# The Effect of Nutritional Status on the Occlusion of Primary Dentition among Iraqi Preschool Children

**Meena O. Abdul Wadood\* and Muna Saleem Khalaf**

*Department of Pedodontics and Preventive Dentistry, College of Dentistry, University of Baghdad, Baghdad, Iraq*

*\*Corresponding e-mail: meena83osamah@gmail.com*

**ABSTRACT**

**Background:** *Nutritional status of children might affect the jaws growth.* **Aim of the study:** *This study aimed to investigate the relationship between the malnutrition and the malocclusion.* **Patients and methods:** *A total sample of 135 preschool children of 5 years was collected. The body mass index was calculated for each child. The primary terminal plane occlusal relationship was assessed in this study.* **Results:** *The flush terminal plane showed the highest percent among normal weight than overweight and obese children with a statistically non-significant difference (Pearson Chi-Square=4.562(a) p<0.335). While the mesial and distal terminal plane showed the highest percent among overweight children than normal weight and obese children.* **Conclusion:** *There was no relationship between the malnutrition and the malocclusion.*

**Keywords:** Primary teeth occlusion, Nutritional status, Preschool children

## INTRODUCTION

The occlusion in the primary teeth might be affected by many factors including the genetical and environmental factors [1]. The mesial terminal plane is an ideal relationship which guides the permanent first molars into a favorable class I relationship. The flash terminal plane can quid the permanent first molars into a class I or class II, while the distal terminal plane guides the permanent first molars into class II malocclusion [2].

There is some evidence that malocclusion elevated within the modern population and this elevation be parallel with the development of modern civilization. However, in isolated and primitive societies there is less variation in occlusal patterns than it is observed in the more heterogeneous population, this might be due to the effect of the environmental factors [3,4].

Different studies had been conducted to assess the prevalence of malocclusion in the primary dentition. Al- Ajwadi, reported the highest percentage of mesial terminal end (60.5%) followed by the flat terminal end (29%) and the smallest percentage for the distal terminal end (10.5%) in Zayona part of Baghdad City [5]. Shavi, et al., found that the flush terminal molar relation (65%) showed the highest percent followed by mesial step (31%) and distal step (4%) [6]. A study on the Bulgarian population showed the highest percentage of a flush terminal plane in 70.1% of the sample, which is similar to research done by Nanda, et al., while the mesial terminal plane and the distal terminal plane were equally distributed [7,8].

Nutrition is the science of food and its relationship to health [9]. Malnutrition was recorded in developing countries which represent the major nutritional problem, it is a multifactorial disease which may have an early onset during intrauterine life or/and childhood and may occur during an individual's life as a result of poor nutrition or repeated or severe infectious or chronic diseases. The children nutritional status might also be affected by demographic and socioeconomic factors, such as paternal and maternal education and occupation, mother's knowledge about nutrition [10-12].

Serdan carried out research in Iraq to study the war effects on nutrition and health, the results of this study showed that

the war has affected the physical growth of children those who were born after the war [13]. This study also suggested that children were not losing weight but rather were not growing properly.

The jaw growth in a good manner requires a favorable environment; one of the most essential factors required is a good plane of nutrition [2]. Evidence suggests that malnutrition is associated with impaired bones growth and development [14]. Malnutrition of children might result in the underdevelopment of the skeleton and facial structure, which could lead to malocclusion in developing teeth [15].

The relation between malnutrition and impaired growth of facial bones was reported by Songvasin, who found a reduction in the jaw height and variations in maxilla-mandibular width, lower facial height and skull base length as a result of malnutrition [16]. While Khan, et al., didn't find such an association [15].

## PATIENTS AND METHODS

The sample of this study involved 5 years old preschool children, who were devoid of any systemic disease, physical or mental abnormality. The sample size was composed of 135 children who were collected from different Baghdad's kindergartens. The children with carious or extracted primary second molars were excluded.

This study has been approved by the scientific and ethical committee of the Pedodontics and Preventive Dentistry Department in the College of Dentistry, University of Baghdad, Iraq. Official permission was obtained from the Ministry of education; written informed consent was obtained from the children's parent who participated in this study.

The body mass index was calculated for each child as following [17]:

- Measurement of weight by bathroom scale

- Measurement of height by using ordinary measuring tape fixed at the wall, the child was standing up after removing his/her shoes with feet parallel to each other. Then body mass index (BMI) was calculated as follows: individual's weight in kilograms divided by the square of the height in meters

The occlusal assessment was done for each child with their teeth in centric occlusion, which was classified according to Baume, into 3 types [18]:

- Flush terminal plane (flush terminus) means that the anterior-posterior position of the distal surfaces of opposing primary molars is in the same vertical plane

- Mesial step terminus is defined as a lower second primary molar terminal plane that is mesial to maxillary primary terminus

- Distal step terminus is descriptive to the situation in which the mandibular second primary molar terminus is distal to the upper second primary molar terminus

**Statistical Analysis**

The data were analyzed by using statistical package for social sciences (SPSS) package version 19, percentage and Pearson Chi-square tests were used.

## RESULTS

The sample distribution by gender is illustrated in Figure 1. The findings showed that the girl's percent (51.1%) was higher than boys' percent (48.9%).
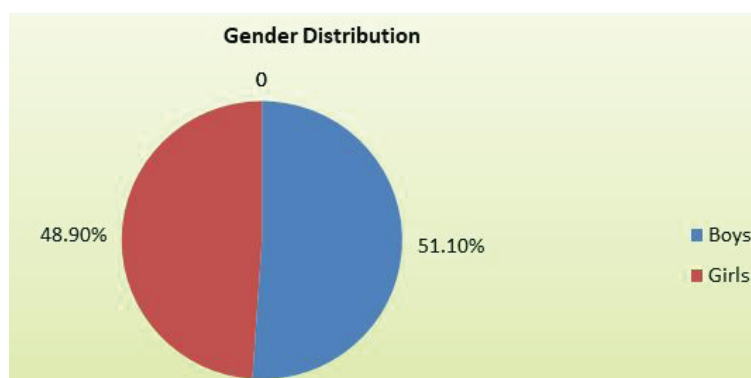
**Figure 1 The sample distribution by gender**

Terminal plane distribution for the preschool children was illustrated in Table 1. The results showed the highest percent of flush terminal plane among boys and girls followed by mesial terminal plane and distal terminal plane percent respectively. Concerning both genders the same results were obtained (91.3%, 50%, and 71.1% respectively) followed by mesial terminal plane and distal terminal plane percent respectively with statistically highly significant difference (Pearson Chi-square=28.656 (a), p<0.000).

**Table 1 Terminal plane distribution by gender**

| Gender | Primary terminal plane | | | | | |
|---|---|---|---|---|---|---|
| | Flush terminus | | Mesial terminus | | Distal terminus | |
| | No | % | No | % | No | % |
| **Boys** | 63 | 91.3% | 3 | 4.3% | 3 | 4.3% |
| **Girls** | 33 | 50.0% | 24 | 36.4% | 9 | 13.6% |
| **Both** | 96 | 71.1%** | 27 | 20.0% | 12 | 8.9% |
| **Highly significant at p<0.01; %: Percentage | | | | | | |

The nutritional status distribution by gender for the preschool children was illustrated in Table 2. The results showed that the normal weight children reported the highest percent among boys and girls followed by overweight and obese children percent respectively. Concerning both genders, the same results were reported (52.2%, 77.3% and 64.4% respectively) with statistically highly significant difference (Pearson Chi-square=11.954 (a), p<0.003).

**Table 2 The nutritional status distribution by gender**

| Gender | BMI | | | | | |
|---|---|---|---|---|---|---|
| | Normal weight | | Overweight | | Obese | |
| | No | % | No | % | No | % |
| **Boys** | 36 | 52.2% | 27 | 39.1% | 6 | 8.7% |
| **Girls** | 51 | 77.3% | 15 | 22.7% | 0 | 0.0% |
| **Both** | 87 | 64.4%** | 42 | 31.1% | 6 | 4.4% |
| **Highly significant at p<0.01; BMI: Body mass index; %: Percentage | | | | | | |

The relation of the terminal plane to nutritional status was demonstrated in Table 3. Concerning normal weight children, the results reported that the children percent with the flush terminal plane (72.4%) was highest than children percent with the mesial terminal plane (20.7%) and children percent with distal terminal plane occlusal relationship (6.7%) respectively.

Concerning overweight children, the results illustrated that the children percent with the flush terminal plane (64.3%) was highest than children percent with the mesial terminal plane (21.4%) and children percent with distal terminal plane occlusal relationship (14.3%) respectively. Concerning obese children, the results showed that the flush terminal plane percent (100%) was the only occlusal relationship present among them.

Concerning the total sample, the flush terminal plane showed the highest percent among normal weight than overweight and obese children with a statistically non-significant difference (Pearson Chi-square=4.562 (a) p<0.335). While the

mesial and distal terminal plane showed the highest percent among overweight children than normal weight and obese children.

**Table 3 The relation of the terminal plane to nutritional status**

| Terminal Plane Relationship | BMI | | | | | | Total | |
|---|---|---|---|---|---|---|---|---|
| | Normal Weight | | Overweight | | Obese | | | |
| | No | % | No | % | No | % | No | % |
| Flush terminus | 63 | 72.4% | 27 | 64.3% | 6 | 100.0% | 96 | 71.7% |
| Mesial terminus | 18 | 20.7% | 9 | 21.4% | 0 | 0.0% | 27 | 20.0% |
| Distal terminus | 6 | 6.9% | 6 | 14.3% | 0 | 0.0% | 12 | 8.7% |
| Total | 87 | 64.4% | 42 | 31.1% | 6 | 4.4% | 135 | 100.0% |

BMI: Body Mass Index; %: Percentage

## DISCUSSION

This study was conducted to reveal the effect of nutrition on primary teeth occlusion among preschool children in Baghdad city because if malocclusion was observed in the primary dentition, it was to be expected that the similar irregularities will occur in the permanent teeth to a more severe degree, so early treatment can be achieved to prevent the malocclusion [19].

In this study, the children who examined were 5 years because the entire primary teeth are completely erupted in the oral cavity and in order to exclude the mixed dentition dynamic period. In addition, the primary dentition is believed to provide the basis for studying and for predicting the occlusion of the corresponding permanent dentition [20].

The results of the current study showed the highest percent of flush terminal plane among boys, girls and both genders followed by mesial terminal plane and distal terminal plane percent respectively with statistically highly significant difference, these results agreed with Agree Nanda, et al., Shavi, et al., Yovcheva, and disagree with Al-Ajwadi [5-8].

BMI is used in this study as it is the most widely used diagnostic tool to identify the nutritional condition of a population, and it usually determines whether a person is underweight, healthy, overweight and obese [21]. The results demonstrated that the normal weight children reported the highest percent among boys, girls and both genders followed by overweight and obese children percent respectively with a statistically highly significant difference. The findings of the present study also showed that the flush terminal plane percent was the highest occlusal relationship percent among normal weight, overweight, and obese children, these findings showed that the majority of the sample was normal weight children who will have favorable permanent molar relation which is considered as an ideal concept for transition to class I Angle's molar relation in permanent dentition. In addition, the mesial terminal plane was found to be the normal phenomena completed primary dentition rather than flush terminal plane [22]. While the mesial and distal terminal plane showed the highest percent among overweight children than normal weight and obese children, these findings might be due to differences in study duration, sample size, and children age. So, the studied population had fewer deviations from normal occlusion which indicates a decrease in the tendency for malocclusion in permanent dentition. This study concluded that there was no relation between the malnutrition and the malocclusion, this conclusion agrees with Khan, et al., [15].

## CONCLUSION

In conclusion, it is difficult to compare the results of this study with other studies because the characteristics of occlusion in primary dentition vary among the population and ethnic groups. The children differ considerably from each other, even within the same family, with regard to growth factors, skeletofacial patterns, and spacing of teeth. It is difficult to speculate on the exact reasons for such differences, because of the multifactorial concept of growth.

## DECLARATIONS

**Conflict of Interest**

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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