The Correlation of Dental Caries with Nutritional Status of Early School children of District Swat

Dr Hira Waqas[1], Dr Eidul Ahad[2], Dr Said Muhammad Usman Shah[3], Shakir Ullah[4]

[1] Department of Dentistry Gandhara University Peshawar, Pakistan, 25000
[2] Department of Dentistry Spinghar Medical University Afghanistan, 2672
[3] Department: Dentistry Liaquat University of medical and health sciences, jamshoro, Pakistan 76060
[4] Department of Microbiology Abasyn University Peshawar Pakistan, 25000
*Corresponding Author: shakirullah1992@gmail.com

ABSTRAC T

The current study was conducted in District Swat from March 2024 to September 2024 to investigate correlation of Dental caries with Nutritional status of early school children. A systematic random sampling technique was applied for sample collection. Total of 300 samples were taken of aged 4 to 10 years of early school children. The total of 300 samples was taken from those children who have dental caries. Among the early school children the high prevalence of nutritional status the high ratio was found in Malnutrition 30(10%) leading by underweight 20(6.66%) and Anemia 5(1.66%) while very low frequency was found in Stunting 5(1.66%) and in Wasting 0(0%). The current study investigate that there is a strong association between Dental caries and Nutritional status. The prevalence of dental caries was very high compared to the WHO's report on oral health among school children. The educational status of mothers, habit of cleaning teeth, consumption of sugared coffee, consumption sweet food, and milk consumption were the associated factors for dental caries. There was significant association between dental caries and nutritional status. Children and parents should receive behavioral interventions regarding diet and dental hygiene. Furthermore, it is advised that more research be done utilizing all available techniques for diagnosing dental caries and evaluating the dental hygiene behaviors, attitudes, and knowledge of both parents and children.

Key words: Prevalence, Malnutrition, Dental Caries, Underweight

INTRODUCTION

Oral health, as defned by the World Health Organization (WHO), is a state of being free of mouth and facial pain, oral infection and sores, periodontal (gum) disease, tooth decay, tooth loss, and other diseases and disorders that limit an individual's capacity for biting/chewing, smiling, speaking, and psychosocial wellbeing (**WHO 2016**). According to the 2017 Global Burden of Disease study, dental caries of the primary teeth afect more than 530 million children worldwide (**WHO 2019**). Consequently, dental caries is a major public health problem globally,

and is the most widespread non-communicable disease (NCD) among school-age children. Te study of the Global Burden of Disease during the year 2016 has ranked decay of permanent teeth in the frst place among half of the world's population (3.58 billion people), and deciduous teeth was ranked 12th position (560 million children) (**WHO 2023**).

Significant effects on general health, quality of life, productivity, development, and academic achievement resulted from the majority of dental caries going untreated (**Monse et al 2010**). It has been demonstrated beyond doubt that having good dental health improves a person's ability to speak clearly, enjoy food, communicate effectively, have a higher quality of life, and feel more confident and self-assured in social situations. Children who have tooth infections may experience pain and restlessness, which lowers growth hormone and raises metabolic rate, perhaps leading to malnutrition (**Pitts et al 2010**). More specifically, due to the high incidence of dental caries and the emergence of permanent teeth in this age range, school-age children (6–12 years) are given priority in oral health initiatives (**WHO 2006**).

The burden of dental caries in children is high. Dental caries will progress into tooth pulp and a dental abscess will result, if untreated, to loss of teeth. In advanced cases, it may interfere with dietary habits as a result afect nutritional status as well as afect sleep, work activities, and school attendance (**Lim et al 2015**) . Dental diseases, especially dental caries, account for 4.6 percent of worldwide health spending and direct treatment costs of $298 billion (**Listl et al 2015**). In addition, it accounts for 5–10% of healthcare spending in developed nations and is a major reason why children are admitted to hospitals in a number of high-income nations. Given that it is among the most costly diseases to treat, it is not surprising that it is neglected in developing nations (**Petersen 2007**).

Oral tissues require nourishment for development, growth, and maintenance, and oral problems can infuence food choices and, ultimately, nutritional status. Prior to tooth eruption, nutritional defciencies can afect enamel maturation and composition as well as tooth morphology and size (**Kumar et al 2017**). Children who are undernourished have both delays and consequences in the development of their teeth. increases the carcinogenicity of dietary sugars and has a high number of carious primary teeth. Overall, it is quite evident that undernutrition is caused by dental deterioration and early tooth loss (**Beramian 2009**).

Aims

1. To Improve oral health of early school children
2. To find out correlation between Dental caries and Nutritional status

METHODS

This study was undertaken for the correlation of dental caries with nutritional status among early school children of District Swat. We retrospectively studied the records of a total of 300 children of aged between 4-10 March 2024 to September 2024. All patients were subjected to a careful physical examination. Weights were measured using a calibrated digital scale. Height measurements were done in triplicate to the nearest millimeter using a calibrated stadiometer. Body mass index (BMI) were calculated according to the formula [weight (kg)/height (m)2].

Dental Caries Assessment

Clinical Examination: Conduct a visual examination of the child's teeth using a dental mirror and explorer.

Dental Caries Index: Use the Decayed, Missing, and Filled Teeth (DMFT) index or the International Caries Detection and Assessment System (ICDAS) to quantify dental caries.

According to WHO formula $\quad\quad BMI= \dfrac{weight}{High\ (M^2)}$

s.no	status	Student BMI	Normal BMI	HB level
1	Anemia	20BMI	18.5-24.9	>12,>14g/dL
2	Underweight	18BMI	18.5-24.9	<12,14g/dL
3	Malnutrition	17.3BMI	18.5-24.9	<12,14g/dL
4	Stunting	11.2BMI	18.5-24.9	<12,14g/dL
5	wasting	9.5BMI	18.5-24.9	<12,14g/dL

Study Area and Period
The study was conducted in Local area of Swat, which is located Khyber Pakhtunkhwa.
Study Design
Institutional based cross-sectional study designs were used.
Study Population
All primary school students (age group wise the source population, whereas sampled or selected students were the study population of this study.
Sample Size Determination
A Total of 300 children between the ages of 4-10 years were studied. A systematic random samplingtechnique was applied for sample collection.
Lab investigations and Tests: All patients were subjected to:
Complete Blood count and reticulocyte count. Patients with microcytosis underwent the following:
• Serum Iron and ferritin
An automatic hematological analyzer and Biochemistry analyzer were used for
Clinical Examination
Routine blood tests
This is done to assess anemia and other vitamin and mineral deficiencies. There may be dehydration, low blood sugar and signs of severe infection as is evident by raised while blood cell counts.
Diagnosis of malnutrition in children
In children weight and height is measured and compared with the charts showing the expected average height and weight for a child of that age. Some children are persistently smaller for age and may be genetically so.
Blood tests in children
Routine blood tests in children include those for blood glucose, blood counts, urine for routine examination.
Levels of iron in blood, folic acid and vitamin B 12 are also done. For protein estimation other tests including
Normal ranges of ferritin 10 to 150 ng/mL for children 4th years to10 years.
MCV normal range is 80 to 95 for children

ANALYSIS & INTERPRETATION
‣ **Analysis and Interpretation of data**
Data will analyze and interpret by using M word, Origin8 and Excel. Frequency and Percentage were calculated for all quantitative variables.

ETHICAL CONSIDERATION

- The subjects were briefed about the study.

Dr Hira Waqas *et, al*

- Consent was taken from the subjects after explaining the purpose of study for the collection of data.

Questionnaire form

Demographics information:	General information	Dietary Habits
Child's Name: _____	Do you have breakfast every day before going to school? (Yes/No)	What is your favorite healthy food?
Age: _____Gender: _____	How many meals do you typically	How often do you drink water in a
Grade/Class: _____	eat in a day?	day?
School Name: _____	Do you eat fruits and vegetables	Less than 3 glasses
Family background:	daily? (Yes/No)	3-5 glasses
How many people live in the child's household.?	How often do you consume fast food? (Yes/No)	6-8 glasses
Male and female ratio in child's household.?	**Anthropometric Measurements**	More than 8 glasses
	Height (cm): __	Are you aware of the importance of a balanced diet? (Yes/No)
Family income status?	Weight (kg): __	Do you receive any nutrition
Hereditary diseases in family?	BMI (Body Mass Index): __	education at school? (Yes/No)

S.no	Serum 25(OH)D	Status
1	**Serum 25(OH)D**	**Deficient < 50nmol/L**
		Insufficient 50-75nmol/L
		Sufficient <75nmol/L
2	**Mean Serum 25(OH)D**	**55± 6nmol/L**

Statistical Analysis

Statistical analysis was performed by using Origin8 and MS office word 2010.

Ethical Considerations

Informed Consent: Obtain informed consent from parents or guardians before enrolling children in the study.

RESULTS

The current study was conducted in District Swat from March 2024 to September 2024 to investigate correlation of Dental caries with Nutritional status of early school children. Total of 300 samples were taken of aged 4 to 10 years of early school children. The total of 300 samples was taken from those children who have dental caries. In which the prevalence of Anemia was 5(1.66%), Underweight 20(6.66%), Malnutrition 30(10%), Stunting 5(1.66%) and Wasting 0(0%). The current study shows that Children and parents should receive behavioral interventions regarding diet and dental hygiene. Furthermore, it is advised that more research be done utilizing all available techniques for diagnosing dental caries and evaluating the dental hygiene behaviors, attitudes, and knowledge of both parents and children.

Table.1 Prevalence of nutritional status in early school children

S.no	Status	Frequency	Student BMI	Normal BMI	HB level
1	Anemia	5(1.66%)	20BMI	18.5-24.9	>12,>14g/dL
2	Underweight	20(6.66%)	18BMI	18.5-24.9	<12,14g/dL

3	Malnutrition	30(10%)	17.3BMI	18.5-24.9	<12,14g/dL
4	Stunting	5(1.66%)	11.2BMI	18.5-24.9	<12,14g/dL
5	wasting	0(0%)	9.5BMI	18.5-24.9	<12,14g/dL

Among the early school children the high prevalence of nutritional status the high ratio was found in Malnutrition 30(10%) leading by underweight 20(6.66%) and Anemia 5(1.66%) while very low frequency was found in Stunting 5(1.66%) and in Wasting 0(0%). The current study investigate that there is a strong association between Dental caries and Nutritional status. The prevalence of dental caries was very high compared to the WHO's report on oral health among school children. The educational status of mothers, habit of cleaning teeth, consumption of sugared coffee, consumption sweet food, and milk consumption were the associated factors for dental caries. There was significant association between dental caries and nutritional status. Children and parents should receive behavioral interventions regarding diet and dental hygiene. Furthermore, it is advised that more research be done utilizing all available techniques for diagnosing dental caries and evaluating the dental hygiene behaviors, attitudes, and knowledge of both parents and children.
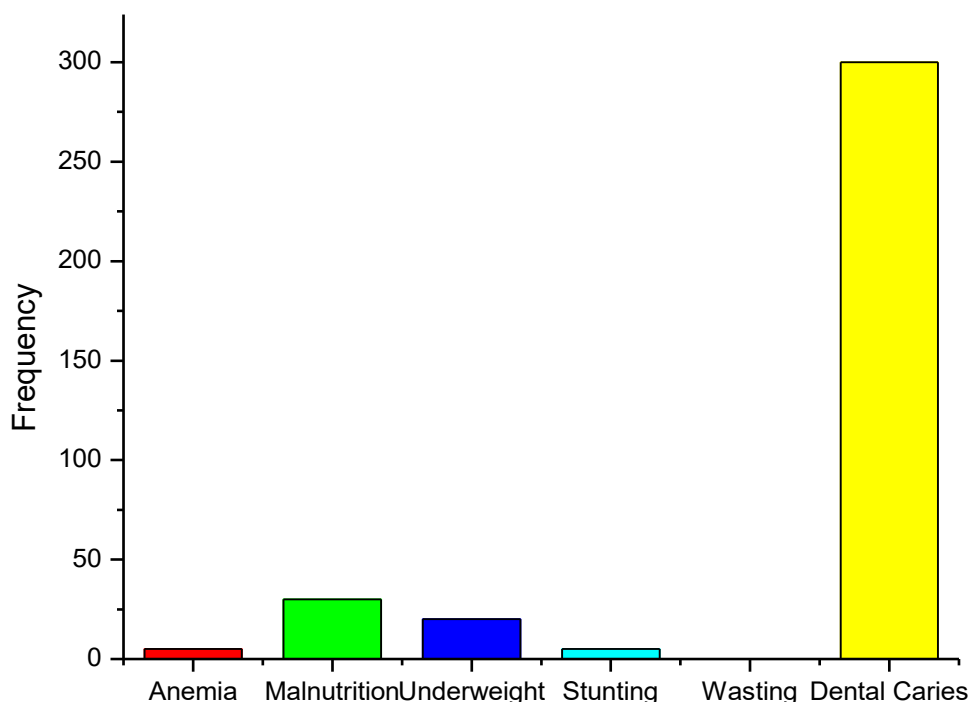

Figure.1 Overall prevalence of Dental caries and Nutritional status

DISCUSSION

The current study was conducted in District Swat from March 2024 to September 2024 to investigate correlation of Dental caries with Nutritional status of early school children. Total of 300 samples were taken of aged 4 to 10 years of early school children. The total of 300 samples was taken from those children who have dental caries. In which the prevalence of Anemia was 5(1.66%), Underweight 20(6.66%), Malnutrition 30(10%), Stunting 5(1.66%) and Wasting 0(0%). Similar work also conducted by (**Bassa et al 2023**) among school-age children, the prevalence of dental caries was 15.6% (95% CI 13.0–18.5). Technically speaking, 14.2% (95% CI 11.7–16.6%) of children were overweight, and 4.3% (95% CI 2.9–5.8%) were underweight. With a p value of 0.32, it was discovered that there was no statistically significant correlation

---

between dental caries and dietary status. A mother's educational status (AOR 3.14, 95% CI 1.03–9.56), not cleaning her teeth (AOR 7.70, 95% CI 4.00–14.85), drinking sugared coffee (AOR 3.22, 95% CI 1.68–6.18.0), consuming sweet foods (AOR 4.19, 95% CI 1.76–9.96), and not drinking milk (AOR 5.66, 95% CI 1.49–21.49) were all factors linked to dental caries.

In the current study among the early school children the high prevalence of nutritional status the high ratio was found in Malnutrition 30(10%) leading by underweight 20(6.66%) and Anemia 5(1.66%) while very low frequency was found in Stunting 5(1.66%) and in Wasting 0(0%). The current study investigate that there is a strong association between Dental caries and Nutritional status. The prevalence of dental caries was very high compared to the WHO's report on oral health among school children. The educational status of mothers, habit of cleaning teeth, consumption of sugared coffee, consumption sweet food, and milk consumption were the associated factors for dental caries. There was significant association between dental caries and nutritional status. Children and parents should receive behavioral interventions regarding diet and dental hygiene. Furthermore, it is advised that more research be done utilizing all available techniques for diagnosing dental caries and evaluating the dental hygiene behaviors, attitudes, and knowledge of both parents and children. (**Olatosi et al 2022**) A total of 273 cases of ECC were included in the analyses (mean age 4.19 ± 0.96 y). Overall, the mean dmft was 3.04 ± 2.28, and most (96%) were accounted for by untreated decay. The distribution of dmft within the different z score categories of BMIA (<-3 = severely wasted, -2 to -3 = wasted, -2 to $+2$ = normal, $+2$ to $+3$ = overweight and $>+3$ = obese) showed the highest dmft scores among the combined Children with normal Z scores had the lowest scores, followed by the severely wasted and wasted groups, while the overweight and obese groups had the middle results. The BMIA z score, WFH z score, and dmft all showed a significant negative connection ($r = -0.181$, $P < 0.05$, and $r = -0.143$, $P < 0.05$, respectively). However, the correlations between HFA z score, WFA z score, and dmft were positive but not significant ($r = 0.048$, $P = 0.44$ and $r = 0.022$, $P = 0.77$, respectively). Data of 1499 children (mean age at baseline = 6.7 years) were analyzed. Levels of dental caries and odontogenic infections in the primary dentition were significantly highest in underweight children, as well as in stunted children, and lowest in overweight children. Dental caries in six old children was also meaningfully connected with increased odds of being underweight and stunted 2 years later. These relations were not dependably found for dental caries and odontogenic infections in the permanent dentition. Underweight and stunting was meaningfully accompanying with a lower number of exploded permanent teeth in children at the age of six to seven-years-old and 2 years later (**Dimaisip et al 2018**)

CONCLUSION AND RECOMMENDATIONS

The prevalence of dental caries was very high compared to the WHO's report on oral health among school children. The educational status of mothers, habit of cleaning teeth, consumption of sugared coffee, consumption sweet food, and milk consumption were the associated factors for dental caries. There was significant association between dental caries and nutritional status. Children and parents should receive behavioral interventions regarding diet and dental hygiene. Furthermore, it is advised that more research be done utilizing all available techniques for diagnosing dental caries and evaluating the dental hygiene behaviors, attitudes, and knowledge of both parents and children.

ACKNOWLEDGEMENT

REFERENCES
.

Arora A, Scott JA, Bhole S, Do L, Schwarz E, Blinkhorn AS. Early childhood feeding practices   and dental caries in preschool children: a multi-centre birth cohort study. BMC Public Health. 2011;11(1):1–

Bagramian RA, Garcia-Godoy F, Volpe AR. The global increase in dental caries. A pending j public health j crisis. Am J Dent. 2009;22(1):3–8

Bassa, S., Workie, S. B., Kassa, Y., & Tegbaru, D. W. (2023). Prevalence of dental caries and relation with nutritional status among school-age children in resource limited setting of southern Ethiopia. *BMC Oral Health*, *23*(1), 84.

Dimaisip-Nabuab, J., Duijster, D., Benzian, H., Heinrich-Weltzien, R., Homsavath, A., Monse,B.&Kromeyer-Hauschild,K.(2018).Nutritional status, dental caries and tooth eruption in children: a longitudinal study in Cambodia, Indonesia and Lao PDR. *BMC pediatrics*, *18*, 1-11.

Folayan MO, Adeniyi AA, Chukwumah NM, Onyejaka N, Esan AO, Sofola OO, et al. Programme guidelines for promoting good oral health for children in Nigeria: a position   paper. BMC Oral   Health. 2014;14(1):1–8.

Khan, H., Ullah, S., Salman, M., Hussain, F., Anwar, Y., Ullah, I., ... & Shuaib10, M. (2019). Microbiological safety and antibiogram analysis of selected food products obtained in the marketplace of Peshawar and Mardan, KPK, Pakistan. *Polish Journal of Environmental   Studies*, 28(6), 4239-4245.

Kumar S, Kroon J, Lalloo R, Kulkarni S, Johnson NW. Relationship between body mass index   and dental   caries in children, and the infuence of socio-economic status. Int Dent J. 2017;67(2):91–7.

Li M, Zhi Q, Zhou Y, Qiu R, Lin H. Impact of early childhood caries on oral health-related quality   of life of preschool children. Eur J Paediatr Dent. 2015;16(1):65–72.

Listl S, Galloway J, Mossey P, Marcenes W. Global economic impact of dental diseases. J Dent Res. J2015;94(10):1355–61

Mouradian WE, Slayton RL, Maas WR, Kleinman DV, Slavkin H, DePaola D, et al. Progress in   children's oral health since the surgeon general's report on oral health. Acad Pediatr.   2009;9(6):374–

Monse B, Heinrich-Weltzien R, Benzian H, Holmgren C, van Palenstein HW. PUFA-an index of clinical consequences of untreated dental caries. Commun Dent Oral Epidemiol. 2010; 38(1):77–82.

Organization WHO. Ending childhood dental caries: WHO Implementation Manual. 2019.

Organization WHO. Oral health surveys: basic methods: World Health Organization. 2013.

Organization WHO. Health system profle. Regional Health Systems Observatory, WHO Eastern h Mediterranean Regional Ofce: Islamic Republic of Iran; 2006

Olatosi, O. O., Alade, A. A., Naicker, T., Busch, T., Oyapero, A., Li, M., ... & Butali, A. (2022). Dental caries severity and nutritional status of Nigerian preschool children. *JDR Clinical & Translational   Research*, 7(2), 154-162.

Petersen PE. World Health Organization global policy for improvement of oral health-World Health Assembly 2007. Int Dent J. 2008;58(3):115–21

Pitts NB, Zero DT, Marsh PD, Ekstrand K, Weintraub JA, Ramos-Gomez F, et al. Dental g caries. Nat Rev Dis Primers. 2017;3(1):1–16.

Reddy KV, Thakur AS, Moon N, Reddy KE, Chandrakala S, Saxena S. Association between overweight   and dental caries among 8–13 year old school children in central India. Indian Assoc Public k Health Dent. 2018;16(1):22.

Saeed, U., Islam, U., Ilyas, M., Ahad, E., Khan, I., Khan, A., ... & Ullah, S. Incidence of Obesity and Malnutrition Am ong School-Aged Children of The District Malaka

Shah, U., & Zubair, M. Exploration of Vitamin D deficiency in school aged children of the local area of District Mardan.

Shah, U., & Zubair, M. Exploration of Vitamin D deficiency in school aged children of the local area of District Mardan

Ullah, Z., Ahad, E., Ali, B., Islam, U., Ilyas, M., Saeed, U., ... & Ullah, S. Assessment of Nutritional Status and Dietary Habits of Patients with Leukaemia in District Peshawar.

Ullah, S., Khan, H., Saeed, U., & Ahmad, K. (2023). Assessment of nutritional status of school-going children in district Mardan at Khyber Pakhtunkhwa in Pakistan. Egyptian Journal of Nutrition, 38(4), 12-18.

Ullah, S., Khan, H., Saeed, U., Shahid, I., Zubair, Y., Bibi, M., ... & Rahman, M. I. K. (2024). DETECTION, IDENTIFICATION, AND ANTIBIOTIC RESISTANCE PATTERNS OF FOODBORNE BACTERIAL AND FUNGAL PATHOGENS. *Journal of Vocational Health Studies*, *8*(2).

Ullah, S., Khan, H., & Ahmad, U. S. K. Assessment of nutritional status of school going children in district Mardan at Khyber Pakhtunkhwa in Pakistan.

Ullah, S., Amin, A. A., Rahman, M. I. K., Islam, U., Muhammad, N., Khan, H., ... & Khalid, S. (2023). Iron Deficiency Anemia among School Going Children of Rural Area of Mardan Khyber Pakhtunkhwa. *International Journal on Food, Agriculture and Natural Resources*, *4*(4), 138-142.

Ullah, S., Islam, U., Khan, H., Khan Rahman, M. I., Muhammad, N., Ilyas, M., ... & Amin, A. A. (2023). The Correlation between the Helminths Infection and Nutritional Status among School-going Children in the Rural Area of Mardan Khyber Pakhtunkhwa Pakistan. *Egyptian Journal of Nutrition, 38*(4), 81-87.

WHO Organization. Promoting Oral Health in Africa: Prevention and control of oraldiseases and j noma as part of essential noncommunicable disease interventions. 2016. .

Zubair, Y., Rahman, M. I. K., Ullah, Z., Saeed, U., Zubair, M., Bibi, M., ... & khan Gohar, A. Correlation of Malaria Infection With Nutritional Assessment of School-Going Children In The Rural Area of Nowshera, Pakistan.