

Effect of Early Childhood Malnutrition on Tooth Eruption in Pakistan Adolescents

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ABSTRACT

Background and Aim: Child malnutrition has long-term consequences. Malnourished children are less productive physically, cognitively, and emotionally they are more prone to chronic diseases and impairments than healthy children. The present study aimed to assess the effect of early childhood malnutrition on tooth eruption in Pakistan adolescents.

Materials and Methods: This cross-sectional study was carried out on 226 adolescents in the Department of Dentistry, Tertiary Care Hospital, Rawalpindi from January 2020 to June 2020. A structured questionnaire was used for administration of all adolescents. Each adolescent underwent dental caries and status of eruption was assessed and recorded. Weight for age, weight for height, and height for age were three different indices calculated in anthropometric data. Nutritional status of adolescents was calculated. Data analysis was done using SPSS version 27.

Results: Of the total 226 adolescents, the prevalence of moderate/severe wasting of muscles, stunted, and underweight were 15% (n=34), 61.9% (n=140), and 48.7% (n=110) respectively. Out of 34 wasting adolescents, the frequency of moderate and severely wasted weight for height (wasting) was 9% (n=20) and 6% (n=14) respectively. Among 140 stunted adolescents, the incidence of moderate and severe stunted adolescents were 23.5% (n=53) and 38.5% (n=87) respectively. Of the 110 underweight adolescents, the incidence of moderately underweight and severely underweight were 32% (n=72) and 16.7% (n=38) respectively. A considerably greater proportion of individuals with wasting had a pattern of delayed eruption compared to those without wasting. There were 27.3% of patients who had delayed eruption alongside a decayed tooth.

Conclusion: The present study revealed that besides delaying tooth eruption in adolescents and affecting oral health, malnutrition increases childhood caries. Throughout adolescence age, there was a correlation between eruption patterns or tooth exfoliation and both nutritional deficiency (stunting).

Keywords: Tooth eruption, Malnutrition, Wasting, Under nutrition, Underweight.

INTRODUCTION

Nutritional status referred to an individual's physiological state as a result of a balance between dietary requirements and consumption, as well as the body's ability to utilize these nutrients. Deficiency in macronutrients (carbs, proteins, and fats) and micronutrients such as minerals and vitamins causes undernutrition in the body. Over nutrition and undernutrition both are involved in malnutrition [1, 2]. Early childhood malnutrition can lead to behavioral issues, insufficient social skills, and even a lower IQ. As an adult, undernutrition increases the risk of infectious diseases and is more likely to lead to chronic illness than excess nutrition does [3, 4]. Child malnutrition is thought to be the result of multifaceted exchanges among socio-demographic, reproductive, cultural, geographical, and political variables [5]. Almost 60% of all children in Sub-Saharan Africa die from undernutrition, which accounts for more than one-third of all child deaths worldwide [6]. Furthermore, those undernourished children who survive must deal with the nutritional state tremendous detrimental impact, which turns their life into a malnutrition cycle, frequent episodes of sickness, and reduced learning ability. There are 13 million deaths in children aged five and under worldwide as a result of early childhood protein-energy malnutrition (EC-PEM) [7]. Though EC-PEM is commonly related with the poor world, it occurs everywhere, including impoverished communities inside developed countries [8, 9].

Energy-protein deficits occur simultaneously and cause EC-PEM. The association between acute infections and EC-PEM is complicated since EC-PEM impairs the immune system, increasing the infection risk, but nutritional imbalances might be induced by acute illnesses, leading to EC-PEM. Because of their intricate association, the modern understanding of EC-PEM is a condition with shortages in calorie, episodes of repeated infectious illness, micronutrient intake, and protein [10]. Starvation has been associated with a delay, caused by treatment adjustments extending primary tooth retention. The other research found that underweight children's permanent teeth erupted earlier [11]. There

is scarcity of data regarding the children malnutrition effects on tooth eruption in Pakistan. Therefore, the present study investigated the effect of early childhood malnutrition on tooth eruption in Pakistan adolescents.

METHODOLOGY

This cross-sectional study was carried out on 226 adolescents in the Department of Dentistry, Tertiary Care Hospital, Rawalpindi from January 2020 to June 2020. A structured questionnaire was used for administration of all adolescents. Each adolescent underwent dental caries and status of eruption was assessed and recorded. Weight for age, weight for height, and height for age were three different indices calculated in anthropometric data. Nutritional status of adolescents was calculated. The mother/guardian of the kid was given a standardized questionnaire performed by an interviewer to examine socioeconomic and demographic information. Detecto Balance Beam Scales were used to educate and calibrate staff in height and weight assessments. Mean and frequency descriptive statistics were computed. Individuals' aggregate scores were calculated by regressing the frequency of primary teeth and permanent teeth on age, EC-PEM status, gender, and wasting, stunting, and stunting with wasting as an the anthropomorphic categories. P-values of ≤ 0.05 on both sides were considered statistically significant. The Chi square test was used to see if there was a relationship between the variables ($P = 0.05$).

RESULTS

Of the total 226 adolescents, the prevalence of moderate/severe wasting of muscles, stunted, and underweight were 15% (n=34), 61.9% (n=140), and 48.7% (n=110) respectively as depicted in Figure-1. Out of 34 wasting adolescents, the frequency of moderate and severely wasted weight for height (wasting) was 9% (n=20) and 6% (n=14) respectively as depicted in Figure-2. Among 140 stunted adolescents, the incidence of moderate and severe

stunned adolescents were 23.5% (n=53) and 38.5% (n=87) respectively as shown in Figure-3. Of the 110 underweight adolescents, the incidence of moderately underweight and severely underweight were 32% (n=72) and 16.7% (n=38) respectively as demonstrated in Figure-4. A considerably greater proportion of individuals with wasting had a pattern of delayed eruption compared to those without wasting. There were 27.3% of patients who had delayed eruption alongside a decayed tooth. Table-I represents the criteria for normal, moderate, and severe cases.

Table-1: criteria for normal, moderate, and severe cases

Level	Value (SD)
Normal	≥ -2
Moderate	<-2SD & ≥ -3SD
Severe	< -3SD

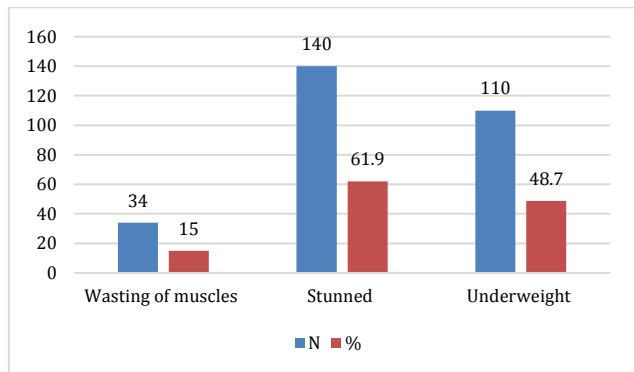


Figure-1: the prevalence of moderate/severe wasting of muscles, stunted, and underweight (n=226)

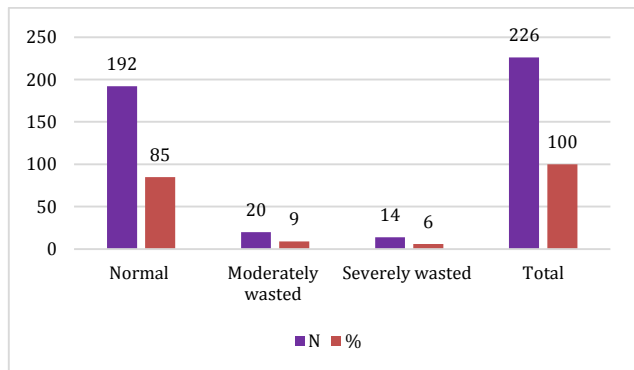


Figure-2: distribution of wasting (weight for height) adolescents (n=226)

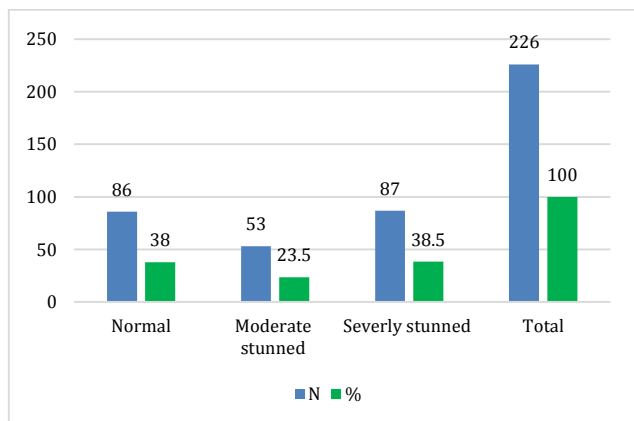


Figure-3: distribution of stunting (Height for age) adolescents (n=226)

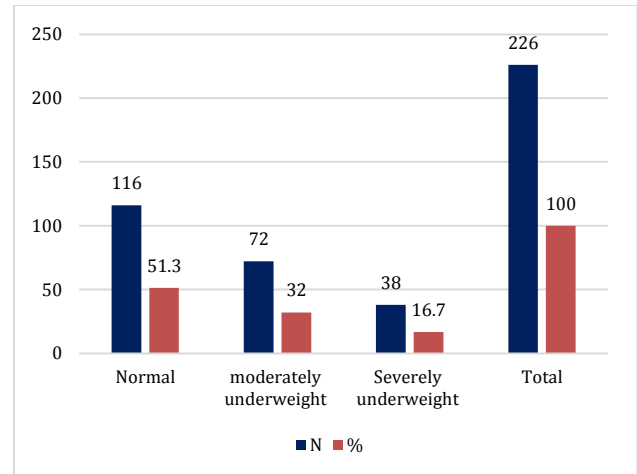


Figure-4: distribution of underweight (weight for age) adolescents (n=226)

DISCUSSION

The present study mainly focused on early childhood malnutrition effects on tooth eruption and found that Malnutrition causes delayed tooth eruption, has an influence on the child's oral health, and increases the risk of caries. There was an association between eruption patterns or tooth exfoliation and dietary deficit throughout adolescence (stunting). The study also finds that malnutrition may be to contribute for delayed tooth eruption sequences and dental caries. The condition with regard to elements such as food security and dietary diversity, which have been connected to more than one indication of undernutrition, must be addressed through intervention initiatives and infrastructure development. Birth spacing, high levels of diarrhea and fever, and growth monitoring among adolescents may all be addressed with a specific emphasis on health education and promotion. The anthropomorphic evaluation of malnutrition has long been the benchmark for measuring children's at risk [13].

Tooth eruption includes both tooth maturation and the capacity of the underlying bone to remodel; conditions that interfere with these processes may cause eruption to be delayed. Endochondral ossification is the process by which long bones form at the bone growth plate [14]. Alvarez et al [15]. Regardless of tooth eruption affected by EC-PEM, unlike the impact of EC-PEM on primary dentition eruption, where multiple investigations have found a delayed eruption in nutritionally deficient adolescents, including these two previous studies [16, 17]. This study discovered delayed primary tooth exfoliation, validating prior reports of a connection with extending EC-PEM and this finding to later exfoliating primary teeth. There was a definite gender difference, when compared to adolescent girls, teenage guys' permanent tooth emergence is delayed [18]. This might be due to gender differences in pubertal growth rates, with females reaching puberty earlier. There were no tests measuring maturation levels or contemporaneous serial anthropomorphic measurements to investigate growth trajectory [19].

Stunting between the ages of 12 and 36 months was linked to poor cognitive performance and/or worse school grades [20, 21]. Prospective cohort studies regularly indicate statistically significant relationships between stunting by the age and subsequent cognitive deficits, dropout, and success in school. Stunting had proved a deleterious influence on cognitive results in early life, with long-term implications [22]. Aside from satisfying dietary requirements, diversified diets are increasingly being acknowledged as aiding in the prevention of several chronic illnesses. Monotonous diets centered on a few products cause micronutrient deficiencies in many poor countries, particularly in rural areas.

A previous study on adolescents, a relation between primary teeth delayed exfoliation, permanent teeth delayed eruption, and stunting was found to be associated with EC-PEM. This approach is useful in evaluating dental caries specified by age-specific groups with varying nutritional histories. Since tooth eruption includes both tooth maturation and the capacity of the underlying bone to remodel, conditions that interfere with these processes may cause eruption to be delayed [23].

Early childhood malnutrition and dental caries are chronic and interconnected worldwide concerns, predominantly for native and physically distant population. Parent-testified oral discomfort was connected to severe caries, but sleep-interrupting mouth pain was linked to poor nutritional status [24]. Another findings shows that poor or inadequate sleep increases calorie expenditure and stimulates hormone secretion, altering appetite, and activating inflammatory processes that contribute to chronic disease. In adolescents, severe tooth decay is a malnutrition major risk factor [25].

CONCLUSION

The present study revealed that besides delaying tooth eruption in adolescents and affecting oral health, malnutrition increases childhood caries. Throughout adolescence age, there was a correlation between eruption patterns or tooth exfoliation and both nutritional deficiency (stunting). In adolescents, severe tooth decay is a malnutrition major risk factor.

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