ABSTRACT

Purpose: Perfect facial symmetry is exceedingly rare. In most individuals one side of the face is larger than the other side. Asymmetries large enough to be easily noted on clinical examination are important for patients and orthodontists, because of functional and esthetic problems. The purpose of this study was to determine the prevalence of mandibular asymmetries in high school students.

Materials & Methods: Eight hundred twenty students were selected randomly from 14 high school including 400 girls and 420 boys in north eastern Tehran province. The diagnostic criteria for skeletal asymmetry was chin deviation more than 2mm from a vertical reference plane confirmed by unilateral cross-bite or different right–left cuspid relationship. For functional asymmetries, apparent lateral shift of the mandible from most retruded position to maximum intercuspation and for dental asymmetries, midline shift accompanied by missing teeth or early loss of teeth was noted.

Results: 44.6% of girls and 46.4% of boys demonstrated at least one form of asymmetry. The prevalence of skeletal, dental and functional asymmetry in girls was 20%, 21% and 10% respectively, while for boys the prevalence was 23.6%, 20.9% and 7.6%. In 62.5% of students with skeletal asymmetry chin was deviated to the right side. There was a positive correlation between history of trauma \( r=0.39 \) and unilateral mastication \( r=0.22 \) with asymmetry. The signs and symptoms of TMD was significantly more prevalent in students with skeletal asymmetry than others.

Conclusion: Asymmetry of the lower third of the face is a common finding. Early diagnosis and proper treatment planning prevents further functional and aesthetic problems.

Keywords: Prevalence, Facial asymmetry, Mandibular, Dental, Functional.

INTRODUCTION

Symmetry is one of the principal elements of beauty. Perfect facial symmetry is exceedingly rare and is more of a theoretic concept that seldom exists in living organism. \(^1\) In most individuals one side of the face is slightly larger than the other. \(^2\) Mild degree of right-left asymmetry in esthetically pleasing and apparently symmetrical faces has been demonstrated by composite photographs and cephalometric studies. \(^5\) Several studies have reported that when images were manipulated to create perfectly symmetrical faces, these faces were perceived as less attractive than those with slight asymmetry. \(^6\) Asymmetries in the craniofacial area may be the results of discrepancies either in the form of individual bones or a malposition of one or more bones. The asymmetry may also be limited to overlaying soft tissue. The point at which

* Granted by I.C.D.R. (Iran Center for Dental Research)
normal asymmetry becomes abnormal cannot be easily defined and is often determined by the clinician’s sense of balance and the patient’s perception of imbalance. Clinical facial asymmetry in the craniofacial complex ranges from the barely detectable to gross discrepancies between the right and left halves of the face. Lu(8) reported that only facial asymmetries greater than 3% are clinically discernible. More severe asymmetries of the jaws large enough to be easily noted on clinical examination are found surprisingly a frequent finding in patients with dentofacial deformity. The greater the magnitude of discrepancy the greater is the functional psychological effects. The purpose of this study was to determine the prevalence of mandibular (skeletal, dental, functional) asymmetries among high school students of Tehran.

MATERIALS & METHODS

In this prospective descriptive study eight hundred and twenty students were selected randomly in four clusters from the 14-17 year old high school students in the north-east part of Tehran, including 400 girls and 420 boys. There are 40 high school in north-east Tehran. 14 high-school were selected randomly from each high-school. The students were randomly selected from the list and according to the number of students in each high-school. Number of samples were calculated by formula

\[ n = \left( \frac{Z_{1-\alpha/2}^2 \times \frac{p(1-p)}{e^2}}{\frac{p(1-p)}{n}} \right)^2 \]  

Two dental students were responsible to collect the data after comprehensive workshop on reliability. Student of one class were first invited, and examined by an orthodontist (first author) and two dental inter learned how to examine. The first 5 high-schools students were also examined under direct supervision of orthodontist each individual was examined clinically to detect skeletal, dental and functional asymmetries. Skeletal asymmetry was defined as more than 2mm chin deviation from midsagital plane measured on a transparent grid (after Bishara) and confirmed by either midline discrepancy, unilateral crossbite, or different right-left canine relationship. The presence of canted occlusal plane was examined by tongue blade. Dental arch asymmetries were defined as midline deviation accompanied by missing teeth or early loss of teeth and confirmed by more crowding on one side. Functional asymmetries were defined as any lateral shift of the mandible from retracted contact position to maximum intercuspal position. TMD signs and symptoms (pain, click, restriction of mandibular movements and deviation of mandible during jaw opening) as well as history of trauma and unilateral chewing were also examined in students with skeletal asymmetries. The history of pain was asked directly, if positive it was included in questioner click and path of closure of mouth were examined directly and clinically, it was not difficult to discriminate a straight path of closure from a s-shape one.

RESULTS

As seen in figure 1, 80 girls (20%) and 99 boys (24.6%) had clinical discernable mandibular asymmetry. Three percent of the population had both skeletal and dental asymmetry. One percent showed dental and functional, 1-4 percent had all three types of asymmetry. Confidence interval for skeletal asymmetry was 0.2±0.04 in girls and 0.24±0.04 in boys. Dental asymmetry was almost the same for both sexes (21%), but functional asymmetry was less frequent (8-10%).

The direction of mandibular skeletal deviation was 62.5% to the right side. But for functional asymmetry, it was distributed equally. (Fig2)

TMD was more frequent among samples with skeletal asymmetry (57%) compared to dental and functional asymmetry (6.2% and 15.9% respectively) (Fig3). The most frequent signs of tempromandibular disorders associated with mandibular deviation was click and deviation during mouth opening (Fig4).

Among the samples with skeletal asymmetry the history of trauma to mandible
was reported twice in boys comparing to girls (42.6% Vs 22.5%) (Fig5).

Unilateral chewing was more frequent in samples with skeletal asymmetry than functional and dental asymmetry (Fig6).

Horizontal cant of occlusal plane was seen in 31% of samples with skeletal asymmetry (Fig7).

Fig 1. Distribution of skeletal, dental and functional asymmetry in 820 students, Tehran 2004.

Fig 2. Distribution of skeletal, dental and functional asymmetry in 820 students, Tehran 2004.


Fig 5. History of trauma in skeletal, dental and functional asymmetry in 820 students, Tehran 2004.


Fig 7. Frequency of horizontal cant of occlusal plane in skeletal asymmetry in 820 students, Tehran 2004.
DISCUSSION

Facial asymmetry is a common clinical and cephalometric finding. Williamson and Simmon reported in their study that asymmetry is a rule rather than an exception.\(^9\)

The results of our prospective study also indicated a high prevalence of mandibular asymmetry among high school students of Tehran. The prevalence of mandibular asymmetry in population with dento-facial deformities was about 25% however, the orthodontic screening that was conducted on school children in Florida showed 12% facial asymmetry and 21% noncoincidence of dental midlines.\(^11\)

The direction of deviation was 62.5% to the left side. Farkas and Cheung,\(^12\) Ferrario et al,\(^13\) Shah and Jashi,\(^3\) and Peck et al\(^5\) also found the right side to be larger; than the left side. However Vig and Hewitt\(^2\) reported the left side of the facial complex to be slightly larger.

The developmental process of dentition and craniofacial growth takes place over a period of approximately 20 years, whereby the environment has a modeling impact on the genotype. In fact growth and development of the mandible is the result of environmental modulation of genetic inheritance.\(^14\)

Etiologic factors at cellular and subcellular levels as well as macroscopic or clinical level can influence growth and development of mandible. Key intrinsic and extrinsic molecular factors whose presence and amount regulate patterning of form and influence gene expression, have direct effect on growth, development and adaptation of craniofacial tissues. Variation in craniofacial morphology is the result of subtle differences in growth of the craniofacial tissues, including their ability to express intrinsic growth factors and to adapt to extrinsic fluctuations.\(^15\)

Numerous etiologic factors have been found to induce skeletal asymmetry by influencing cell activities. Some factors affect the mandible prenataly (hemifacial microsomia) and many other postnataly including trauma (unilateral ankylosis of the TMG), Osteochondroma of the condyle, unilateral muscle dysfunction (nerve injury), unilateral rhumatoid arthritis of TMJ, ambylopia (asymmetry of muscle tones) and cranioscoliosis.

Prepubertal trauma could be one etiologic factor responsible for the development of mandibular asymmetry.\(^16\) The results of this study also confirmed that trauma is a potential etiologic factor. However history of trauma was reported twice in boys comparing to girls (42% vs 22%).

CONCLUSION

Asymmetry of lower third of the face is a common finding. Early diagnosis and proper treatment planning prevents further functional and aesthetic problems.

REFERENCES

9. Williamson EH, Simmon MD : Mandibular asymmetry and its relation to


