

Prevalence of lower incisor crowding in Pakistani population using Little's Irregularity Index

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Abstract

Introduction: Lower anterior dental irregularity has an important impact on prognosis, treatment planning and retention of orthodontic cases. As malocclusion is considered to be a public health problem, prevalence of dental anomalies, need and demand of orthodontic treatment should be asserted within a given community. Hence this study was conducted to determine the prevalence of lower incisor irregularity in a sample of Pakistani population; its correlation with ALD and skeletal pattern.

Material and Methods: A group of 100 patients with age range of 12 - 26 years were randomly selected from Orthodontic department, Margalla Collage of Dentistry, Margalla Institute of Health Sciences, Rawalpindi. To determine lower incisor irregularity, Little's Irregularity method was used as described by Little in his index.

Results: Lower incisor irregularity can affect any type of skeletal pattern. Little's index score was calculated for each patient to evaluate incisor irregularity (Mean 4.835, SD 4.387). Pearson correlation coefficient was calculated between Little's score and ALD (-0.585), and between Little's score and ANB (+0.013) as representation of skeletal pattern.

Conclusions: According to the results, there appears to be a strong correlation between incisor irregularity and tooth size-arch length discrepancy.

Key words: Corrective orthodontics; Incisor Irregularity; arch length discrepancy

Introduction

Malalignment and crowding are unaesthetic features of dentition, which are the primary reason of most patients seeking orthodontic treatment.¹ Crowding is common in anterior part of the dentition. Central incisors, lateral incisors and canines are the teeth that mostly display crowding in the arches.² Many factors influence tooth position in the arch and the amount of crowding expressed later on. These include position of permanent tooth germ, premature loss of deciduous teeth, order of replacement of deciduous teeth by permanent teeth and soft tissue pressures.³ The method most

frequently used for calculating crowding in both arches is the arch length discrepancy (ALD).⁴ ALD refers to the imbalance between space available and space required to accommodate teeth in the arch; a positive value indicating an excess space and a negative value showing deficiency of space.⁴ Although this is the most commonly used method, it is still considered time consuming for clinical use as mesio-distal widths of all permanent teeth and space available have to be measured.⁵ Many reasons have been reported in the literature for using an index as an epidemiological screening tool. Desired features should include improved accuracy of screening, ease of use, inexpensive, technically simple and quick to generate results.⁶

Several indices have been reported to quantify the amount of crowding for epidemiological and clinical use. These include the labio-lingual deviation index, which is the visual assessment of crowding in both arches.⁷ Dental Aesthetic Index measures

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incisor irregularity in each arch using a probe and also determines the ALD.⁷ Peer Assessment Rating Index assesses the displacement between the contact points of anterior teeth using a ruler.⁸ The most practical and reliable indicator after ALD is the Little's index proposed in 1975.⁹ This involves assessment of lower incisor crowding by measuring the labio-lingual deviations of contact points of six anterior teeth from canine to canine. The amount of displacement is measured in millimeters and degree of crowding is correlated against a table which displays the severity of crowding. One drawback of this method is that it is only a partial evaluation of the degree of crowding and may over or underestimate the actual degree of crowding present.⁹ A modest association has been reported between ALD and Little's index.⁹

Lower incisor crowding has an impact on prognosis, treatment planning and retention of a given malocclusion.⁸ The purpose of this study was to determine the prevalence of lower incisor crowding in Pakistani population using Little's index and calculating its correlation with ALD and the skeletal pattern.

Material and Methods

The study was conducted at Orthodontic Department, Margalla College Of Dentistry, Margalla Institute of Health Sciences, Rawalpindi. Casts of 100 patients were selected with age range of 10-28 years. The inclusion criteria was; patients with no history of extractions, missing or supernumerary teeth, fillings or fracture of teeth and previous orthodontic treatment.

The displacement of contact points in a labio-lingual direction from canine to canine was measured with the help of vernier calipers. The measurements were obtained from mandibular casts and each of the five measurements represented the horizontal linear distance between the anatomic contact points of adjacent teeth (Figure 1).

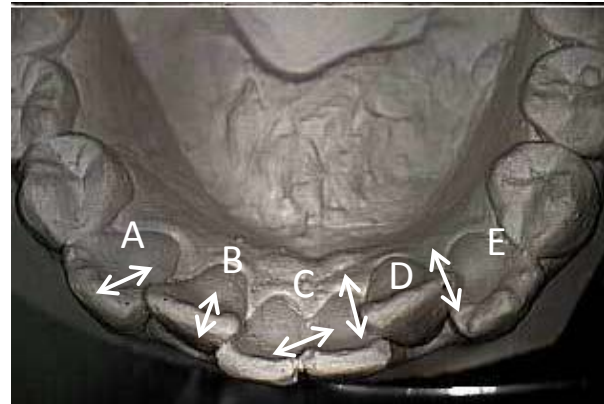


Figure 1. Mandibular incisor irregularity: $A + B + C + D + E =$ irregularity index.

Scoring for each patient's casts was carried out according to Little's Irregularity Index (Table I).

Table I. Scoring of Little's Irregularity Index

DEGREE OF CROWDING	LITTLE'S INDEX
0mm	Perfect alignment
1-3mm	Minimal crowding
4-6mm	Moderate crowding
7-9mm	Severe crowding
10mm >	Very severe crowding

The study design was descriptive and type was cross sectional. The software used for analysis was SPSS version 17.

Results

The mean age of the patients whose casts were used was 16.25 ± 4.513 years. There were 76 females and 24 males showing a ratio of almost 3:1.

Lower ALD, and lower incisor irregularity was measured for Mean lower ALD for females was -2.44 ± 4.07 mm, and for males -4.06 ± 3.90 mm (Overall -2.83 ± 4.07 mm). The mean lower incisor irregularity for females was calculated to be 4.41 ± 4.08 mm and for

males was $6.19 \pm 5.11\text{mm}$ (Overall $4.835 \pm 4.39\text{mm}$).
all casts (Table II).

Table II

Females n = 76			Males n = 24		
	ALD L	Little's		ALD L	Little's
Mean	-2.44	4.41	Mean	-4.06	6.19
SD	4.07	4.08	SD	3.90	5.11

Prevalence of lower incisor irregularity was calculated as a percentage of the whole (Table III), with 15% of the sample showing perfect alignment, 49% with minimal to moderate crowding and the remaining showed varying degrees of severe crowding.

Table III

DEGREE OF CROWDING	LITTLE'S INDEX	PERCENTAGE
0	Perfect alignment	15%
1-3	Minimal crowding	26%
4-6	Moderate crowding	23%
7-9	Severe crowding	18%
10 >	Very severe crowding	18%

The sample was divided into skeletal class I, II, and III using ANB as a reference. An ANB between 0° and 4° was taken as class I, above 4° as class II and below 0° as class III (Figure 2).

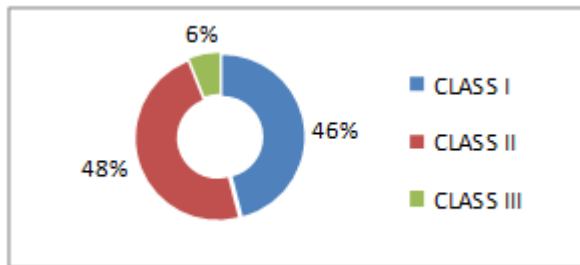


Figure 2. Skeletal classes of the sample

Pearson correlation coefficient was calculated for lower ALD & Little's irregularity and ANB & Little's irregularity. A significant and strong correlation was found to exist between

lower ALD and Little's irregularity with a coefficient of -0.586 ($P=0.01$) (Figure 3). A weak correlation was noted between ANB and Little's irregularity (0.01) being insignificant (Figure 4).

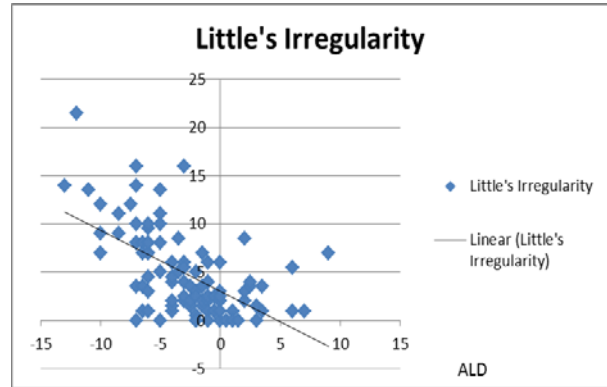


Figure 3. Scatter diagram showing a strong relationship between lower ALD and Little's irregularity

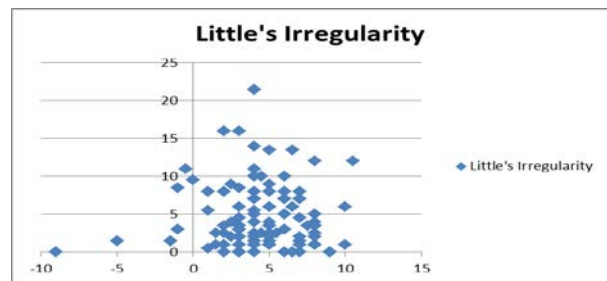


Figure 4. Scatter diagram showing a weak relationship between ANB and Little's irregularity

Discussion

In this study our aim was to calculate the prevalence of lower incisor irregularity and to correlate Little's Irregularity Index with ALD in lower arch and to ANB. These were patients who believed that they needed treatment to improve their dentofacial esthetics. The age range of the selected patients was 10 - 28 years, with dental ages more than 13 years. The patients had all the mandibular deciduous dentition replaced with permanent dentition from right first molar to the contra lateral first molar.

The study showed a low incidence of well aligned incisors i.e. 15% and a high incidence

of crowded incisors, which is in agreement with studies conducted by few other investigators.¹⁰⁻¹² These figures however, do not represent the whole population, since the sample was taken from patients who thought that they needed orthodontic treatment. Data from a Nigerian study showed a lower prevalence which could probably be associated with racial differences between individuals of African and Middle Eastern descent.¹⁰

The high correlation coefficient between ALD and Lower incisor irregularity (- 0.586) offers theoretical support to propose incisor irregularity as an estimate of ALD. This is in accordance with a study conducted in Canada¹¹ which showed a similar value (- 0.68). Our determination coefficient was found to be 34.3%, which was in the same range as previously reported by Harris et al for lower anterior teeth.¹² Correlation and determination coefficients were used in well renowned studies by Tanaka Johnston and Moyers to predict clinical traits.¹³ The negative sign present in the correlation coefficient value indicates that there is an inversely proportional relationship between lower incisor irregularity and ALD. The Higher the irregularity, greater the crowding and therefore the more negative the ALD and vice versa.

Little's index is an anterior measurement so it would show higher correlation with Anterior ALD.² It was noted in this study that there was little if any crowding in the lower posterior segment.¹⁵ A bigger sample size may have included individuals with crowding in the lower premolar area.

Another parameter that was investigated was ANB, which is used as an indicator of skeletal pattern. In this study the relationship between skeletal pattern and lower incisor crowding was also assessed. The Pearson correlation coefficient value of 0.013 showed an extremely weak relationship between ANB and lower incisor irregularity. In retrospect, a comparison of lower arch depth to lower

incisor irregularity might have resulted in a stronger correlation.

It is suggested that further research needs to be done on lower incisor irregularity and its applications. Until then, Little's index can be used as a simple and economic tool for the estimation of lower total ALD.

Conclusion

1. Lower incisor crowding is a common feature of Pakistani population.
2. There is strong correlation between lower ALD and Lower incisor irregularity.
3. There was no correlation between ANB and Lower incisor irregularity.

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