# Dental Caries and Anthropometric Measurements in Children Aged between 5-14 Years

**Pragati Poudyel[1], Sunanda Sundas[2], Neha Dhakal[2], Pujan Bhusal[3], Krishna Hari Subedi[4]**

[1]*Department of Physiology, People's Dental College and Hospital, Nayabazar, Kathmandu, Nepal.*

[2]*Department of Pedodontics, People's Dental College and Hospital, Nayabazar, Kathmandu, Nepal.*

[3] *Department of Physiology, Chitwan Medical College,Chitwan, Nepal*

[4] *Department of pediatrics, Rapti Provincial Hospital,Dang, Nepal*

## CORRESPONDENCE

Dr.Pragati Poudyel
Department of Physiology,
People's Dental College and Hospital,
Kathmandu, Nepal.
Email:pragati.poudyel1@gmail.com

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## ABSTRACT

**Introduction:** Dental caries is common health condition affecting billions of people in the world. Dental caries may be linked to obesity, while on the other hand, it may be linked to underweight/stunting; both are kinds of malnutrition. This study aims to find dental caries in primary and permanent dentition and nutritional status of children aged between 5-14 years.

**Methods:** A descriptive cross-sectional study was conducted among children aged between 5-14 years who attended the Department of Pedodontic from January to April 2022.Dental caries was observed and dmft /DMFT index was calculated. Anthropometric measurements were done following WHO criteria. Body Mass Index (BMI) was calculated using age percentiles charts for boys and girls developed by Center for Chronic Disease Prevention.

**Results:** The total participants were 200 among which 88 (44%) were female and 112 (56%) were males. The dental caries status of all BMI categories were observed, caries status was found to be more in deciduous teeth (mean dmft) than in permanent teeth (mean DMFT).BMI categories showed 39(19.5%) underweight, 122 (61%) healthy weight, 25 (12.5%) at risk of overweight and 14 (7%) were overweight.

**Conclusion:** Dental caries status was higher in primary dentition compared to permanent dentition. Correlation between BMI and dental caries status was not significant.

**Keywords: Body Mass Index; Dentition; Dental Caries; Hip Circumference; Waist Circumference**

## INTRODUCTION

Dental caries is commonest childhood disease. Global changes has lead to change in food habits leading to increased in caries risk and number of overweight problems among children and adults.[1] The link between dental caries and weight is biologically realistic, given the significant evidence linking dental caries to irregular food intake, as well as the fact that improper dietary intake has been connected to the development of malnutrition at a young age.[2] Anthropometric measurements are a set of quantitative measurements of muscle, bone, and adipose tissue that are used to determine a person's body composition. Height, Weight, Body Mass Index (BMI), body circumferences (waist, hip, and limbs) are the main components of anthropometry. BMI is another extensively used index for determining nutritional status in both children and adults. BMI is a valuable tool for determining obesity and its severity.[3] Studies had shown association of dental

caries with anthropometric measurements.[2,4] This study aimed to find out dental caries in primary and permanent dentition using dmft/DMFT index and correlating it with nutritional status of children by anthropometric measurements.

## METHODS

A descriptive cross-sectional study was conducted in Department of Pedodontics of People's Dental College and Hospital (PDCH), Nayabazar, Kathmandu from 26th January 2022 to 25thApril 2022. The ethical approval was taken from the Institutional Review Committee of PDCH (Registration number: 15/1.2078/79). This study included children aged between 5-14 years who visited the Pedodontic department for their dental treatment. The study was conducted after informed consent from parents and assent from the participating children were obtained. The sample size was calculated using following formula:

$$n = \frac{z^2 \sigma^2}{d^2},$$

$$\text{So } n = \frac{(1.96)2 \times (2.44)}{(0.6)^2} = 192$$

Where,
n: minimum required sample size
Z: 1.96 at 95% Confidence Interval
σ: 2.44 (Standard deviation obtained for overweight categories from reference article)
d: 0.6 (Tolerable error of 20% of Mean S.D)
From reference article[5], mean of three BMI groups (underweight, normal and overweight) were calculated, among which 64 sample size were highest in overweight categories so 64 was considered in all groups using above formula which gave minimum sample size of 192. Hence, sample size considered was 200 assuming 5 % non response rate. Dental examination was performed by pedodontits under clinical lighting using dental probe and mirror. Dental caries was diagnosed using WHO standard criteria for caries diagnosis as decayed, missing and filled teeth (dmft for deciduous /DMFT for permanent).[6] The nutritional status was calculated by body mass index (BMI) using formula weight (kg)/ height ($m^2$) and percentile of BMI categories were calculated by using BMI for age percentile graph of male and female between 2-20 years.[3] According to WHO, BMI categories were explained as underweight (<5%), healthy weight (5%-85%), at risk of overweight (85%-95%) and overweight (>95%).The findings were recorded in Performa and analyzed by SPSS version 20.

## RESULT

The total participants were 200 among which 88 (44%) were female and 112 (56%) were males. Most of the patients were in age-group of 8-10 years(Table 1) with mean age being 8.89 ±2.28 years. The mean scores were as follows: decayed teeth 4.8 ± 3, missing teeth 0.29± 0.68 and filled teeth 0.50 ±1.19 whereas total mean dmft score was 4.69 ± 3.33 while mean DMFT score was recorded as 0.95 ±1.56. (Table2)

**Table 1: Socio- demographic distrubiton of participitant**

| Age group (years) | Frequency(n) | Percentage |
|---|---|---|
| 5-7 | 59 | 29.5 |
| 8-10 | 92 | 46 |
| 11-14 | 49 | 24.5 |
| **Gender** | | |
| Male | 112 | 56 |
| Female | 88 | 44 |
| **Diet Habit** | | |
| Vegetarian | 10 | 5 |
| Non-vegetarian | 190 | 95 |
| **BMI (Percentile)** | | |
| Underweight(<5%) | 39 | 19.5 |
| Healthy weight (5%-85%) | 122 | 61 |
| At risk of overweight (85%-95%) | 25 | 12.5 |
| Overweight (>95%) | 14 | 7 |

BMI categories showed 39(19.5%) were underweight, 122 (61%) were healthy weight, 25 (12.5%) at risk of overweight and 14 (7%) were overweight. When the dental caries status of all BMI categories were observed, caries status was found to be more in deciduous teeth (mean dmft) than in permanent teeth (mean DMFT). (Table 3)

**Table 2: Anthropometric and dental characteristics related to participants**

| Variables | Mean±Std. Deviation |
|---|---|
| AGE(Yrs) | 8.89 ±2.28 |
| Weight (kg) | 29.17± 9.29 |
| Height (meter) | 1.30 ±0.14 |
| BMI(Kg/m2) | 16.7 ± 2.98 |
| Waist Circumference(cm) | 58.7±8.25 |
| Hip Circumference (cm) | 67.9 ±9 |
| Mid Upper arm circumference(cm) | 19.7 ± 2.53 |
| Dmft | 4.69 ±3.33 |
| DMFT | 0.95 ±1.56 |
| Decayed | 4.8± 3 |
| Missing | 0.29 ± 0.68 |
| Filled | 0.50 ±1.19 |

**Table 3: BMI categories and DMFT index of permanent and primary dentition**

| BMI CATEGORIES (BMI percentile wise) | Number of subject | DMFT (Mean±S.D) | dmft |
|---|---|---|---|
| Underweight (<5%) | 39 | 0.85 ± 1.18 | 5.05 ± 3.50 |
| Healthy weight (5%-85%) | 122 | 0.14±0.53 | 4.78 ± 3.83 |
| At risk of overweight (85%-95%) | 25 | 1.02±1.66 | 4.76 ± 3.40 |
| Overweight (>95%) | 14 | 0.14±0.53 | 3.72 ± 2.92 |

Dental caries status when compared with the BMI using Pearson's correlation coefficient showed non-significant relationship (p >0.05). (Table 4)

**Table 4: Correlation between BMI and dental caries**

| | | Correlation Cofficient(r) | p-value |
|---|---|---|---|
| BMI | Dmft | -0.13 | >0.05 |
| | DMFT | 0.12 | >0.05 |

## DISCUSSION

Oral problems have become more frequent worldwide in the last two decade, with dental caries being the most common. Periodontal and dental diseases primarily impacts children worldwide. In Nepal, several studies regarding oral health and prevalence of dental caries have been done. However, studies done were mainly focused on particular ethnic group or school going children of particular region.[7,8,9] Only few studies correlating anthropometric measurement with dental caries have been done in Nepal.[2,5] Though, there are multiple similar studies at other part of world.[10,11,12,13]

This study reveals that dental caries in deciduous teeth are more common than in permanent teeth. This finding is similar to study done by Anzar et al where caries in primary dentition was higher than in permanent dentition.[14] Other studies also produced similar results.[7,15] Similarly, Swaminathan et al also showed that caries experience is higher in deciduous dentition.[16] Our study population is similar to theirs and children at our part of the world are taught to brush teeth at an older age which could be the cause for this increased caries rate in primary dentition. In our study, children with BMI categories of underweight had highest caries status compared to other BMI categories in primary dentition. Similarly, Anzar et al. also showed that dmft score increases with decline in anthropometric variable.[14] This could be due to the fact that malnourished children lack balanced diet required for healthy teeth.

Result from our study shows no correlation between BMI and dmft score which is similar to the result of Parajeeta et al and other studies.[5, 14, 15] However, studies conducted in western countries showed that increased BMI had positive correlation with dental caries. This contrast in result could be due to the difference in socioeconomic status, oral hygiene and food habits in western world. [14,17] The results obtained didn't show positive correlation which may be due to skewed and small samples. Hence, a study with larger sample size is required to get a proper correlation between BMI and dental caries.

## CONCLUSION

Dental caries status is found to be higher in primary dentition compared to permanent dentition and dental caries is higher in underweight category of primary dentition. So, maintenance of oral hygiene is important to prevent dental caries along with avoidance of cariogenic food.

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