Original Article

The prevalence of malocclusion and orthodontic treatment need among 15-year-old school children in Galle district in Sri Lanka: An epidemiological study

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Abstract

Background: To ascertain the prevalence of malocclusion and orthodontic treatment need among 15 year old school children in Galle district in the Southern Province in Sri Lanka. **Objective:** To ascertain the prevalence of malocclusion and orthodontic treatment need among 15-year-old school children in Galle district in the Southern Province in Sri Lanka. **Materials and Methods:** A descriptive cross-sectional study was carried out among 802 school children in the Galle district. Multi-stage cluster sampling technique combined with probability proportionate to size method was used to select the sample. Occlusal characteristics including overjet, overbite, crossbites, crowding, and spacing were recorded using a standard pro forma and the need for orthodontic treatment was assessed using the index of orthodontic treatment need dental health component. SPSS 17 for Windows was used to analyze the data. The awareness of malocclusion among the subjects was also assessed. **Results:** It was observed that the prevalence of malocclusion among the sample was 69.5%, and the overall treatment need was 26.6%.

Key words: Index of orthodontic treatment need, prevalence, malocclusion

INTRODUCTION

Malocclusion is an occlusion in which there is mal-relationship between the arches in any three planes of space or in which there are anomalies in tooth position beyond the limits of acceptable "norms".[1] The appearance of the mouth and smile plays a significant role in judgments regarding facial attractiveness.[2] Thus, malocclusion has large physical, social, and psychological impact on the individual and society.[3,4]

Although malocclusion now occurs in a majority of the population that does not mean it is normal. Skeletal remains indicate that the present prevalence is several times greater than it was only a few 100 years ago.[5]

A large number of studies on the prevalence of malocclusion in different populations have been published. Different surveys have reported data on the prevalence of different types of malocclusions. The reported incidence varies from 30% to 93% making it clear that the majority of children have irregular teeth.[6] Despite the amount of literature on the subject, there are not many epidemiologic studies on Sri Lankan population.

Psychosocial and facial considerations play a role in defining orthodontic treatment. In the recent years, there has been a

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steady increase in the number of young and adult patients seeking orthodontic treatment in the public sector as well as the private sector. It seems reasonable that the severity of the malocclusion correlates with the need for treatment. This assumption is necessary when treatment need is to be estimated for population groups.

Teaching Hospital Karapitiya is the only public sector treatment provider for the orthodontic patients in the Galle district in Sri Lanka.

This study aimed to find the different types of malocclusions among the school children, and the treatment need in the Galle district.

MATERIALS AND METHODS

Study design and study population

A descriptive cross-sectional study was conducted from January 2012 to March 2012 among the 15-year-old school children in the Galle district in the Southern Province of Sri Lanka.

The study population consisted of 15-year-old children attending schools in the Galle education division. Students who had completed their 15th birthday but not reached their 16th birthday were considered in the sample.

Children who were receiving orthodontic treatment and those who have received orthodontic treatment were excluded from the sample.

Sampling design

The Galle education division comprises of 337 schools which are public, private, and international. The total student population was 16951. The list of schools including public and private was collected from the Galle education office. The Galle education division comprised of four educational zones.

Multistage cluster sampling technique with probability proportionate to size was used to select the sample. As the cluster sampling technique was used, the design effect was considered, and a sample size of 806 was obtained.

On the first stage of cluster sampling, the sample unit was the school. The cluster size was twenty as a large number of small clusters were preferable. Hence, the total number of 41 schools was selected. Ten schools from each zone were randomly selected.

In the second stage, required number of subjects from the cluster was selected using random number table.

Ethical clearance, official permission, and informed consent

Ethical clearance was obtained from the ethical review committee of the Faculty of Medicine, University of Ruhuna as the study was carried out in the Southern province.

Official permission was obtained from the district education officer in the Galle district, Southern province education department, Galle.

A written informed consent was obtained from all parents of the students who fulfilled the eligibility criteria.

Pro forma details

The pro forma consisted of two sections:

1. The demographic data – including the name, age, gender, name of the school
2. Clinical parameter – Index of orthodontic treatment need (IOTN).

Pilot study

The questionnaire was pretested on a group of forty 15-year-old students. The pilot study was carried out in Colombo district to prevent the contamination of the sample. Modifications were made accordingly.

On average 10 min were taken to administer the questionnaire and 20 min for the clinical oral examination.

Orthodontic variables

The IOTN dental health component was used to examine and identify malocclusions. This index places patients in five grades. Grades 4 and 5 are identified as extreme/need treatment and Grade 3 as moderate/borderline need and Grades 1 and 2 as no/little need.

The degree of crowding in the upper and lower arches was assessed. Then it was categorized as mild, moderate, and severe crowding (mild 4 mm and below, moderate 5–9 mm, severe 10 mm and above).

The overjet was measured and recorded as 2–4, 4–6, and 7 mm and above. The overbite was also measured in millimeter and recorded as 2 mm and below and above 2 mm.

Spacing was measured in millimeter and recorded as 4 mm and below and 4 mm and above.

Four subjects from each cluster were re-examined to prevent intra-examiner variability.

Methodology

Data were collected by a single examiner. The investigator visited the selected schools in two occasions.

On the first occasion, eligible children were identified as per above specified sampling design and given informed consent forms to get them signed from their parents/guardians who were also notified by the school teachers on request of the investigator. A total of 810 subjects aged 15 years whose parents/guardians had given a written informed consent were examined among which 383 (47.3%) were males and 427 (52.7%) were females.

The investigator was accompanied by a dental surgery assistant during data collection. Clinical examination was carried out in the medical room of the schools. Occlusal conditions were assessed using latex gloves, mouth mirrors, calipers, blunt probe, and millimeter rulers.

Statistical analysis

The recorded data were compiled and entered in a spreadsheet computer program (Microsoft Excel 2013) and then exported to data editor page of Statistical Package for the Social Sciences version 17 (SPSS Inc., Chicago, Illinois, USA).

RESULTS

A total of 561 students had any form of malocclusion which was 69.5% of the total population.

249 students did not have any form of malocclusion which was 30.5% of the total population.

A total of 275 male students (71.5%) and 290 female students (67.6%) were found to have any form of malocclusion.

IOTN Grades 1 and 2 were considered as treatment not required and IOTN Grades 3, 4, and 5 considered as requiring orthodontic treatment.

A total of 217 subjects were identified with orthodontic treatment need which was 26.6% of the total population.

A total of 117 male students from the total of 383 were identified to have orthodontic treatment need (30.3%). 100 female students from the total of 427 were identified to have orthodontic treatment need (23.1%) [Tables 1-4 & Figures 1-2].

DISCUSSION

The study represented the first epidemiological survey carried out on a Galle district population with the primary aim to achieve a true image of the orthodontic conditions of the students aged 15 years. The execution

Table 1: Crowding

	Frequency (%)
Lower arch	
4 mm and below	229 (28.3)
5-9 mm	39 (4.6)
>9 mm	6 (0.5)
No crowding	536 (66.6)
Upper arch	
4 mm and below	152 (18.7)
5-9 mm	39 (3.7)
>9 mm	9 (0.5)
No crowding	620 (77.1)

Table 2: Spacing

	Frequency (%)
Upper	
1-4 mm	55 (6.9)
5 mm and above	34 (4.2)
Lower	
1-4 mm	22 (2.7)
5 mm and above	6 (0.7)

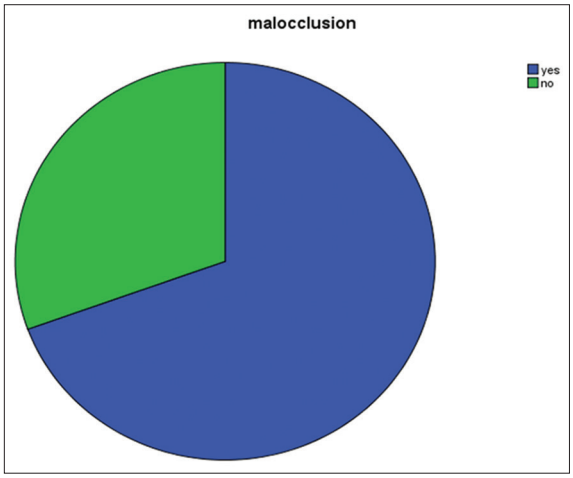

Figure 1: Prevalance of malocclussion among 15 year old school children in Galle district yes - 69.5% no - 30.5%

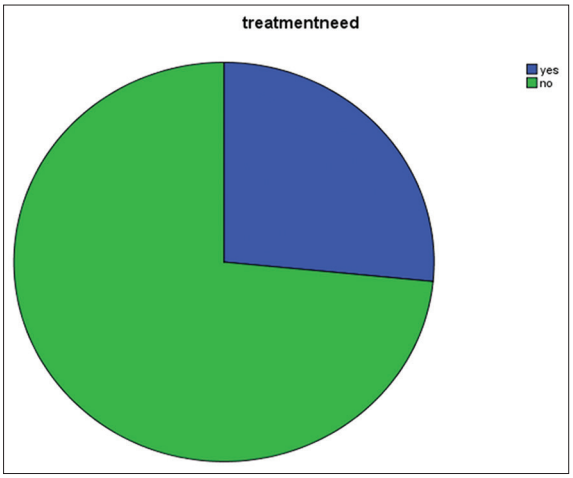

Figure 2: Orthodontic treatment need among 15 year old school children in Galle District yes - 26.6% No- 73.4%

Table 3: Overjet

Overjet	Frequency (%)
1-3 mm	539 (67)
4-6 mm	173 (21.3)
7 mm and above	49 (5.9)
Reverse over jet	49 (5.9)

Table 4: Overbite

Overbite	Frequency (%)
2 mm and below	640 (79.4)
3 mm and above	144 (16.1)
Ant open bite	36 (4.5)

of epidemiologic studies and dissemination of data such as that of the present study seek to advocate the need to include an orthodontic focus in the public dental services.

The development of a uniform method of epidemiological assessment and grading of malocclusion has been of interest for several decades. An orthodontic index is a numerical scale that is derived by scoring specific features of a malocclusion to objectively assess some parameters such as how far a malocclusion varies from an ideal occlusion.[7] Occlusal indices are useful for research, audit, practice management, and quality assurance in orthodontics.[8] In this study, the DHC of the IOTN, which is considered an objective and synthetic method, was used to assess the need for orthodontic treatment.

In this study, 69.5% of the population was found to have any form of malocclusion. However, only 26.6% was identified as requiring orthodontic treatment according to the IOTN. Over the past few decades, the demand for orthodontic treatment has been high in Sri Lanka as well. It was observed that the young adults sought more due to the increase in awareness of esthetics. There are only few institutions that provide orthodontic care to the public, hence, the need to identify the orthodontic treatment need is vital.

In a similar study which was carried out in the Gampaha district in the Western province using the DAI index among 15-year-old school children 70% of the population was found to have mild or no form of malocclusion. The treatment need in the above-mentioned study was 31.9% similar to the findings of the current study which was 26.6%. Even though the two studies cannot be compared because two different indices were used the important conclusion that can be deduced is that the treatment need is similar in the two districts.

The prevalence among Sri Lankan 15-year-old school children in similar to the European subjects. In a British sample of 15-year-old, 21% was judged to have definite orthodontic treatment need.[9] The prevalence is similar to the Indian subjects as well. In a prevalence study carried out in Rajastan, India utilizing the Dental Aesthetic Index the treatment need was found to be 33.3%.[10] The Sri Lankan values been slightly lower suggests the fact that access to free orthodontic treatment in the public sector resources and the proper identification of malocclusion and referring at the appropriate age to a relevant specialist for interceptive management has been effective.

Notwithstanding its advantages the study had some limitations. The examination was carried out in the school medical facility where there was no access to radiographs. The dental radiographs would have been a valuable tool to confirm the missing and impacted teeth. The children who had already received orthodontic treatment were excluded from the study. It would have been valuable if they were included in the study which would have indicated the percentage who had already received treatment.

Malocclusion has a negative impact on the oral health-related quality of life of adolescents. Children aged between 11 and 14-year-old with malocclusion demonstrate significantly more "impacts," i.e. worse quality of life, compared with a minimal malocclusion group based on the IOTN.[11] Adolescents who complete orthodontic treatment report fewer oral health impacts on their daily life activities than those who had never had treatment. Groups of children who need orthodontic treatment exhibit significantly higher impacts on their emotional and social well-being.

With regards to the occlusal findings highest prevalence rate was for crowding which was 56.2% considering both upper and lower arches. 27.3% had an increase in overjet and 5.95 had a reverse overjet. 16.1% had an increase in overbite while 4.5% had an anterior open bite.

CONCLUSION

Widespread use of the IOTN along with the detailed study of occlusal traits is suitable for planning community dental health resources. In the population of Galle, 25% of school children presented an orthodontic treatment need.

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Conflicts of interest
There are no conflicts of interest.

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