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ASSESSMENT OF THE OCCLUSAL CHARACTERISTICS OF THE PRIMARY DENTITION AMONG LEBANESE PRE-SCHOOL CHILDREN: A BASE LINE STUDY CROSS-SECTIONAL STUDY

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Abstract

One of the most important goals in pediatric dentistry is to achieve and maintain a normal occlusion throughout the development of the child. Any deviation from the normal dentofacial growth pattern might lead to esthetic and functional problems in the future. These changes can be noticed during regular dental checkups, and actions can be taken to reduce their effect on the developing dentition. The aim of this study is to assess the occlusal characteristics of primary dentition in children under 6 years of age, attending the BAU output dental clinics and a number of private schools. This cross-sectional study was conducted among 377 Lebanese children with their ages ranging between 3 to 6 years. Each child possessing a complete set of primary teeth, with no severe caries, and without the eruption of any of his permanent teeth, had his occlusal parameters evaluated separately such as: primary molar relationship (flushed terminal plane, mesial step, distal step), canine relationship (class I, class II, class III), overjet, overbite, presence or absence of spaces, crowding, crossbite (anterior and posterior) in each jaw. Then the percentage of each characteristic was calculated. The results showed the following percentages; flushed terminal plane molar relationship (62%), class 1 canine relationship (84%), spaced upper and lower arches (98%), over jet 2mm (49.1%), and overbite 50% (53%).. It was found that the flushed terminal plane molar relationship, Class I canine relationship, spacing in both arches, increased overbite and overbite predominated.

Keywords

Occlusal characteristics, Primary dentition, Lebanese, and children

1. INTRODUCTION

Malocclusion is defined as any deviation from the norm of the arrangement of the teeth and occurs commonly among various populations. Malocclusion may cause altered functions (mastication, speech) and poor dentofacial esthetics that reduce the quality of life of affected subjects including social and functional limitations. Malocclusion has also been associated with the development of periodontal disease, although not a direct etiology (Hanna et al., 2015).

The reason to develop malocclusion could be a general factor such as: genetic, environmental, and growth disturbances, or a local factor such as adverse oral habits, tooth anomalies, and developmental position of teeth. (Zakirulla, 2012)

The characteristics of the permanent dentition occlusion are known to be largely dependent on the primary dentition's characteristics. Thus, any malocclusion in the latter can result in discrepancies in the permanent occlusion, which draws in particular attention as well as consideration. (Sahebalam, Hajian, & Mokarami, 2017).

The available data on malocclusion in Lebanon only covers the age range of 8–15 years. Prevention of oral disease or dysmorphology is usually implemented at an earlier age, thus the importance of assessing the prevalence of malocclusion at younger ages (4–11 years), accordingly our aim was to study the characteristics of primary dentition occlusion in Lebanese preschool children. Such information potentially helps public health workers to plan intervention programs and highlight the importance of early orthodontic screening. (Hanna et al., 2015)

2. MATERIALS AND METHODS

This cross-sectional study, was carried out among 377 children with age range between three to six years old (as calculated using the raosoft free online sample calculator by assuming 70% as the percentage of flushed terminal plane, which is the expected outcome, and 20000 as the population size). Children were collected from the BAU output dental clinics, and some private schools. Ethical approval was taken from the IRB-BAU committee (code: 2019H-0069-D-R-0354), moreover the parents of the patients were asked to sign a consent form after explaining the aim and the importance of the study. This parental consent form was distributed to children two days prior to the visit of the examiner to the school. For children to be included in this study, they should possess a complete primary dentition without any erupting permanent teeth, their primary teeth should be free of extensive caries, which affect the mesio- distal and occluso-gingival dimension of the teeth and the children shouldn't have any oral habit (Kirzioglu, Simsek & Yilmaz, 2013).

The study was in the schools conducted after obtaining a permission from schools' authorities. The clinical examination was done in natural light aided by a head light, using a disposable diagnostic kit, tongue depressors, and millimeter gauge. The following observed parameters were recorded:

- Molar relationship; flush terminal plane, mesial step, and distal step.
- Canine relationship; Class I, Class II, and Class III.
- Spaces; primate space, developmental/ generalized/ physiological spaces.
- Crowding; maxillary, mandibular arch.
- Midline discrepancy; present/absent.
- Crossbite; anterior crossbite and posterior crossbite.
- Scissors bite; present/absent.
- Openbite; anterior/posterior.
- Overbite; measured in percentage.
- Overjet; 1-2 mm, 2-4 mm, >4 mm. (Zakirulla, 2012)

3. RESULTS

The present study assessed the occlusal characteristics of the primary dentition of 377 children aged, three to six years. Demographic data among the studied population were first recorded. Boys represent 188 (50%) and girls 189 (50%). Concerning their age, 95 (25%) were 3 years old, 142 (38%) were 4 years old, 136 (36%) were 5 years old and 4 (1%) were 6 years old (as indicated in Table 1).

Table 1: Demographic data among the studied population.

Characteristics	No. of children (n=377)	No. of children (%)
Gender		
Male	188	50%
Female	189	50%
Age		
3 years	95	25%
4 years	142	38%
5 years	136	36%
6 years	4	1%

The prevalence of occlusal characteristics of the primary dentition in the studied population were then recorded. The flushed terminal plane molar relationship was found in 232 (62%), class I canine relationship was found in 317 (84%), normal physiological spaces in the lower arch were found in 261 (69%), normal physiological spaces in the upper arch were found in 263 (70%), primate spaces in the lower and upper arch were found in 269 (98%), crowding was absent in the lower arch in 365 (97%), crowding was absent in the upper arch in 377 (100%), midline discrepancy was found in 374 (99.2%), posterior crossbite was found in 365 (97%), anterior crossbite was found in 366 (97%), open bite was found only in 9 (2%), deep bite was found only in 52 (14%) and 2mm overjet was fund in 187 (49.6%) (as indicated in Table 2).

Table 2: Prevalence of occlusal characteristics of the primary dentition in the studied population.

Characteristics	No. of children(n=377)	No. of children (%)
Molar relationship		
Flush terminal plane	232	62%
Mesial step	122	32%
Distal step	23	6%
Canine relationship		
Class I	317	84%
Class II	53	14%
Class III	7	2%
Physiological spaces(lower)		
Present	261	69%
Absent	116	31%
Physiological spaces(upper)		
Present	263	70%
Absent	114	30%
Primate spaces(lower)		
Present	369	98%
Absent	8	2%
Primate spaces(upper)		
Present	369	98%
Absent	8	2%
Crowding(lower)		
Present	12	3%
Absent	365	97%
Crowding(upper)		
Present	0	0%
Absent	377	100%

Continue Table 2

Midline discrepancy		
Present	3	0.8%
Absent	374	99.2%
Crossbite(posterior)		
Present	12	3%
Absent	365	97%
Crossbite(anterior)		
Present	11	3%
Absent	366	97%
Scissors bite		
Present	0	0%
Absent	377	100%
Open bite		
Present	9	2%
Absent	368	98%
Overbite		
50%	200	53.1%
Other findings	177	46.9%
Deep bite		
Present	52	14%
Absent	325	86%
Overjet		
2mm	187	49.6%
Other findings	190	50.4%

4. DISCUSSION

Early detection of any discrepancy in the primary dentition is crucial for the prevention of malocclusion in the permanent one. Any clinician concerned in early interceptive treatment must understand the different changes that occur during the shift form primary dentition to a permanent one. (Bhat S. et al., 2012). Thus this study was conducted to investigate the occlusal relationship and characteristics of primary dentition in the three to six-year-old children of Lebanese preschool children. In the present cross-sectional study, 377 children were evaluated for their different occlusal characteristics in the primary dentition, to provide a baseline data concerning these characteristics among the Lebanese population. The results of the study showed that primary molar relationship with flush terminal plane was observed in 232 (62%) participant, mesial step molar relationship was observed in 122 (32%) participants, while distal step molar relationship was observed in 23 (6%) participants. Similar to our results, findings of several studies among children in similar age group in different countries such as Romania, India, and Iran showed predisposition for flush terminal plane relationship, followed by mesial step, while the distal step was least prevalent. (Cosma C. et al., 2017, Fernandes S. et al., 2017, and Sahebalam, Hajian, & Mokarami., 2017). The transition from flush terminal plane to Class I molar relationship is the ideal and commonly observed scenario. Primate spaces are utilized during the early mesial shift of the first permanent molar, if they do not exist, leeway spaces are then occupied which is known as the late mesial shift of the first permanent molar. (Srinivasan D. et al., 2017). In the present study, we anticipate that the majority of the Lebanese population may have a favorable permanent molar relation, as flush terminal plane was the most common relationship detected. Regarding primary canine relationship, Class I canine was seen in 317 (84%) participant, followed by class II canine seen in 53 (14%) participant, and class III canine seen in 7 (2%) participants.

Similar studies have shown results close to ours in other countries as Romania, Turkey, and Brazil where these studies showed the predominance of primary canine class I, followed by class II canine, and class III canine as the least prevalent. (Cosma C. et al., 2017, Kirzioglu, Simsek & Yilmaz, 2013, and Da Silva et al., 2008). This indicates that the majority of the Lebanese population may have a favorable permanent canine relationship as class I primary canine was the most common canine relationship detected.

The extent of overjet was 2mm in 187 (49.1%) participant, and 50% overbite showed the prevalent percentage of overbite as it was observed in 200 (53%) participants, which is consistent with the results of other studies done in Saudi Arabia, Germany, and US. (Zakirulla, 2012, Wagner & Heinrich-Weltzien, 2015, and Alexander Stanley A. et al., 2015). Concerning the presence of spaces (physiological and primate) in both arches, physiological spaces were present in 261 (69%) participant in the upper arch, and similarly in 263 (70%) participant in lower arch, while primate spaces were present in 369 (98%) participant in both arches. Studies done in different countries showed close results to the ones we had such as in the US, India, and Saudi Arabia, where spaced arches were commonly seen as a common favorable characteristic of the primary dentition to allow good alignment of their larger permanent successors. (Alexander Stanley A. et al., 2015, Fernandes S. et al., 2017, and Zakirulla, 2012). As for the unfavorable traits only, few children showed crowding in the primary dentition which was present only in the lower arch of 12 (3%) participants, and midline discrepancy which was seen only in 3 (0.8%) participants. Crossbites were present at almost equal distribution between anterior and posterior arch segments in about 12 (3%) participant. Open bite was seen in 9 (2%) participants, while deep bite was only present in 52(14%) participant. Similar results were seen in studies done in India, Saudi Arabia, and Brazil (Fernandes S. et al., 2017, Zakirulla, 2012, and Da Silva et al., 2008). This indicates that the majority of the Lebanese population possess spaced arches, with normal overjet and overbite that will probably lead to favorable occlusal characteristics in their permanent dentition.

5. CONCLUSION

The results of this study implies that the majority of the Lebanese population might possess favorable occlusal characteristics during their primary dentition that might later develop to favorable occlusion in the permanent one. The unfavorable occlusal characteristics were only found in a minority. This data could serve as a prediction for future malocclusion problems among the Lebanese population.

6. RECOMMENDATIONS

Further longitudinal studies are needed to assess the changes in occlusal pattern from the primary to the permanent dentition, and more cross-sectional studies are needed to asses other parameters; radiographic and soft tissue assessment to detect skeletal problems and soft tissue discrepancies, that could give additional value to the forecasting of future malocclusion.

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