



Prevalence of Malocclusion Amongst School Children in Mombasa County, Kenya

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Received: November 12, 2019; **Published:** November 25, 2019

Abstract

Introduction: There is little data on the prevalence of malocclusion in Kenya, with majority of the studies being conducted in Nairobi and its environs. The main objective of this study was to determine the prevalence of malocclusion amongst school children in Mombasa, Kenya.

Methods: The study was carried out in three schools. Data was collected by clinical examination of the children and the registration method evolved by Bjork et al (1964) was used. This is because it is a qualitative registration of teeth and dentitional and occlusal anomalies.

Results: The sample ages were between 10-15 from both genders. A total of 196 school children were examined using Angles' classification. Of those 99 of 196 who consisted of 50.5% were males and the remaining 97 being 49.9% were females. In all, 75% of the study sample had malocclusion. A statistically significant difference was found between male/female and orthodontic anomalies.

Conclusion: The study indicated that more females than males had malocclusion. This discrepancy was however not significant enough to suggest a gender predilection. One striking finding was that, prevalence of malocclusion decreased with age.

Keywords: Prevalence; Malocclusion

Introduction

Malocclusions are not a 'disease' in themselves, but rather appreciable deviations from ideal occlusion that are considered aesthetically or functionally unsatisfying. A malocclusion considered unsightly by one patient may be acceptable to another depending on the facial features, personality, and attitudes [1]. Therefore the main indications for orthodontic treatment are function and aesthetics.

Interest in orthodontic treatment has increased as a consequence of the treatment opportunities afforded and patient's expectation as regards the impact oral health has on people's quality of life. Moreover, the importance of oral health is related to the

quality of life particularly relevant to children and adolescents. Since younger subjects are more sensitive to a variety of impacts such as appearance that may affect their current quality of life, psychological development and untimely result in influencing their social life and education. The psychological impacts of oral health, such as avoiding to laugh and being teased about teeth, were more prevalent in children than in adults and elderly, in general. Therefore, the study aims to provide oral health planners in Kenya with information on the prevalence of malocclusion in an attempt to define the target population for orthodontic services in the future.

Mombasa County, in which the study was carried out, is one of the 47 counties in the Republic of Kenya. It lies on the Indian Ocean and has a population of 915,101 as at 2009.

Occlusion is the interdigitation of the teeth when the jaws are closed. Occlusal variation is central to the study of orthodontics. Ideal occlusion in man is seldom if every found. It is a hypothetical concept based upon the anatomy of the teeth and is useful as a benchmark by which occlusal irregularities and treatment objectives can be judged.

Normal occlusion is the term that encompasses minor deviations from the ideal that do not constitute aesthetics or functional problems [1]. This is generally accepted to be a Class I molar relationship, which represents only 30 - 40% of the population [2].

Malocclusion is imperfect positioning of the teeth when the jaws are closed. Estimates of frequency of different traits of malocclusion are available from a number of different surveys, mainly in Northern Europe and North America. Direct comparison between surveys is not generally possible as estimates vary according to the existing criteria of age and gender availability of study casts, radiographs and accuracy of examiners [3].

The differences in criteria for the registration methods is the most important factor in explaining the differences in malocclusion.

The different registration methods include:

- Bjork., *et al.*
- Foster and Day
- Angles modified classification etc

In one study conducted in Nairobi, Kenya in 1996 using the Bjork., *et al.* registration method, prevalence of malocclusion in 13-15 year olds was found as follows:

- Neutral occlusion 19%
- Crowding 19%
- Rotations 10%
- Posterior crossbite 10%
- Maxillary overjet 10%
- Anterior open bite 8%
- The prevalence was 72% [4].

In other parts of East Africa, malocclusion has been reported to be 45% in Tanzania in 13 - 15 years olds and 54% in Uganda in 12 year olds.

In a study done in the United Kingdom, prevalence of malocclusion in 12 year olds was as follows:

- Crowding 69%
- Overjet (> 5 mm) 22%
- Instanding incisors 6%
- Spacing was found to be uncommon in UK where crowding was the norm.

Prevalence of median diastema was:

- 6 year olds 98%
- 11 year olds 49%
- 13 - 18 year olds 7% [5].

Fox and Thompson carried out an audit research of new patient referrals to their district general (UK) orthodontic unit and concluded that 42% of 8-12 year old children were referred when they were too young for treatment to be provided [6].

A study conducted in an adolescent Kuwaiti population revealed that 86% had malocclusion, 70% had moderate to severe malocclusion, with incisor mal-alignment as the most prevalent malocclusal trait of these 57.8% had Class I molar relationship and 36.1% had Class I canine relationship [7].

In a similar study done in young Finnish Skolt-Lapps 8-16 years olds by Bengt Ingervall and Bjorn Hedegaard in which malocclusion was judged in accordance with the method of Bjork., *et al.* the following results were obtained:

- 88% of the individuals had one or more dentitional anomalies
- 47% had space anomalies
- 72% had occlusal anomalies [8].

A large number of other studies in prevalence of malocclusion in different populations have been published. The reported incidences among different ethnic groups vary from 31 - 93% thus making it clear that the majority of children have irregular teeth and the occlusal relationship differs from the ideal occlusion [9].

It is therefore important to equate possession of an anomaly with need for orthodontic treatment as this differs from individual to individual [1].

Commencement of orthodontic treatment depends on the particular anomaly. In the early mixed dentition, treatment is only indicated to correct incisor crossbites and posterior crossbites with displacement [5].

Objective of the Study

The objectives of this study were:

General

- To determine the prevalence of malocclusion amongst 10 - 15 year old school children in Mombasa County, Kenya.

Specific

- To determine the age and gender distribution of malocclusion.
- To establish the association between age and orthodontic anomaly.
- To categorise the different occlusal traits according to the frequency of occurrence.

Materials and Methods

This was a cross-sectional survey that involved clinical examination to assess the state of occlusion and its severity, so as to determine orthodontic needs.

Malocclusion was judged mainly in accordance with the Bjork, *et al.* (1964) with a few modifications to fit with the clinical criteria and study of interest.

Malocclusion was categorised into 4 broad categories as follows:

- Teeth and dentitional anomalies
- Space anomalies
- Crowding
- Occlusal anomalies.

A total of 196 school children between 10 - 15 years old were examined. The sampling was done through 'convenience' and free will.

Permission from the school authorities was sought on behalf of the children's parents/guardians to conduct the non-invasive survey.

Results

There were slightly more males (50.5%) than females (49.5%) in the study sample.

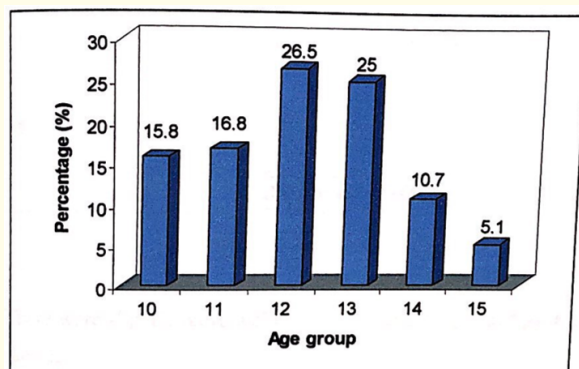


Figure 1: Age distribution of study population.

Majority of the children examined were 12 - 13 year olds with the least being 15 year olds.

In incisor relationship, the majority had Class III (42%) and 22.5% had Class II. The majority in Class I were 13 year olds (9%), Class II (6%) were 12 year olds, and Class III (13%) were seen in 12 year olds. Generally, the results indicated that 12 year old females had Class III and Class I incisor relationship. While Class II was highest amongst the 12 year old males.

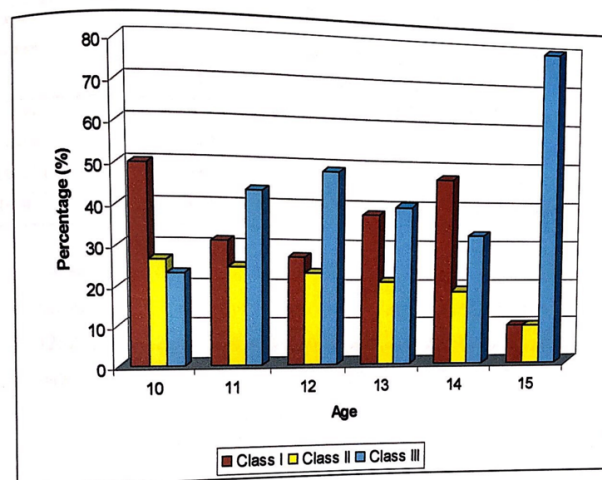


Figure 2: Distribution of incisor relationships by age.

Class I was highest among the 10 year olds and lowest among the 15 year olds.

Class II was highest among the 10 year olds and lowest among the 15 year olds.

Class III was highest among the 15 year olds and lowest among the 10 year olds.

The results for the canine relationship revealed that majority in Class I are 15 year olds, Class II are 12 year olds and Class III, 12 and 13 year olds respectively. Generally, Class I canine relationship was noted to be the highest (44%) followed by Class III (34%) and finally Class II (22%).

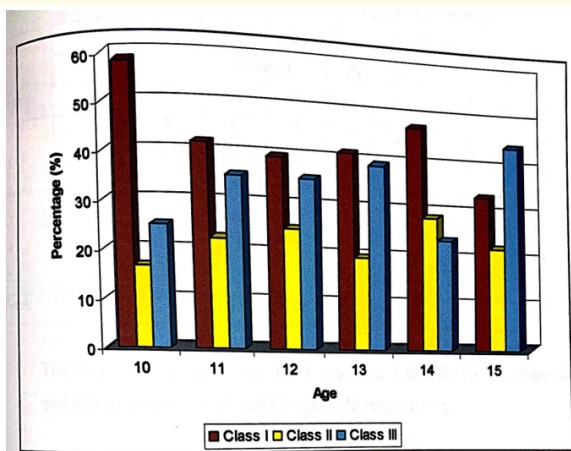


Figure 3: Distribution of canine relation by age.

Class I was the highest among the 10 year olds and lowest among the 15 year olds.

Class II was highest among the 15 year olds and lowest among the 11 year olds.

Class III was highest among the 15 year olds and lowest among the 10 year olds.

Angles' Class I molar relationship was the highest (41%) among all the three classes. This was followed by Class III with (36%) and Class II with 23%. Class I had the commonest age being 13 year olds, Class II in the 12 year olds and Class III among the 13 year olds.

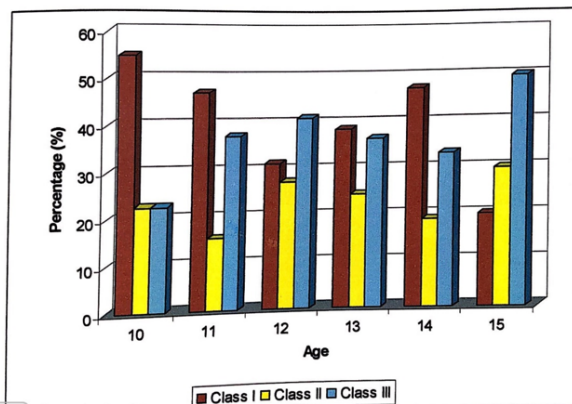


Figure 4: Distribution of molar relationship by age.

Class I molar relation was highest amongst the 10 year olds and lowest amongst the 15 year olds.

Class II molar relation was highest amongst the 15 year olds and lowest amongst the 11 year olds.

Class III was highest amongst the 15 year olds and lowest amongst 10 year olds.

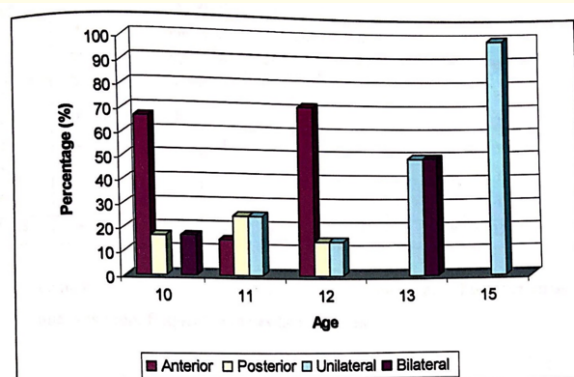


Figure 5: Distribution of cross bite with age.

Anterior crossbite was highest among the 12 year olds and not present at all among the 13-15 year olds.

Posterior crossbite was highest in 11 year olds.

Crossbite tendency was more unilateral than bilateral.

The abnormal centrelines were more in females than males. This was realised in the females of 12 and 13 year old and 12 years old among the males.

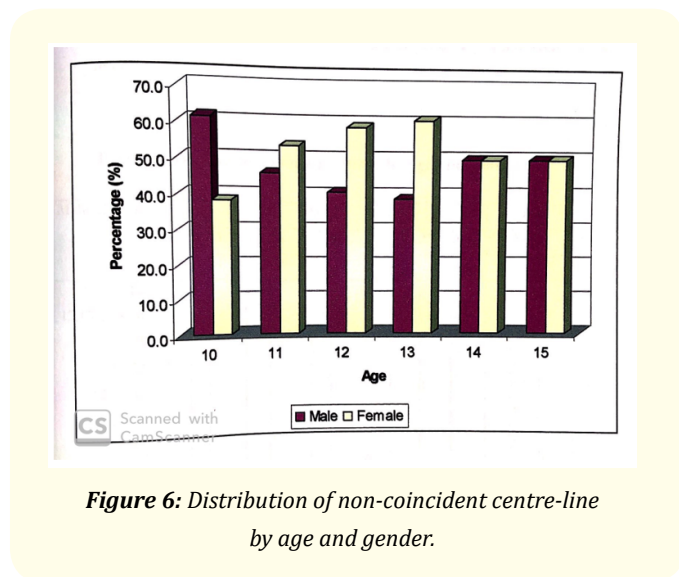


Figure 6: Distribution of non-coincident centre-line by age and gender.

The abnormal centrelines were more in females than males. This was realised in the females of 12 and 13 year old and 12 years old among the males.

Discussion

The primary goal of this survey was to detect the prevalence of malocclusions in the population of school children in Mombasa County, Kenya.

As stated, a large number of studies on the prevalence of malocclusion in different populations have been published. The reported incidences among different ethnic groups vary from 31 - 93% making it clear that the majority of children have irregular teeth and the occlusal relationship differs from the ideal occlusion [9].

It is therefore important to equate possession of an anomaly with the need for orthodontic treatment as this is defined from individual to individual [1].

Having straight and correctly aligned teeth, apart from creating improved function and greater resistance to disease, improves personal appearance, which enhances the social and psychological well-being of an individual [10].

Malocclusion can be due to a number of causes including crowding/spacing, tooth number, overjet, habits, large labial frenum, premature tooth loss and dental caries. The “causes” of malocclusion are grouped because they are usually nonspecific and our knowledge is often imprecise [2].

The results of this study show that, very few 15 year olds were examined. This is because most of the children at this age are in secondary schools yet the researcher chose primary schools in order to capture the 10 - 12 year olds. There were slightly more males (50.5%) than females (49.5%) in the sample, with more males (11) missing maxillary teeth than females (3) missing the maxillary canines at age 12. More males (3) were generally missing mandibular teeth especially the canines at age 10 than females (1). By the males’ late eruption of the canines at 12 years, it confirms that males mature later than females.

The variations can be attributed to lack of study casts to accurately assess the incisor relationship. The relevance of this incisor relationship is to assess the esthetic component of the index of the orthodontic treatment need (IOTN) and its severity to warrant treatment.

The variations of the canine and molar relationships can be explained in terms of aetiological factors that are linked to the “cause” of malocclusion. These factors are broadly grouped as:

- Intrinsic or genetic
- Extrinsic or environmental.

It is generally accepted that the prevalence of malocclusion amongst Caucasians is much higher than in the Negroes. This can be explained in terms of different nutrition and exercise. Africans have high fiber diets and also feed on hard foods from childhood that encourage jaw growth by increased activity. This is not the case custom however with the Caucasian counterparts who feed on light soft snacky foods. Apart from the environmental factors, this can also be explained in terms of intrinsic factors of genotype.

The significance of incisor, canine and molar relationships is to quantify and standardize and individual patient’s need for orthodontic treatment (Index of Orthodontic Treatment Need; IOTN) so that the potential benefits can be weighed against the possible disadvantages. The index consists of two components:

- Dental health
- Aesthetic.

Only 20 children out of the study population had a crossbite tendency-11 (55%) had anterior crossbite, 4 (20%) had unilateral crossbite, 3 (15%) had posterior crossbite, and 2 (10%) had bilateral crossbite. Females had more anterior crossbite tendency than males. Posterior crossbite was more frequent in males than females. The reason females have more anterior crossbite tendency than males may be due to the fact that females have smaller jaws.

From previous studies, it has been shown that upto 10% of children present with crossbite; there is a strong genetic component. The three most common types of anterior crossbites which may present in the mixed dentition are; ectopic incisors, skeletal Class III malocclusion and pseudo Class III malocclusion. Posterior crossbite is an abnormal finding with three main types; dental, muscular and osseous.

The non-coincident centrelines were more in females than males. This was realised in females of 12 and 13 year olds and 12 year olds among the males. This variation is because females have a higher tendency of mandibular anterior crowding which is realised at 11 years old.

It was hypothesised that the prevalence of malocclusion in Mombasa was lower than that in Nairobi. However, the results have shown a higher prevalence of malocclusion at 75% in the study compared to Nairobi with a prevalence of 72% [4].

Study Limitations

The registration method that was employed did not take into account the subjects need for orthodontic treatment and the level of severity so as to assess the potential impact of treatment.

Conclusion

There were more males than females in the study sample. The frequency of the ages in the sample showed a decrease with age; 12 year olds were the majority and 15 year olds were the minority.

In all, 75% of the study sample had malocclusion.

Ethical Approval

Ethical approval was given for this study.

Consent for Publication

Given consent for publication.

Availability of Data and Material

Not applicable.

Competing Interests

There are no competing interests.

Funding

Not applicable.

Authors' Contribution

Edith K Maraga, carried out the study.

Acknowledgments

Drs Isaac Okullo and Andrew Mwanika for their guidance in this study.

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Volume 2 Issue 12 December 2019

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