



“ASSESSMENT OF ORAL HEALTH STATUS IN SEVERE ACUTE MALNOURISHED CHILDREN AMONG 6-60 MONTHS OF AGE IN VADODARA CITY, GUJARAT-A CROSS SECTIONAL STUDY.”

Dental Science

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ABSTRACT

Background: Severe acute malnutrition (SAM) is a major public health issue and is an important concern for the health authorities in India. Nutrition affects the teeth during development and malnutrition may exacerbate periodontal and oral infectious diseases.

Aim: To assess the oral health status in severe acute malnourished children among 6-60 months of age.

Methodology: 200 severe acute malnourished children age of 6-60 months from three different hospitals in Vadodara, Gujarat were taken and divided them in five age groups: 6-12 months, 13-24 months, 25-36 months, 37-48 months and 49-60 months. Oral health assessment was performed according to the basic method of oral health survey of the WHO proforma (1997 and 2013).

Results: The mean value of total no. of teeth present was 10.42. It shows delayed eruption of the primary teeth. Dental caries prevalence was 9.5% (n=19). 36.5% (n=73) children had periodontal disease. Preventive or routine treatment needed in 8.0% (n=16) children, Prompt treatment needed in 34.50% (n=69) children.

Conclusion: There is an urgent need for awareness and motivation among the paediatricians to refer severe acute malnourished children to paediatric dentists in order to provide them appropriate oral health care.

KEYWORDS

Severe acute malnourished children, Dental caries, Periodontal health,

INTRODUCTION

Nutrition concerns the comprehension of food and its effect on the metabolic processes on the build. According to the W.H.O. "Nutrition is the science of food and its relationship to health". Malnutrition is the cellular polarity between the furnish of the nutrients, energy and the body's command for them to secure growth, maintenance, and specific functions.¹

Severe acute malnutrition (SAM) is a crucial public health concern. It agonize an approximated 8.1 million under-five age group children in India causing nearly 0.6 million deaths. Severe Acute Malnutrition (SAM) is defined as very low weight for height/length (Z score below -3 SD of the median WHO child growth standards), a mid-upper arm circumference <115 mm, or by the presence of nutritional oedema.²

Malnutrition have an impact on oral health and an abysmal oral health, may bring about malnutrition. Due to the deficiencies of various vitamins like vitamin D, vitamin C, vitamin B and vitamin A, interruption in the oral structures occurs.¹

Periodontal disease emerge more rapidly in malnourished children; the pathology starts within the gum and infect the periodontal ligament up to the alveolar bone. Due to malnourishment and bad oral-hygiene, periodontal disease and necrotizing gingivitis also develop.³

In Gujarat prevalence of severe acute malnourished children (SAM) is 5.8% and In vadodara, prevalence wasting is 4.8%. Upon searching various databases (viz, PubMed, EBSCOhost, ProQuest and Google Scholar) it is found that studies on oral health assessment in severe acute malnourished children of Indian population are not present so, the purpose of this study was to evaluate the oral health status in severe acute malnourished children (SAM) between age of 6-60 months.

This study displays an insight of ferocity delayed primary teeth eruption, dental caries, gingivitis and need for the dental treatment in severe acute malnourished children (SAM) between ages of 6-60 months in vadodara city, Gujarat.

MATERIALS AND METHODOLOGY

- This study was conducted at Paediatric departments of two government medical colleges and one private medical college, Vadodara. Approval from the institutional ethical committee and from three medical hospitals have been taken.

SAMPLE DESCRIPTION :

- It was a time bound study. The proposed study was conducted for 15 months (Data collection and analysis). Sample size – 200 severe acute malnourished children were taken. (According to three hospitals' record on an average 20 patients reported / month.)
- To get prevalence of oral health status by 40% with 10% relative precision at 1% risk.

$N = Z^2 * P * Q / L^2$ Where,
Z = z-value of normal table, P = prevalence as given above, Q = 100-P
L = relative precision as given above

1. SELECTION CRITERIA:

Inclusion criteria:

- Parents who gave consent.
- Children of 6-60 months of age with severe acute malnutrition satisfying following criteria were included.³
 - Weight-for-height less than -3 SD and/or
 - Mid arm circumference (MUAC) < 115 mm and/or
 - Bilateral Oedema of feet

EXCLUSION CRITERIA:

- Children who were not willing to co-operate with the oral examination.

METHOD OF EXAMINATION:

Examination of the children was carried-out by principal investigator calibrated by co-investigator. Parents' were informed about the study and consent was taken prior examination of the children. An assistant was trained to assist in documenting the observation done by the investigator in the study.

Oral health assessment :

- Oral health assessment was performed according to the basic method of oral health survey of the WHO proforma (1997 and 2013).⁴ It includes the information regarding decayed, missing, filled, un-erupted teeth and gingival health of the children and the treatment need of those children.
- Total number of teeth present in oral cavity were also counted for finding out the delayed eruption of teeth according to chronology of primary teeth.⁵

- Oral health examinations were conducted with a sterilized mouth mirror and a WHO periodontal probe under good natural light starting from upper right side quadrant follow the clockwise direction and ending with lower right side quadrant. Parents or guardians help was taken as assistant for children below 3 years.

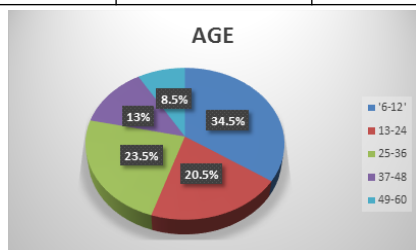
OBSERVATIONS AND RESULTS

1. Age wise distribution of the Participants

200 participants between 6-60 months of age were selected for the study. Table no. 1 and Graph no.1 shows, there were n=69 (34.5%) participants between the age group of 6-12 months, n=41 (20.5%) participants between the age group of 13-24 months, n=47 (23.5%) participants between the age group of 25-36 months, n=26 (13.0%) participants between the age group of 37-48 months and n=17 (8.5%) participants between the age group of 49-60 months.

Table no. 1

Age (months)	Frequency	Percent
6-12	69	34.5
13-24	41	20.5
25-36	47	23.5
37-48	26	13.0
49-60	17	8.5
Total	200	100.0



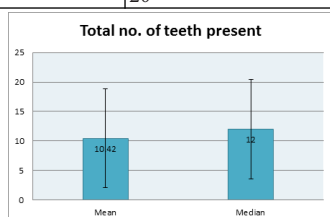
Graph no. 1

2. Total number of teeth present in the participants

Table no.2 and Graph no.2 shows, the mean value of total no of teeth was 10.42 ± 8.389 with minimum value of 0 and maximum value of 20. It shows delayed eruption of primary teeth.

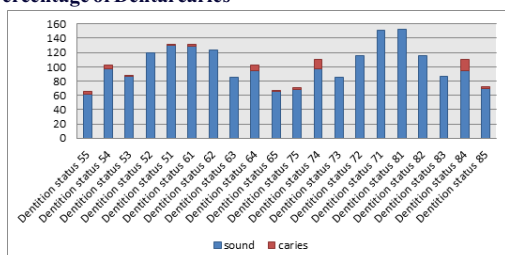
Table no. 2

Total no. of teeth present	Total no. of teeth present(for delayed eruption)
N (Number of participants)	200
Mean	10.42
Median	12.00
Std. Deviation	8.389
Minimum	0
Maximum	20



Graph no. 2

3. Percentage of Dental caries



Graph no. 3

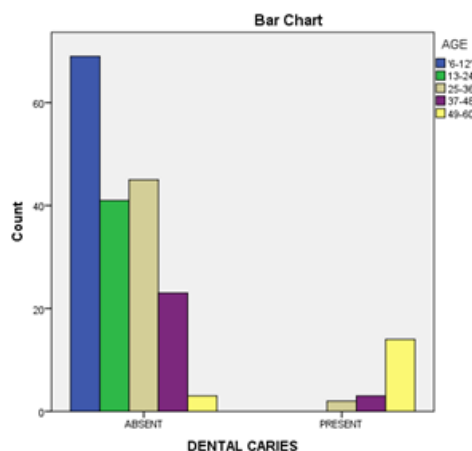
Graph no.3 shows the dental caries distribution in teeth. It shows that highest percentage of dental caries in 84 (mandibular right first primary molar), n=15 (13.60%) followed by 74 (mandibular left first primary molar) n=13 (11.80%). It also shows that mandibular primary first molars affected with dental caries are more than maxillary primary first molars, followed by second primary molars and upper incisors and mandibular primary lower incisors were free from the caries.

4. Age wise distribution of Dental caries

Table no.4 and Graph no.4 shows the Age wise distribution of Dental caries applying the chi square test, the difference was statistically highly significant with p value <0.001.

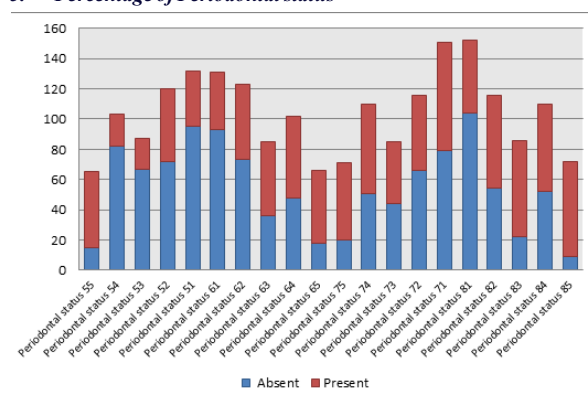
Table no. 4

Dental Caries*Age								
			AGE (months)					Total
			6-12	13-24	25-36	37-48	49-60	
Dental Caries	Absent	Count	69	41	45	23	3	181
		% within Age	100.0 %	100.0 %	95.7%	88.5%	17.6%	90.5%
	Present	Count	0	0	2	3	14	19
		% within Age	0.0%	0.0%	4.3%	11.5%	82.4%	9.5%
Total		Count	69	41	47	26	17	200
		% within Age	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %



Graph no. 4

5. Percentage of Periodontal status



Graph no. 5

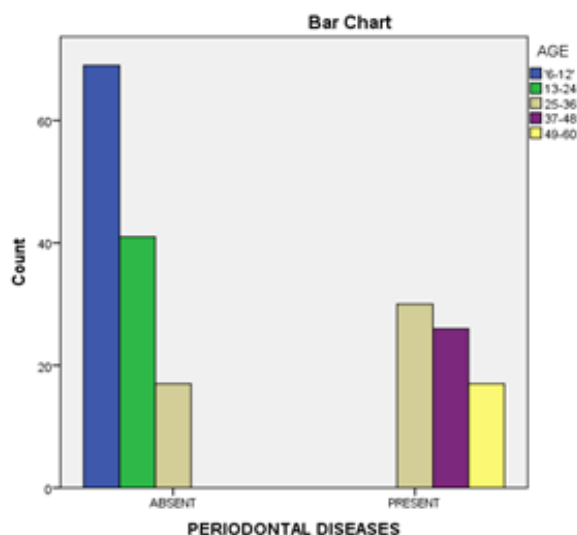
Graph no.5 shows the distribution of periodontal status according to teeth. Periodontal problem is more in relation with mandibular teeth than in the maxillary teeth. In the mandibular teeth anterior teeth are more prone than the posterior teeth.

6. Age wise distribution of Periodontal status

Table no.6 and Graph no.6 shows Age wise distribution of Periodontal status using the chi square test, the difference was statistically highly significant with p value <0.001.

Periodontal Diseases*Age								
			AGE (months)					Total
			6-12	13-24	25-36	37-48	49-60	
Period ontal disea ses	Absent	Count	69	41	17	0	0	127
		% within Age	100.0 %	100.0%	36.2%	0.0%	0.0%	63.5%
	Present	Count	0	0	30	26	17	73
		% within Age	0.0%	0.0%	63.8%	100.0 %	100.0 %	36.5%
Total		Count	69	41	47	26	17	200
		% within Age	100.0 %	100.0%	100.0 %	100.0 %	100.0 %	100.0 %

Table no. 6



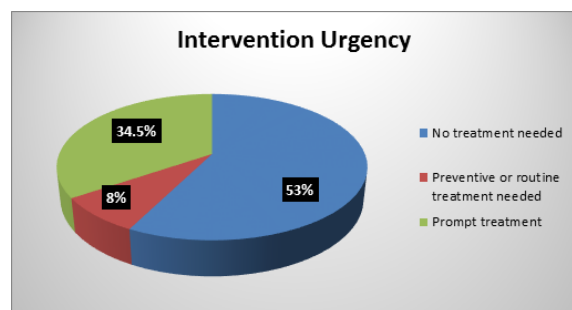
Graph no. 6

7. Percentage of Intervention urgency in participants

Table no.7 and Graph no.7 shows, Out of 200 children, Preventive or routine treatment needed in 16 (8.0%) children, Prompt treatment needed in 69 (34.50%) children.

Table no. 7

INTERVENTION URGENCY	No treatment needed	115	57.50%
	Preventive or routine treatment needed	16	8.00%
	Prompt treatment needed	69	34.50%



Graph no. 7

DISCUSSION

Malnutrition among under-five children is a major public health problem in India. This is reflected by the fact that the prevalence of under-weight children in India is among the highest in the world, and is nearly double that of Sub-Saharan Africa.⁶

The NFHS 4 data for 15 states in India shows that 37% of children under the age of five in these states are stunted, a fall of just 5% points in a decade. The proportion of underweight children has also reduced equally slowly from 39% as per NFHS 3 to 34% as per NFHS 4. But

there has been a success in reducing child wasting. The states for which data is available have more that have halved their proportion of wasted children from 48% to 22%.⁷

This study was designed to estimate the oral health status of severe acute malnourished children in vadodara city. The collected data are intended to be used as a base line in evaluating the future efforts to improve health preventive program of the population, help in the better oral-health development and further stoppage of malnourishment.

Age of the children

The present study included severe acute malnourished children between 6 to 60 months of age because of the criteria for the severe acute malnourished children, from Paediatric department of three different hospitals (S.B.K.S. Medical Institute and Research Center, Jannabai general hospital, GMERS medical hospital) located in vadodara,Gujarat.

We had divided five age-groups: 6-12 months, 13-24 months, 25-36 months, 37-48 months and 49-60 months.

J.O. Alvarez et al. (1993)⁸ conducted A prospective, four-year longitudinal study of 209 Peruvian children to evaluate the effect of a single malnutrition episode occurring at infancy (i.e., < 1 year of age) on dental caries in the primary teeth on 1 to 4 year of age. Zuniga-Manriquez AG et al. (2013)⁹ determined the experience, prevalence and severity of dental caries and its relationship with nutritional status in nursery infants 17 to 47 months of age.

Delayed eruption

The eruption of deciduous teeth is delayed by malnutrition, Researchers in India¹⁰, Guatemala¹¹, Tunisia¹², Australia¹³ and Nigeria¹⁴ among others have reported that malnutrition is associated with a delayed eruption of the deciduous teeth. Also, other previous cross-sectional studies from Cantogrande (Peru) have documented this effect.¹⁵

In present study, the delay eruption of primary teeth seen until the age of 3 years. After 3 years all the children had full set of teeth (20 teeth). In accordance with the present study, Alvarez J.O et al (1993)⁸ revealed the mean numbers of teeth at ages 1 and 1.5 years for the children who were nutritionally normal as infants were significantly higher than those of the children who were either wasted, stunted, or stunted and wasted as infants. At age 2, normal children had significantly more teeth in the mouth than did stunted children and stunted and wasted children. At age 2.5, the number of teeth in the normal children was still significantly higher than in stunted children. By age 3, all four groups had a statistically equal number of teeth. At age 4, all four groups had their full 20 teeth.

Dental Caries

Dental caries is one of the most prevalent dental diseases and children are one of the most affected groups.¹⁶ The individual growth of the child is influenced by both genetic and environmental factors. Many of these factors can give rise to dental caries, thus growth /development and dental caries are thought to share a common pathogenesis.

Alvarez. J O et al (1995)¹⁷ shown that a prolonged malnutrition episode in infancy that leads to both stunting and wasting results in more caries by the age of 4 year and no differences in caries were observed by the age of 4 between the normal, the stunted, and the wasted groups, the malnourished children had a delayed tooth eruption that likely resulted in delayed caries development. Also in our study we found no dental caries until the age of 2 years in SAM children, after that caries was present with 9.5% and it was statistically significant among the age groups (p <0.001).

In favour of the present study, Zuniga-Manriquez AG et al. (2013)⁹ identified no association between experience, prevalence and severity of dental caries and nutritional status of infants. Eman K. Chaloo et al (2013) did not found significant relation between age, gender, nutritional status and caries experience, Other studies found that caries scores are reported to increase with age.¹⁸ Many studies found that malnourished individuals were more susceptible to dental diseases, as it interacts with dental composition, morphology and eruption time of tooth.¹⁹

In the present study first primary molars was most affected with dental caries followed by second primary molars and upper incisors and

mandibular primary lower incisors were free from the caries. **Ribeiro T.R et al (2014)**²⁰ found that the second primary molar was the most affected primary tooth by dental caries among undernourished and in control group, followed by the first primary molar and upper central incisor. Lower incisors were not affected by dental caries in any of the studied groups.

Periodontal status

The effect of the nutritional factors in the development of periodontal diseases still unclear, so numerous studies carried out to compare the prevalence of gingivitis between well and malnourished children produced different results.¹⁸ **Chaloob E.K.etal (2013)**²¹ showed no significance in the nutritional status in according to plaque, gingival and calculus indices. Which is in contrast to the present study.

In the present study, 36.5% SAM children had periodontal problem and it was statistically highly significant for age groups ($p = <0.001$). Males (42.2%, $n=54$) were more susceptible for periodontal problems than females (26.4%, $n=19$) and it was statistically significant ($p=0.026$). In the favour of present study **Dashash etal (2002)**²² investigated the relation between protein-energy malnutrition and gingivitis in children in Damascus and its suburbs. Used a random sample of 840 male and female children aged 6-12 years. In their result gingivitis increased among low weight children (44%) compared to normal children (31%). It was more severe in low-height children in comparison to others.

Muhammad NO etal (2015)²³ in their study the prevalence of gingivitis for malnourished children was 100%, while for wellnourished group was 99.9%. The higher gingival mean was found among malnourished children than wellnourished children for all indicators. Gingival index was found to be higher among males than females. Which is in accordance with the present study, to increase invasion of the microorganisms and by producing in salivary flow and composition.

Intervention urgency

In the present study, Preventive or routine treatment needed in 16(8.0%) children, Prompt treatment needed in 69(34.50%) children for dental caries and periodontal problem. It was statistically highly significant in all the age groups ($p < 0.001$). More number of males required treatment urgency than females but this difference was not statistically significant ($p=0.375$).

Zuniga-Manríquez AG et al (2013)⁹ determined the experience, prevalence and severity of dental caries and its relationship with nutritional status in nursery infants 17 to 47 months of age. They found the treatment needs index (TNI) 86.3% and the care index (CI) 13.7%. Which is in favour to the present study.

CONCLUSION

The incidence of Severe Acute malnutrition is very high in India and government has established various Nutritional rehabilitation centers (NRC) in the government hospitals for the betterment of the SAM children by providing the nutritional supplements.

The aim of the present study was to evaluate the oral health status in severe acute malnourished children among 6-60 months of age. The following findings were observed in the present study: delayed primary teeth eruption, dental caries, periodontal problems. Thus the need of the dental treatment is only imperative in the SAM children. The current study validates that oral health is as important as general health. Oral health favours general health by increasing the effects of nutritional status.

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