



## **Assessment of Malocclusion and Orthodontic Treatment Needs in 3-6 years old school going children using Baby ROMA scale**

**Dr. Aishwarya Kailasrao Shelar**, PG Student, Department of Paediatrics and Preventive Dentistry, Saraswati Dhanwantari Dental College, Hospital and Research Institute, Parbhani – Maharashtra

**Dr. Rajesh Aduri**, Head of Department, Department of Paediatrics and Preventive Dentistry, Saraswati Dental College, Hospital and Research Institute, Parbhani – Maharashtra

**Dr. Rehan Khan**, Associate Professor, Department of Paediatrics and Preventive Dentistry, Saraswati Dhanwantari Dental College, Hospital and Research Institute, Parbhani – Maharashtra

**Dr. Parikshit S. Kadam**, Senior Lecturer, Department of Paediatrics and Preventive Dentistry, Saraswati Dhanwantari Dental College, Hospital and Research Institute, Parbhani – Maharashtra

**Dr. Dinesh M. Khandare**, PG Student, Department of Paediatrics and Preventive Dentistry, Saraswati Dhanwantari Dental College, Hospital and Research Institute, Parbhani – Maharashtra

**Dr. Meenal S. Pande**, PG Student, Department of Paediatrics and Preventive Dentistry, Saraswati Dhanwantari Dental College, Hospital and Research Institute, Parbhani – Maharashtra

**Corresponding address: Dr. Aishwarya Kailasrao Shelar**, PG Student, Department of Paediatrics and Preventive Dentistry, Saraswati Dhanwantari Dental College, Hospital and Research Institute, Parbhani – Maharashtra

---

### **Abstract**

**Background:** Malocclusion is third most common condition encountered in children after dental caries and trauma. It's prevalence ranges between 39% to 93%. It can also influence the psychological development of children. The new Index of Baby-ROMA, primarily characterized for primary dentition, is fast, sensitive and reliable for diagnosing and prioritizing orthodontic treatment needs.

**Aim:** Aim of this paper is to assess malocclusion and Orthodontic Treatment Needs in 3-6 years old school going children using Baby ROMA scale.

**Materials and Methods:** 220 children were examined according to BABY ROMA INDEX. The extraoral and intraoral examination was done. A proforma was prepared which contains

personal details such as name, gender, age and scoring was given according to index.

**Result:** Score 2 (36.8 %), score 3 (68%), score 4 (16.4%), score 5 (1.47%) as per Baby ROMA scale.

**Conclusion:** The prevalence of malocclusion was 61.4%. The most common finding in this study were crowding, Caries and early loss of deciduous teeth followed by deep bite and cross bite.

**Keywords:** Malocclusion, Primary Dentition, Baby Roma Scale, Orthodontic Treatment Need

---

**Introduction:** Malocclusion is defined as an abnormal occlusion in which teeth are not in a normal position in relation to adjacent teeth in the same jaw and the opposing teeth when the jaws are closed<sup>1</sup>. Malocclusion may occur in any of the three planes of spaces: anteroposterior, vertical or transverse<sup>2</sup>. Malocclusion one of the most important oral health problems, after caries and periodontal disease. It's prevalence is highly variable and is estimated to be between 39% to 93% in children and adolescents. This prevalence range is very wide and heterogeneous.

Etiology, that causes malocclusion, can affect different organs such as teeth, bone tissue and/or neuromuscular components. According to Moyers, the etiology of malocclusion is categorised into six categories: hereditary, developmental cause of unknown origin, trauma, physical agents, habit and diseases, Whereas, Proffit classified the etiology of malocclusion into three categories, which are specific causes of malocclusion, environmental influences and genetic influences<sup>3,4</sup>

Several factors related to malocclusion, such as anterior crowding, midline malalignment and facial asymmetry, have strong effects on the perception of facial esthetics. Thus, factors influence the psychological development of children and adolescents which in turn, influence social acceptance and self-perception. The impact of dental appearance varies among the sexes, age groups, socioeconomic groups and according to the cultural standards of beauty. Thus, it seems to have different psychological impacts between the sexes in their perceptions of facial and dental appearance<sup>5</sup>

Interceptive orthodontic therapies are performed in order to restore a normal occlusion once a malocclusion has developed. However, the majority of malocclusions can be prevented and corrected at an early stage<sup>6</sup>. Many indices have been proposed earlier for diagnosing the conditions.

The Index for Preventive and Interceptive Orthodontic Need (IPION) is a valuable tool for preventing malocclusion in children 6–9 years of age. 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. This index has been modified to the new Index of Baby-ROMA, primarily characterized for primary dentition and it is fast, sensitive and reliable for diagnosing and prioritizing orthodontic treatment needs. However very few studies have been carried out using this Index in Indian population particularly in this region of India.

Thus, this study was designed with an aim to assess the prevalence of malocclusion & orthodontic treatment needs in Baby Roma Index in early stage in primary dentition for early diagnosing & treatment of malocclusion.

**Materials and Methods:** This study was designed as a cross-sectional in Department of pediatric and preventive dentistry carried out by applying the Baby R.O.M.A. Index (Table 1) examining 220 children: (118 males and 102 females) of age 3-6 years. In detail, 58 were patients of the Department of pedodontics and preventive Dentistry. The remaining 162 were primary school students. None of them had previously undergone orthodontic treatment. Study design was explained to parents, school headmasters to obtain legal permissions to conduct the study. This study was carried out early after obtaining necessary clearance from Institutional Ethical committee and written consent from parent and school Authorities.

Scores were calculated according to timing for orthodontic therapy where scores of 1 and 2 needed only routine check-ups to monitor the occlusion, while score 3 was exposed to the action of risk factors. Score of 3 indicated the presence of a malocclusion which can persist or worsen; therefore, patients should be assessed again before the growth spurt. While the scores of 4 and 5 indicated for an immediate orthodontic treatment.

Data were recorded and tabulated in excel sheet in MS Excel. Statistical analysis was performed using Statistical Product and Service Solutions (SPSS) version 21 for Windows (Armonk, NY:IBM corp). Descriptive qualitative data expressed in percentage/proportion respectively. Data normality was checked by using Shapiro – Wilk test.

**Results:** Results showed that 61% of patients were affected by malocclusion (Fig.1): 1.4% had a score of 5; 16.4% had a score of 4; 6.8% had a score of 3 and 36.8% had a score of 2 and remaining 38.6 % were normal (Fig. 2).

Females affected (70.58%) more than Male (53.39%) which was highly significant.

(Fig.3)

The risk factors with higher prevalence were overbite up to >5 mm (8.6%) and tooth decay and early loss of deciduous teeth (8.2%). The prevalence of oral breathing was 3.6%; the prevalence of overjet between 3 and 6 mm was 2.7% and overjet greater than 6 mm was 1.4%; the prevalence of open bite more than 2 mm was 2.3% and more than 4 mm was 2.3%. Also, bad habits and increased overbite were found in 4.1% of children, scissorbite was seen in 2.7%. However, prevalence of parafunction was 6.8% while thumb sucking habit was seen in 3.6%. The remaining scores in the index have a prevalence of less than 2% (Fig. 4).

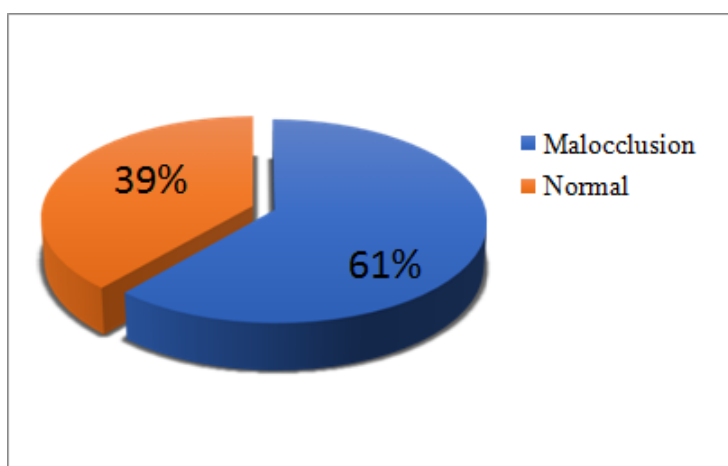


Fig. 1 Prevalence of malocclusion in 3–6 years old children

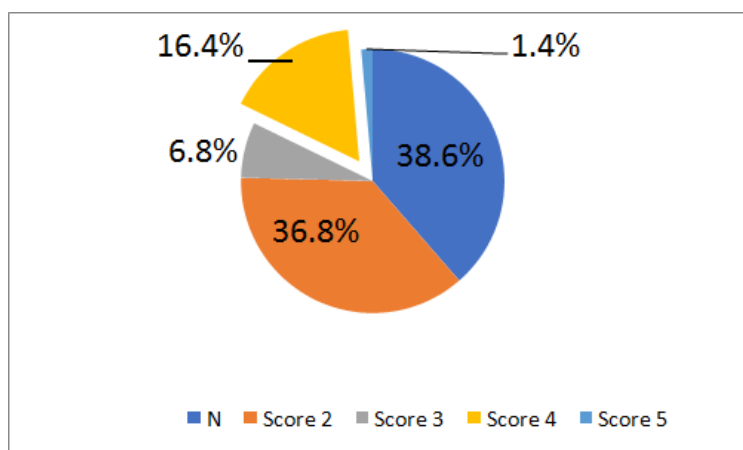


Fig 2. Prevalence in percentage of risk scores in the sample

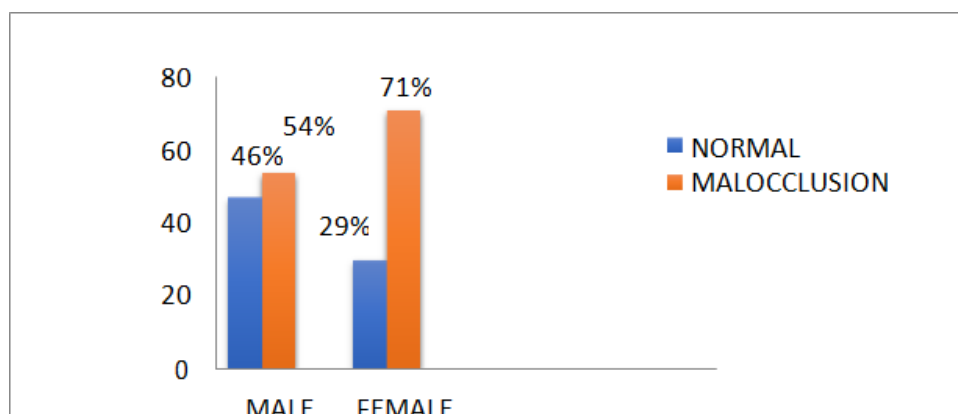


Fig 3. Gender-wise prevalence of malocclusion

**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. According to literature, some of the occlusal characteristics on primary dentition persist in mixed dentition: children with a malocclusion in primary dentition (posterior crossbite, increased overjet, etc) present higher risks of having a malocclusion in early mixed dentition [Góis, 2012].

Authors [Thilander et al, 1984; Far nik et al., 1988; Korpar et al., 1994; Trotman and Elsbach, 1996; Tschill et al., 1997; Thilander et al , 2001; Ovsenik et al., 2004] concluded that early orthodontic treatments would be beneficial and desirable especially to enhance skeletal and dental discrepancies and correct habits, dysfunction and malocclusion in their early stages, and especially transverse discrepancies which may cause temporo-mandibular joint problems or facial asymmetry [Franchi et al., 2004; Kurol, 2006; Proffit, 2006].

Early orthodontic therapies also help to prevent traumatic dental injuries of maxillary incisors when they are protruding and can reduce the severity of a skeletal malocclusion and therefore the need of orthognathic surgery in adult age.

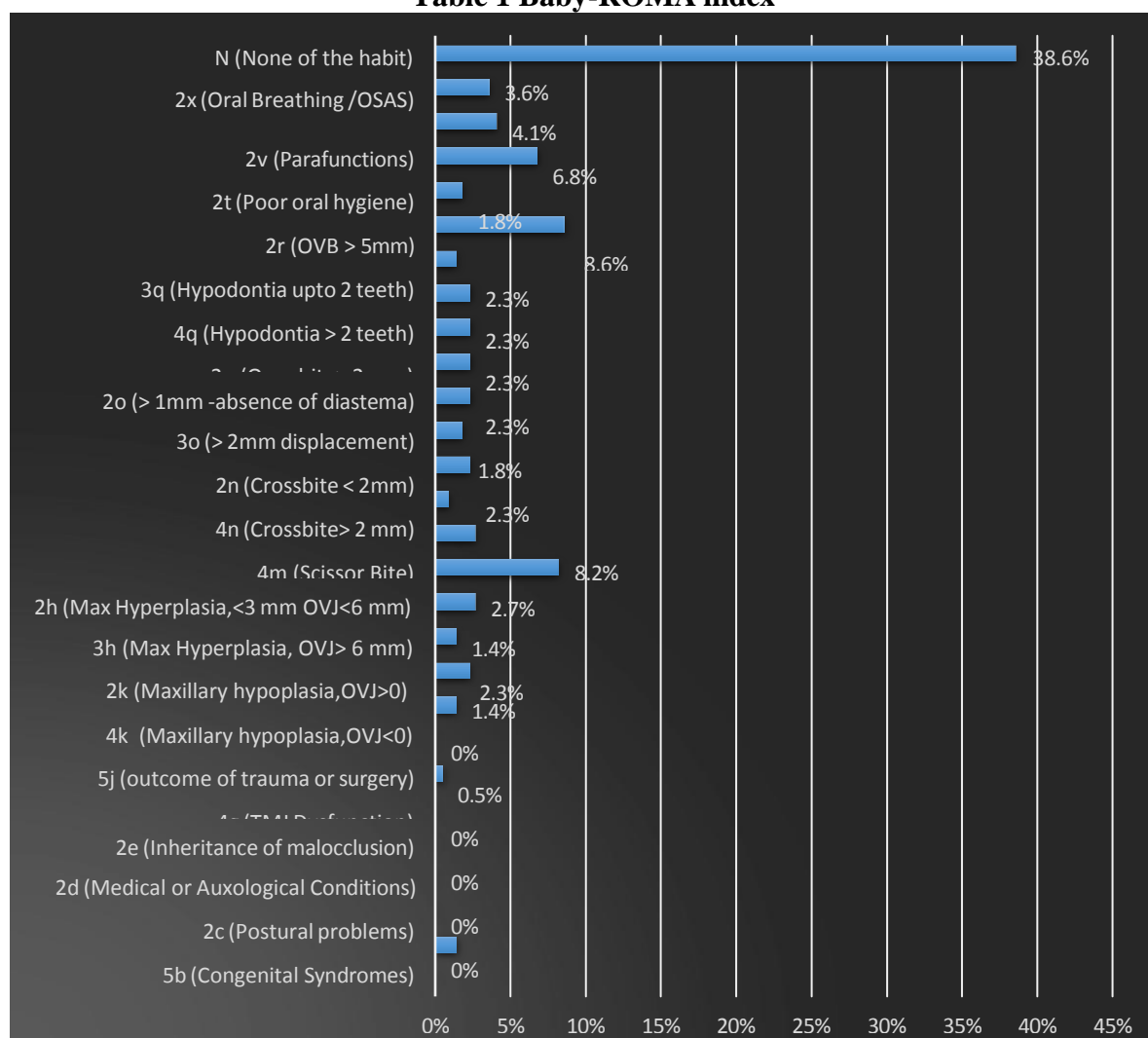
The results of our study showed that 39.6% of the sample was not affected by malocclusion.17.8% of children needed orthodontic therapy (score 4 and 5) and 43.6% had a malocclusion that might persist or worsen with growth (grades 2 and 3). Females (70.58%) were affected more than Males (53.39%). However According to Zheng and Farrokh no gender differences in malocclusion was noted. Most frequent malocclusion detected in the

study was crowding. Caries and early loss of deciduous teeth, were also prevalent followed by deepbite and crossbite. According to Asiry and Alshahrani, the most prevalent malocclusion trait was crowding (26.6%), followed by spacing (20.6%), increased overjet (19.5%) which is in accordance in our study. While Grippaudo, reported increased overbite was the most common occlusal abnormality, Perrotta *et al.* reported that posterior crossbite was observed in 12% of children while according to Singh A, the most frequent malocclusions detected in the children aged 3–6 years were with caries and early loss of deciduous teeth (37.7%)

<b>Problems</b>	
<b>Systemic problems</b>	
<b>Maxillofacial trauma</b>	
With condylar fracture	5a
Without condylar fracture	2a
Congenital syndromes / malformations	5b
postural orthopedic problems	2c
Medical / auxological problems	2d
Inheritance of malocclusion	2e
<b>Craniofacial problems</b>	
Facial / mandibular asymmetries	4f
TMJ dysfunction	4g
Outcomes of trauma / surgery of the craniofacial region	5j
Maxillary hypoplasia /mandibular hyperplasia	
OVJ <0	4k
OVJ >0	2k
Maxillary hyperplasia / mandibular hypoplasia	
OVJ > 6 mm	3h
3 mm < OVJ < 6 mm	2h
<b>Dental problems</b>	
Caries and early loss of deciduous teeth	4l
Scissors bite	4m
Cross bite	
>2mm or lateral shift	4n
<2mm or no lateral shift	2n
Displacement	
>2mm displacement	3o
>1mm – absence of diastema	2o

Open bite	
>4 mm	3p
>2 mm	2p
Hypodontia	
Up to 2 teeth	3q
>2 teeth	4q
<b>Functional problems</b>	
Supernumerary teeth	4q
OVB > 5mm	2r
Poor oral hygiene	2t
Parafunctions ( bruxism, jaw clenching )	2v
Thumb / finger sucking habit	2w
Oral breathing / OSAS	2x
<b>None</b>	

**Table 1 Baby-ROMA index**



**Fig 4: Prevalence of the Baby – ROMA index values in the sample**

According to Zheng Z, Luo Q (2006) 31.5% of children required immediate orthodontic treatment and 18.5% needed evaluation and routine occlusion follow ups before puberty. While according to Farrokh Gisour (2016) 24.1% of children required immediate orthodontic treatment and 34.3% had an intermediate need for orthodontic treatment by using Baby Roma Index.

In the preventive phase orthodontic treatments are not expensive, often have a short duration and use simple devices: besides the lower therapeutic costs they provide important advantages in terms of children oral health. The new index proposed, the Baby-ROMA index, can be used by paediatricians with the aim of detecting the malocclusions which may need an early interception.

**Conclusion:** Baby R.O.M.A. index is a new tool, created to evaluate the priorities of orthodontic treatment in primary dentition. The prevalence of malocclusion was 61.4%. Females prevalence was more with most common finding were Crowding, Caries and early loss of deciduous teeth followed by deep bite and cross bite. According to Baby R.O.M.A 17.8% children needed immediate treatment and 43.6% little or no treatment with periodic observation.

### **References**

1. Davies SJ. Malocclusion—a term in need of dropping or redefinition?. *British Dental Journal*. 2007 May;202(9):519-20.
2. Hassan R, Rahimah AK. Occlusion, malocclusion and method of measurements-an overview. *Archives of orofacial sciences*. 2007;2:3-9.
3. Cenzato N, Nobili A, Maspero C. Prevalence of dental malocclusions in different geographical areas: Scoping review. *Dentistry Journal*. 2021 Oct 11;9(10):117.
4. Moyers RE. *Handbook of orthodontics*. Year Book Medical Pub; 1988.
5. Taibah SM, Al-Hummayani FM. Effect of malocclusion on the self-esteem of adolescents. *Journal of orthodontic science*. 2017 Oct;6(4):123.
6. Grippaudo, C., Paolantonio, E.G., Pantanali, F.R.A.N.C.E.S.C.A., Antonini, G.I.U.L.I.A. and Deli, R., 2014. Early orthodontic treatment: a new index to assess the risk of malocclusion in primary dentition. *Eur J Paediatr Dent*, 15(4), pp.401-6.
7. Golovachova E, Mikadze T, Kalandadze M. Overview of prevalence of malocclusions in primary dentition. *Caucasus Journal of Health Sciences and Public Health*.



2018;2(3):1-4.

8. Singh, A., Rathore, M., Govil, S., Umale, V., Kulshrestha, R. and Kolhe, T., 2021. Prevalence of Malocclusion and Orthodontic Treatment Needs in Primary and Mixed Dentition Using Baby Roma Index and Index of Orthodontic Treatment Needs. *International Journal of Clinical Pediatric Dentistry*, 14(Suppl 1), p.S22.
9. Farrokh Gisour E, Rezayi M, Bayani S. Evaluating the need to preventive Orthodontic treatment in Kerman school children using iotn, roma and coas indices in 2014. *Int J BiolPharm Allied Sci* 2016;5:2008-17
10. Perrotta S, Bucci R, Simeon V, Martina S, Michelotti A, Valletta, R. Prevalence of malocclusion, oral parafunctions and temporomandibular disorder-pain in Italian schoolchildren: An epidemiological study. *J Oral Rehabil* 2019;46:611-6
11. Asiry M, AlShahrani I. Prevalence of malocclusion among school children of Southern Saudi Arabia. *J Orthod Sci* 2019;8:2
12. Zheng Z, Luo Q. The prevalence of malocclusion among juvenile and children in Guiyang city, Guizhou province. *J Guizhou Med* 2006;30:82-3.
13. Lu S, Fang H, Cai Z, Haofeng J, Jinhua W. Prevalence of malocclusion in primary dentition in mainland China, 1988–2017: A systematic. *Sci Rep* 2018;8:4716. [doi: 10.1038/s41598-018-22900-x
14. Lew K, Foong W, Loh E. Malocclusion prevalence in an ethnic Chinese populations. *Aust Dent J* 1993;38:442-9.
15. Akbari M, Lankarani KB, Honarvar B, Tabrizi R, Mirhadi H, Moosazadeh M. Prevalence of malocclusion among Iranian children: A systematic review and meta-analysis. *Dent Res J (Isfahan)* 2016;13:387-95.