ORIGINAL RESEARCH

Prevalence of Vision Defects in a School Based Population with Malocclusion

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ABSTRACT

Introduction: Myopia and hyperopia are the two most prevailing vision defects in the world. Dental occlusion of any individual can be classified broadly into three categories according to Angle. Since various system of our body is interconnected and any pathological condition in one area can affect the other, the aim of the study was to find any association between vision defects like myopia and hyperopia and malocclusion. **Methods**: A total of 500 school children with age range from six to twelve years residing in and around the city of Mangalore were selected for the study. Molar relations of the children were checked and they were sent for an ophthalmologic visit. **Results**: 40.69% of children having class II malocclusion had myopia where as 21% of children having class III malocclusion had myopia. On the other hand 11.72% of children having class II malocclusion had hyperopia and 3.94% of children having class III malocclusion had hyperopia. 26.88% of children having class I malocclusion had myopia where as 13.26% had hyperopia. **Conclusions**: From the results it can be noted that children with class II malocclusion had a higher prevalence of myopia and there was slightly higher prevalence of hyperopia in children with class I malocclusion.

KEYWORDS: Angle's Classification, Hyperopia, Malocclusion, Myopia, Occulomotor System

INTRODUCTION

Various systems in the body are interconnected to form a single structural unit and so a pathological condition in one area can also affect any other area. The skeletal muscles correlate the skull lower jaw, spine, limbs and pelvis functionally and anatomically, therefore it plays a major role in the coincidence of various disorders of these structures.[1-5] Recently some authors showed the relationship between visual focusing and dental occlusion, others between visual eye dominance and mandibular deviation associated with head posture. [6-7]

A strong relationship exists between the occulomotor and the trigeminal system. The occulomotor system comes from the occipital somites together with the tongue muscles and the suboccipital muscles.These structures are functionally bound and cooperate to manage head and neck position. The trigeminal system represents the connection between the somatic structures and those derived from the branchial arches collecting the propioception from both somatic structures and occulomotor muscles.[8] Fibres emerging from the muscle spindles and palisade endings in the occulomotor muscles especially the lateral rectus muscle form pathways to the occulomotor nuclei and trigeminal nucleus.[6,9,10] The eye position in the orbit is controlled by ocular nuclei. They receive afferent impulses from vestibular nuclei and send fibres to nuclei which control head and neck movements. The ocular proprioceptive afferences have the same sub cortical stations in which vestibular stimuli arrive.[11]

Structural alterations in mandible can cause the position of the pupillary line to be altered which in turn intervene the ocular muscles to keep the gaze straight. Occular defects that can be linked to dental malocclusion are convergence defects, heterophora, heterotrophia and esodeviations.[12]

Since an anatomical and neurological link exists between stomathognathic and ocular system, the purpose of this study is to investigate the prevalence of vision defects like myopia and hyperopia in a group of South Indian children.

MATERIALS & METHODS

A total of 500 school children with age range from six to twelve years residing in and around the city of Mangalore were selected for the study. Molar relation of all the children were noted and they were sent for an ophthalmologic visit. The following ocular defects were investigated:

Myopia:short-sightedness, a condition of the eye in which parallel rays are focused in front of the retina and the objects can be seen distinctly only when near to the eye.

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Hyperopia: far-sightedness, a condition of the eye in which parallel rays are focused behind the retina and distant objects can be seen more distinctly than near ones. Children having more than one vision defect , diagnosed with any syndromes, undergoing extensive orthodontic treatment or had undergone extraction of permanent teeth were excluded.

All children were divided into three groups according to Angle's classification of malocclusion evaluated on their molar relation.

They were:
Class I : The mesio buccal cusp of the maxillary first moar occludes in the buccal groove of mandibular first permanent molar.
Class II: The disto-bucccal cusp of the upper first permanent molar occludes in the buccal groove of the lower first permanent molar.
Class III: The mesio-buccal cusp of the maxillary first permanent molar occludes in the interdental space between the mandibular first and second molars.
The occurence rates of vision defect were calculated as percentages of the total sample.

RESULTS

From the examination it was found that myopia was more prevalent than hyperopia among the children. From among five hundred children 293 did not have any vision problems (Table No.1).

	Myopia	Heteropia	No Defects	Total
CLASS I	75	37	167	279
CLASS II	59	17	69	145
CLASS III	16	3	57	076
TOTAL	150	57	293	500

Table No.1: Number of individual with Angle's Class I, Class II and Class III having myopia and heteropia

Malocclusion	Vision Defects In %	
	MYOPIA	HETEROPIA
CLASS I	26.88	13.26
CLASS II	40.69	11.72
CLASS III	21.05	3.94

Table No.2: Occurrence rates of myopia and heteropia in different malocclusion groups

40.69% of children having class II malocclusion had myopia where as 21.05% of children having class III malocclusion had myopia. On the other hand 11.72% of children having class II malocclusion had hyperopia and 3.94% of children having class III malocclusion had hyperopia. 26.88% of children having class I malocclusion had myopia where as 13.26% had hyperopia. From the results it can be noted that children with class II malocclusion had a higher prevalence of myopia and there was slightly higher prevalence of hyperopia in children with class I malocclusion. The occurrence rates are tabulated in Table No.2.

DISCUSSION

From a clinical point of view many studies have shown the relationship among dental occlusion, the occulomotor system and the visual stabilization. Evidence for a correlation between eyes and dental occlusion came from the use of mandibular orthopedic repositioning appliances, which simultaneously modify mandibular position and visual focusing tests using prismatic bars.[12] SharfiMilani et al described the effects of occlusal modification caused by a mandibular orthopaedic repositioning appliance on visual focussing.[13] These phenomena gradually disappear after removal of the appliance. Many studies conducted by Monaco et al showed the presence of a relationship between malocclusions, temperomandibular disorders and visual defects remarking a higher prevalence of myopia in patient with Class II malocclusion than in patients with Class I and Class III malocclusions.

In our study, 54.6% of the children didnot report any vision problems. The prevalence of myopia was more in children with Class II malocclusion and hyperopia was more in children with Class I malocclusion which was in accordance to another study.[13]

Skeletal pattern may attribute to an altered development of the structures linked with the vision.For example, recent studies demonstrated that deformational posterior plagiocephaly can affect visual development in a quantifiable manner and, in children with nonsyndromic craniosynostosis, the presence and severity of visual impairment is related to the type of craniosynostosis.[14,15] In addition it can be postulated that the association between vision defects and orthodontic malocclusion can be the result of some global developmental delay and that a vision defect which can alter the postural system can affect the growth of skeletodental structures also.[16] However more studies are required to draw the conclusion regarding the mechanisms that supports the findings probably with a bigger sample size and beter evaluation means.

CONCLUSION

Based on this study's results, the following conclusions can be made: A) The prevalence of myopia was higher in Class II malocclusions. B)The prevalence of hyperopia was higher in Class I malocclusions.

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