizing members to impart its objectives, opinions, skills and practices to the target population or general population thereby generating awareness and improving oral health [18].

Material and Methods

A retrospective observational study was conducted among 5-15 year old children who attended outreach program conducted by M.R. Ambedkar dental college and hospital in the year from 2010 to 2018. A total of 1231 participants (male-631, female-598) were included after doing random sampling. Data collection was done from the previous year's record maintained by the M.R. Ambedkar dental college and hospital for the outreach program. Informed consent was taken from the participants at the time of their enrolment for the use of their information for research purposes after explaining the same to the participants.

Dental caries assessment

An oral examination was carried out under natural light using plane mouth mirrors, World Health Organization (WHO) probes, and explorers. The sterilization of instruments was done by autoclave method. No radiographs were taken.

Assessment of nutritional status

All anthropometric measures were performed. Body weight was measured to the nearest 0.1 kg with a digital scale. The height was measured to the nearest 0.1 cm with a portable measuring unit.

Under weight:- An underweight is defined as low weight for age for children.

Gomez's classification

Weight for age = ((patient weight) / (weight of normal child of same age)) * 100.

Stunting:- Stunting is defined as a low height-for-age for children, and it measures the past (chronic) child under nutrition.

Waterlow classification

Height for age = ((height of patient) / height of a normal child of the same age)) * 100.

Wasting:- Wasting is defined as low weight-for-height for children, and it is a measure of current or acute under nutrition.

Waterlow classification

Weight for height = (weight of patient) / (weight of a normal child of the same height)) * 100 [19].

Table 1: Distribution of study population according to Soci-demographic factor.

| | | Frequency | Percentage |
|--------|-------------|-----------|------------|
| Gender | Male | 603 | 49 |
| | female | 628 | 51 |
| Age | 5-10 years | 813 | 66 |
| | 11-15 years | 418 | 34 |

Table 2: Prevalence of dental caries.

| Dental caries | Frequency | Percent |
|---------------|-----------|---------|
| Absent | 404 | 32.8 |
| Present | 827 | 67.2 |
| Total | 1231 | 100 |

Data analysis

Analysis was done using SPSS version24. Descriptive analysis was done. Inferential analysis using chi-square and Anova was done. A p-value of less than 0.05 was considered statistically significant.

Result

The total sample 1231 Study participant consisted of Male 603 and female 628. Majority of the study population were in the age group 5-10 years 66.0% and 10-15 years 34.0%. Prevalence of dental caries (Tables 1 and 2).

Prevalence of underweight 46.8%, prevalence of wasting was 15.1% and prevalence of stunting was 32.9% (Table 3).

Association between dental caries and underweight was statistically not significant (p=0.072). 74.7% of the study population having 2nd degree malnutrition showed presence of dental caries. Association between dental caries and stunting was statistically significant (P=0.002). 68.7% of children with mild stunting had dental caries as compared to 31.3%. 69.5% of children who were normal also showed presence of dental caries. Association between dental caries and wasting was statistically significant (P=0.018). 88.2% of children who were severely wasted had dental when compared to 11.8% who did not have dental caries (Table 4).

Association between underweight and mean number of dental caries was statistically significant (p=0.001). Mean and standard deviation for children who were 3rd degree malnourished was 2.85±3.358. As degree of malnourishment increased mean and standard deviation of dental caries also increased. Association between dental caries and stunting was statistically significant (P=0.004). Mean and Standard deviation of dental caries among children with mild stunting was 2.67±2.936. However in children with severe stunting mean and standard deviation of dental caries was 1.65±1.839. Association between dental caries and wasting was statistically significant (P=0.045). Mean and standard deviation in children with severe wasting was 3.56±3.302 (Table 5).

Table 3: Prevalence of malnutrition.

| | Nutritional status | Frequency | Percentage |
|-------------|--------------------|-----------|------------|
| Underweight | Normal | 655 | 53.2 |
| | Malnutrition | 576 | 46.8 |
| Wasting | Normal | 1045 | 84.9 |
| | Malnutrition | 186 | 15.1 |
| Stunting | Normal | 826 | 67.1 |
| | Malnutrition | 405 | 32.9 |

Table 4: Showing Association between dental caries and Nutrition status.

| | Dental caries | Absent | Present | P value |
|--------------|-------------------------------------|-----------|-----------|----------|
| | | N (%) | N (%) | |
| Under weight | Normal | 214(32.7) | 441(67.3) | P=0.072 |
| | 1 st degree malnutrition | 120(36.8) | 266(63.2) | |
| | 2 nd degree malnutrition | 49(25.3) | 145(74.7) | |
| | 3 rd degree malnutrition | 21(37.5) | 35(62.5) | |
| Stunting | Normal | 252(30.5) | 574(69.5) | P=0.002* |
| | Mild malnutrition | 68(31.3) | 149(68.7) | |
| | Moderate malnutrition | 60(48.4) | 64(51.6) | |
| | Severe malnutrition | 24(37.5) | 40(62.5) | |
| Wasting | Normal | 355(34) | 690(66) | P=0.018* |
| | Mild malnutrition | 32(34.4) | 61(65.6) | |
| | Moderate malnutrition | 11(26.2) | 31(73.8) | |
| | Severe malnutrition | 6(11.8) | 45(88.2) | |

¥ Using Chi-Square Test

*P Value 0.05 Significant

**P Value 0.001 Highly Significant

Table 5: Showing Association between number dental caries and Nutrition status.

| | Dental caries | N | Mean | Std deviation | P value |
|--------------|-------------------------------------|------|------|---------------|-----------|
| Under weight | Normal | 655 | 2.43 | 2.729 | P=0.001** |
| | 1 st degree malnutrition | 326 | 2.46 | 3.226 | |
| | 2 nd degree malnutrition | 194 | 2.76 | 2.658 | |
| | 3 rd degree malnutrition | 56 | 2.85 | 3.358 | |
| Stunting | Normal | 826 | 2.66 | 2.980 | P=0.004* |
| | Mild malnutrition | 217 | 2.67 | 2.936 | |
| | Moderate malnutrition | 124 | 1.81 | 2.622 | |
| | Severe malnutrition | 64 | 1.65 | 1.839 | |
| Wasting | Normal | 1045 | 2.44 | 2.840 | P=0.045* |
| | Mild malnutrition | 93 | 2.97 | 3.443 | |
| | Moderate malnutrition | 42 | 2.26 | 2.499 | |
| | Severe malnutrition | 51 | 3.56 | 3.302 | |

¥ Using Anova

*P Value 0.05 Significant

**P Value 0.001 Highly Significant

Discussion

The present study was a retrospective observational study done to find association between dental caries and malnutrition among school children attending outreach program.

In our study 46.8% of the children were underweight (26.5% of the study population were 1st degree underweight, 15.8% were 2nd degree underweight, 4.5% were 3rd degree underweight). This is higher than the NFHS part 4 which reports prevalence of 35.7%. In this study

prevalence of wasting was 15.1% (7.6% showed mild wasting, 3.4% moderate wasting, 4.1% showed severe wasting) and prevalence of stunting was 32.9% (17.6% of the study population showed mild stunting, 10.1% were moderate stunting, 5.0% severe stunting). This is lower than the NFHS part 4 which reports prevalence of wasting and stunting to be 21% and 38.4% respectively [4]. As there is a lot of variation in the prevalence of nutritional status this can be attributed to variation in availability of food intake, literacy rate, poverty, access to medical facilities and time period to data collection [20].

In this study prevalence of dental caries was 67.2% this was lesser than the study conducted by Wilawan Weraarchakul 2017 which had prevalence rate of 73.4% [21] and higher than the study conducted by Gupta et.al (2015) 46% [22] and Dinesh P V et.al 2017 46.59% [23]

This can be due to inequality in economic condition and the resources, efficiency of health care system, availability of refined sugar, standard of oral health awareness among public, dietary and oral hygiene life style, as well as motivational status of parents and child [20].

In this study there was no significant association found between dental caries and underweight (weight for age). This was in accordance with study conducted by Fawaz et al 2016 [24] and in contrast with study conducted by Masuma PervinMishu et.al. 2013 [25], Aluckal E.et.al 2016 [26]. This can be due to as dental caries is multifactorial disease Also, the relationship between childhood growth and dental caries is complex and varies depending on many factors, such as age, gender, race, and other social factors and most of the published literature represented diverse populations [27].

Significant association was found between dental caries and stunting (height for age). This was in accordance with the study conducted by Wilawan Weraarchakul (2017) [21], Nicolau B et.al 2005 [28] and significant association was found between wasting and the dental caries. This was in accordance with the study conducted by Abolfotouh MA (2000) [29] which reports that children with wasting showed higher prevalence of dental caries when compared to normal nourished children. This may be because protein energy malnutrition during tooth formation leads to delayed eruption and enamel hypoplasia in addition possibly affecting the salivary glands increases the risk of dental caries [30].

Mean number of dental caries was higher in children with underweight, stunting and wasting. This was in also significantly associated. This was in accordance with study carried by Adeniyi et.al 2016 [31]. The main limitation of this study was its retrospective observation design limiting to identify casual relationship. A longitudinal design would be a better design for assessing the relationship between nutritional status and dental caries.

Conclusion

Our result showed that there exist a association between dental caries and stunting, dental caries wasting. It was statistically significant also. There was high prevalence of dental caries and malnutrition among the school children attending the outreach program. Outreach programs can be used as an effective measure to provide education regarding health, providing treatment in the area inaccessible to the health services.

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