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Early Assessment of Risk of Malocclusion Using Baby - Roma Index In Indian Population

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Abstract

Context: Preventive therapies in Orthodontics aim at promoting a physiological development of a good occlusion and avoid the progress of a malocclusion. An index, which assesses the need of orthodontic treatment in primary dentition, when a wide variety of skeletal, dental and functional factors, if unobserved, could adversely influence occlusion and craniofacial growth, is needed.

Aims: to test the Baby-ROMA index, in a sample of 4- 6 year aged children, never treated before with orthodontic appliances

Settings and Design: A cross-sectional and was carried out by applying the Baby ROMA index on a sample of children visiting department of Pedodontics and Preventive Dentistry. The sample included 200 children, 4-6 years old had been referred by pediatric Department to Department of Orthodontics and Dentofacial Orthopaedics for assessment.

Methods and Material: Risk prevalence and the prevalence of each risk factor were calculated from reading obtained the prevalence of treatment need for each degree of risk and for each index value was calculated

Statistical analysis used: The statistical evaluation of the reproducibility of the index was performed using Kappa test to correlate the data. The risk prevalence and the prevalence of each risk factor were then calculated. Furthermore the prevalence of treatment need for each degree of risk and for each index value was calculated.

Results: 68% of patients presented malocclusion and crossbite had highest prevalence, followed by tooth decay and early loss of deciduous teeth

Conclusions: The Baby-ROMA index assesses risk that a malocclusion observed in young children may worsen over time and affect oral health and function. It is important to identify risk of developing malocclusion and to determine whether patient needs interceptive orthodontic treatment at early age.

Keywords: Baby Roma; Malocclusion; Indian Population

Key message: Need for early orthodontic intervention assessed by Baby Roma Index

Introduction

Occlusal indices are used to rank malocclusion and identify the individuals in special need for orthodontic treatment, on the grounds of the potential damages malocclusion might cause [Taylor, 1993]. They are introduced to minimize the subjective component of diagnosis and assessment of the malocclusion.[1] A number of orthodontic treatments need indices have been introduced with the aim of identifying the individuals with a greater need for therapy on the basis of the potential damage that the detected malocclusion may cause [Taylor, 1993]. Such systems are usually limited to estimating the incidence of the different problems observed and attributing to each of them a score based on the need for immediate treatments. Many indices have been used to estimate the prevalence of malocclusion and the amount of individuals in need of orthodontic treatment in a population [Tausche et al., 2004; Soh e Sandham, 2004; Soh et al., 2005; Mandall et al., 2005; Richmond et al., 2005; Bernabe e Flores-Mir, 2006; Souames et al., 2006; Josefsson et al., 2007]. The ROMA Index - Risk Of Malocclusion Assessment Index [Russo et al., 1998] - is a tool to assess treatment need in young patients. It was developed reviewing and modifying the dental and occlusal parameters of DHC with the addition of items related to skeletal and functional problems, to identify the risk of worsening of the malocclusion during growth. Taking into account the negative effects of malocclusion on both the dento-skeletal apparatus and on psycho-social wellbeing, the index identifies five grades, ranked in increasing order of malocclusion severity, or rather, according to whether there is a higher or lower risk of dysfunction. Each degree of risk calls for a more or less urgent intervention. In ROMA index additional entries were then added for skeletal and functional problems, likely aiming to represent additional risk factors for incorrect orofacial development in children. ROMA index is able to substitute IOTN (DHC) as a mean of measuring orthodontic treatment need in cases of growing children in deciduous and mixed dentition, offering the possibility to estimate if skeletal and functional problems inhibiting normal growth and establish when orthopedic or orthodontic treatment should start.[2]

Treatment of dental crowding and malocclusions is normally initiated after referral of a child at the age of 10–12 years, i.e. during the second period of the mixed dentition when a canine erupts or an increase in overjet becomes noticeable to the patient and parents. However, patients with discrepancies in occlusion, impairment of voluntary movement, and abnormalities in tooth number require earlier intervention (Miotti, 1991). In these cases, early intervention performs a similar function to interceptive orthodontics by preventing progression to the full form of a given disorder and excluding factors

interfering with the regular development of the dental arches. For estimation of the need for early intervention, data on the incidence of malocclusions and their progression is required; together with information on the validity of treatment need (Foster, 1980). There are still insufficient reliable data on the negative functional and psychosocial effects of malocclusion to permit true scientific validation of different indices of orthodontic treatment need (Burden and Holmes, 1994). Therefore an index, which assesses the need of orthodontic treatment in primary dentition, when a wide variety of skeletal, dental and functional factors, if unobserved, could adversely influence occlusion and craniofacial growth, is needed. The ROMA index (Risk of Malocclusion Assessment Index) [Russo et al., 1998], was set up for mixed and permanent dentitions in growing patients and evaluates skeletal and functional aspects of a malocclusion. The ROMA index was validated [Grippaudo et al., 2007] and tested on a large sample of Italian children 9-13 aged [Grippaudo et al., 2008 and 2013]. The authors had modified the ROMA Index and targeted on the age of primary dentition (Baby-ROMA Index). The aim of the Baby-ROMA Index is early diagnosis and treatment of malocclusion at an early stage of development.[1]

Baby Roma Index

The Baby-ROMA index is quick and easy to use at the first visit. It measures occlusal parameters, skeletal and functional factors that may represent negative risks for a physiological development of the orofacial region (Table 1), and indicates the need of preventive or interceptive orthodontic treatment in a score scale. The Baby-ROMA Index is divided into four main categories of problems: systemic, craniofacial, dental and functional. Each category has a number which corresponds to the risk severity and an alphabet letter for each different type of malocclusions (Table 1).

The Baby-ROMA index gives indications regarding timing for orthodontic therapy:

• Scores of 4 and 5 require an immediate orthodontic treatment.

• Score of 3 indicates the presence of a malocclusion which can persist or worsen, therefore patients will be assessed again before the growth spurt.

• Scores of 1 and 2 need only routine check-ups to monitor the occlusion score 2 is more exposed to the action of risk factors.

Subjects and Methods

The aim of the study was to test the Baby-ROMA index, in a sample of 4- 6 year aged children, never treated before with orthodontic appliances and visiting Department Of Pedodontics And Preventive Dentistry. The study is done in Department Of Orthodontics And Dentofacial Orthopaedics, Bhojia Dental College coupled with Department Of Pedodontics And Preventive Dentistry. The study also aimed at evaluating:

1. The ease of use and the reproducibility of the index;
2. An epidemiologic evaluation of the main orthodontic problems of children referred for orthodontic assessment.

The study is cross-sectional and was carried out by applying the Baby ROMA index on a sample of children visiting department of Pedodontics and Preventive Dentistry, Bhojia Dental college for various irregularities in dentition. The sample included 200 children, 4-6 years old and in full primary dentition, who had been referred by Pediatric Department to Department of Orthodontics and Dentofacial Orthopaedics for orthodontic assessment. To verify the reproducibility of the index, the intra-examiner and inter-examiner reproducibility were calculated. The intra-examiner reproducibility was tested comparing the data of 20 children examined by the same operator twice at one month interval. The inter-examiners reproducibility was tested with the data of the same group

of 20 children collected by another operator. The statistical evaluation of the reproducibility of the index was performed using Kappa test to correlate the data [Cohen, 1960]. The risk prevalence and the prevalence of each risk factor were then calculated. Furthermore the prevalence of treatment need for each degree of risk and for each index value was calculated.

Results

High correlation between operators was observed and analyzed using K test. The results of K test suggested that BABY ROMA is highly reproducible and has inter examiner and intra examiner reliability.

Results showed that 68% of patients are affected by malocclusion. Out of which 1.5% had a score of 5; 35% had a score of 4; 12.2% had a score of 3 and 19.30% had a score of 2 as depicted in figure 1.

On individual scale, the highest prevalence (17.5%) was recorded of crossbite >2mm or lateral shift. The second highest prevalence was recorded that of caries and early loss of deciduous teeth – 15.2%. Following this was cross bite<2mm or no lateral shift-6.5%. Maxillary hyperplasia / mandibular hypoplasia amounted to 5.7 %, oral breathing -5.2% and thumb/finger sucking habit- 4.8%.Poor oral hygiene accounted for 2.8% and hypodontia (more than 2 teeth) was 2.3%. The prevalence of all the other factors was less than 2%. (Figure 2)

Discussion

The passage from primary to early mixed dentition is often susceptible to changes which can be caused by a variety of factors and may interfere with a normal occlusion. A correct timing when to start an orthodontic therapy is essential for the treatment to be most effective in the shortest time and with the lowest cost possible.[3] The development of the dentition in children aged between 4 and 6 years is characterized by a wide range of variations. This variability concerned both the eruption of teeth and their alignment. Obviously this was paralleled by an age related variation in the development of disorders.[4] The prevalence of orthodontic problems can be assessed in terms of the number of individuals who are believed to require treatment. For this reason, a malocclusion index has to distinguish subjects with the highest scores and priority for treatment, from those with lower scores and a less urgent need. Therefore, a meaningful cut-off point along the index must be established.[5] The establishment of a relationship between the registered onset of orthodontic treatment and disorders inhibiting growth of the alveolar bone and development of the dentition reflects, on the one hand, the lack of validity of the indices used to estimate treatment need but, on the other hand, shows that most orthodontists fail to take account of the potential progression of malocclusions at this early stage .The lag effect is also reflected in the proportion of children affected by crossbite, mandibular prognathism and the presence of asymmetries with a functional shift up to the age of 9 years.[4]

According to AAPD guidelines, in Early-to-mid mixed dentition stage; Treatment consideration should address: (a) habits; (b) arch length shortage; (c) intervention for crowded incisors; (d) intervention for ectopic teeth; (e) holding of leeway space; (f) crossbites; (g) surgical needs; and (h) adverse skeletal growth. Intervention for ectopic teeth may include extractions of primary teeth and space maintenance/regaining to aid eruption of succedenous teeth and reduce the risk of need for permanent tooth extraction or surgical bracket placement for orthodontic traction. Treatment should take advantage of high rates of growth and should be aimed at prevention of adverse dental relationships and skeletal growth.[6]

Crossbites should be treated as soon as they are detected, because a purely dental malocclusion may lead to growth problems and skeletal deviations if left untreated.[7] This is

especially true in posterior crossbites caused by a functional shift. These crossbites should be corrected as soon as they are discovered, even in the deciduous dentition.[8] Anterior crossbites are best treated at an early age, because the upper incisor may traumatically occlude with the lower incisor, potentially giving rise to adverse periodontal problems, mobility and fracture.[9]

Untreated carious primary teeth create a risk for malocclusion by shortening the dental arch either through breakdown of interproximal surfaces or loss of these teeth.[10] Premature loss of primary teeth is regarded as the most common local factor leading to a malocclusion.[11]Early tooth loss could eventually create a space shortage if the remaining teeth drift into the leeway space.[8]

The identification of an abnormal habit and the assessment of its potential immediate and long-term effects on the craniofacial complex and dentition should be made as early as possible. The dentist should evaluate habit frequency, duration, and intensity in all patients with habits. Intervention to terminate the habit should be initiated if indicated.[12]

Addressing problems in the mixed dentition offers several benefits. First, children at this age are often more attentive and cooperative than adolescent patients.[13] Second, early treatment of deleterious habits, such as digit sucking and tongue thrusting, is recommended after 8 years of age as it can simultaneously improve speech impediments due to the open bite, which often develops as a result of oral habits.[14]

Historically, orthodontic treatment was provided mainly for adolescents. Interest continues to be expressed in the concept of interceptive (early) treatment as well as in adult treatment. Treatment and timing options for the growing patient, especially in the mixed dentition and early permanent dentition, have increased and continue to be evaluated by the research community.[15, 16, 17] Many clinicians seek to modify skeletal, muscular, and dentoalveolar abnormalities before the eruption of the full permanent dentition.[18]

Guidance of eruption and development of the primary, mixed, and permanent dentitions is an integral component of comprehensive oral health care for all pediatric dental patients. Such guidance should contribute to the development of a permanent dentition that is in a stable, functional, and esthetically acceptable occlusion and normal subsequent dentofacial development. Early diagnosis and successful treatment of developing malocclusions can have both short-term and long-term benefits while achieving the goals of occlusal harmony and function and dentofacial esthetics.[19, 20] Orthodontists have the responsibility to recognize, diagnose, and manage or refer abnormalities in the developing dentition as dictated by the complexity of the problem and the individual clinician's training, knowledge, and experience.

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Legend Table and Figures

Table 1: Baby Roma index

Systemic Problems	Maxillofacial trauma	With condylar fracture	5a
		Without condylar fracture	5b
	Congenital Syndromes/ Malformations		5b
	Postural/ Orthopaedic Problems		2c
	Medical or Auxological Conditions		2d
	Inheritance of malocclusion		2e
Craniofacial problems	Facial or Mandibular Asymmetries		4f
	TMJ dysfunctions		4g
	Outcomes of trauma or Surgery		5j
	Maxillary Hypoplasia /Mandibular Hyperplasia	OVJ<0	4k
		OVJ>0	2k
Dental problems	Maxillary Hyperplasia/ Mandibular Hypoplasia	OVJ>6mm	3h
		3mm<OVJ<6mm	2h
	Caries and Early Loss of Deciduous Teeth		4l
	Scissor bite		4m
	Cross bite	>2mm or lateral shift	4n
		<2mm or no lateral shift	2n
	Displacement	>2mm displacement	2o
		>1mm – absence of diastema	2o
	Open bite	>4mm	3p
		>2mm	2p
	Hypodontia	Up to 2 teeth	3q
		More than 2 teeth	4q
	Supernumerary teeth		2q
	OVB> 5mm		2r
	Poor oral hygiene		2t
Functional problems	Para functions (bruxism, jaw clenching)		2v
	Thumb/finger Sucking Habit		2w
	Oral breathing / OSAS		2x
None of the above			N

Figure 1

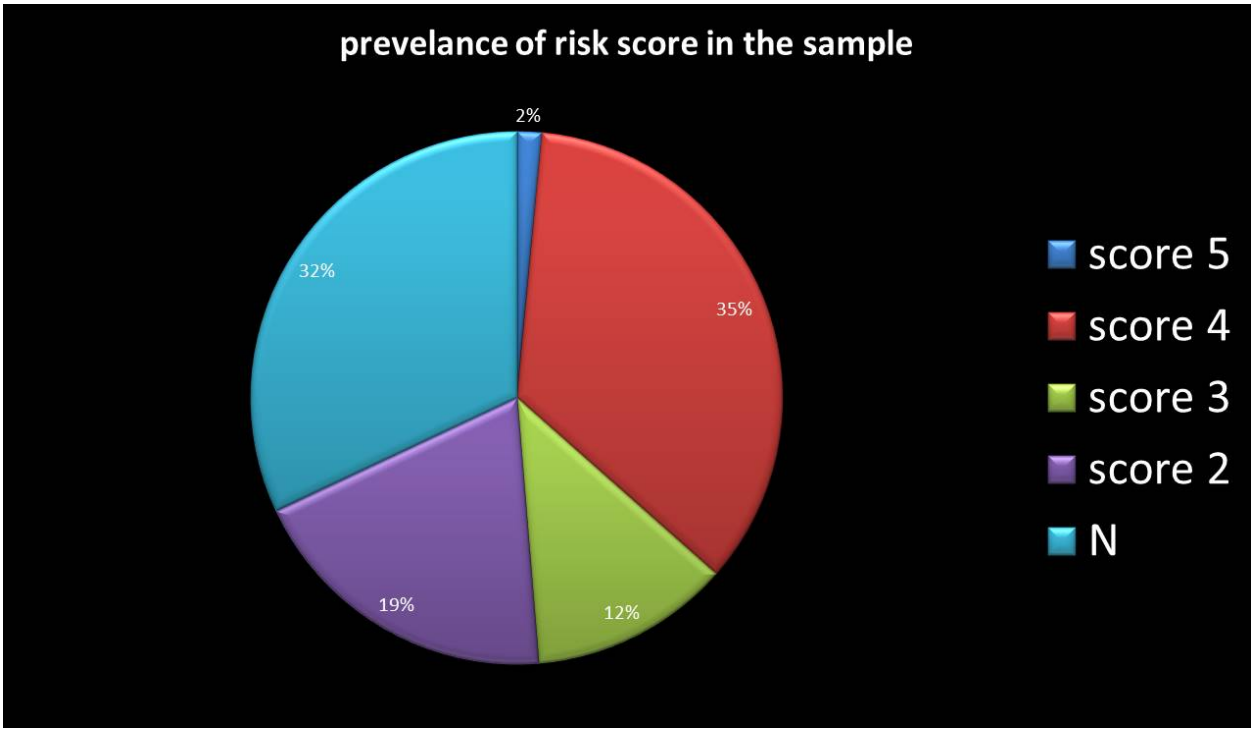

Figure 2