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ORIGINAL RESEARCH

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Assessment of early orthodontic treatment needs in children aged 4–6 using the baby-risk of malocclusion assessment (Baby-ROMA) index

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Abstract

Background: This study aimed to assess the prevalence of malocclusion and orthodontic treatment needs using the Baby-ROMA index in a group of Turkish children aged 4–6 years, and to examine the association between Baby-ROMA index scores and demographic and dental characteristics. **Methods**: A total of 203 children aged 4–6 years with primary dentition and no previous orthodontic treatment were included. Demographic data and parental perceptions of orthodontic treatment need were collected via interviews. Clinical examinations were performed using the Baby-ROMA index, and dental caries status was assessed using the decayed, missing and filled teeth (dmft) index. The presence of primate spaces, molar relationships, and canine relationships were also recorded. **Results**: The most prevalent risk factors for malocclusion were parafunctional habits (27.6%), poor oral hygiene (27.1%), and dental caries or early loss of primary teeth (25.1%). The results indicated statistically significant differences in Baby-ROMA index scores based on age groups ($p = 0.004$), right molar relationship ($p = 0.019$) and dmft scores ($p < 0.001$). Despite these findings, 76.2% of parents did not perceive any orthodontic treatment need for their children. **Conclusions**: Our findings demonstrate a high prevalence of malocclusion risk and orthodontic treatment needs among Turkish children aged 4–6 years. The results highlight the importance of early intervention and preventive strategies to address key risk factors, such as parafunctional habits, dental caries and poor oral hygiene.

Keywords

Malocclusion; Primary teeth; Treatment need; Baby-ROMA

1. Introduction

Malocclusion is a common condition that may have significant impacts on oral health, aesthetics and oral health-related quality of life [1]. In more severe cases, it can result in functional impairments [2]. Early diagnosis and interceptive orthodontic treatments can halt the progress of malocclusion and facilitate optimal occlusal development. Such treatments are effective and desirable since they are less expensive, less invasive and have a relatively short duration [3].

Determining the ideal timing for orthodontic therapy and accurately assessing orthodontic treatment need are important in order to achieve effective treatment outcomes in the shortest possible time and at the lowest cost [4]. Hence, several orthodontic treatment need indexes are used to assess and categorize the severity of malocclusion, guide orthodontic treatment planning and facilitate optimal patient care. These indexes are also needed for countrywide epidemiologic studies to help build appropriate health policies [5].

At present, various indexes, including the Index of Orthodontic Treatment Need (IOTN) [6], the Dental Aesthetic Index (DAI) [7], the Risk of Malocclusion Assessment Index (ROMA index) and the Occlusal Index (OI) [8] are used to determine the malocclusion and orthodontic treatment need. With the exception of the OI, these indexes are targeted on mixed or permanent dentition. Although the OI is based on primary dentition, it overlooks both skeletal and functional problems and it also presents challenges in terms of data collection [9]. Studies have shown that malocclusion in primary dentition can predict the orthodontic treatment need in mixed and/or permanent dentition [10, 11]. Therefore, children with an apparent malocclusion in primary dentition should be frequently monitored with a simple and reliable method. The Baby-ROMA Index was developed as an adaptation of the original ROMA index, which was introduced by Russo *et al.* [12] in 1998 to evaluate skeletal and functional aspects of malocclusion in children with mixed or permanent dentition. The ROMA index was subsequently validated and applied to large cohorts of Italian children aged 9–13 years [12]. Recognizing the need for an index tailored to the primary dentition (when numerous skeletal, dental, and functional factors may adversely affect occlusion and craniofacial development if left

unmonitored) the authors later modified the original index to create the Baby-ROMA. The Baby-ROMA index is intended to support early diagnosis of malocclusion risk and guide timely preventive or interceptive orthodontic interventions during the earliest stages of development. It can also indicate preventive or interceptive orthodontic treatment need by using a scored scale [4].

In the literature, the prevalence of malocclusion varies from country to country. Grippaudo *et al.* [13] reported that the prevalence of malocclusion is 71% among the Italian children aged between 2–7 years. Another study in which Baby-ROMA index was used showed that 31.6% of Iranian children aged 4–6 years had one type of malocclusion [14]. Despite the presence of studies in the literature investigating the prevalence of malocclusion in pre-schoolers using Baby-ROMA index, studies about the association between factors such as dental caries, molar-canine relationship, and presence of primate spaces with orthodontic treatment needs are limited. Therefore, the present study aimed:

- To assess the prevalence of malocclusion and orthodontic treatment need using Baby-ROMA index in a group of Turkish children aged 4–6 years.
- To assess the association between the Baby-ROMA index scores and demographic and dental characteristics in a group of Turkish children aged 4–6 years.

The null hypothesis was that there are no statistically significant differences in the dental characteristics of children with different Baby-ROMA index scores.

2. Materials and methods

2.1 Study participants

This cross-sectional observational research protocol was approved by the ethical committee of the Faculty of Dentistry at Ankara Yıldırım Beyazıt University (protocol number: 2023-140) and was performed in full accordance with Declaration of Helsinki, as revised in 2013.

The recruitment process and identification of eligible participants took place between April 2023 and July 2023. The participants consisted of patients who visit Department of Pediatric Dentistry at the Faculty of Dentistry at Ankara Yıldırım Beyazıt University. The inclusion criteria were as follows: (i) children aged between 4 and 6 years; (ii) children with primary dentition; (iii) children who had not previously received any orthodontic treatment. All subjects who had any permanent tooth eruption, had previously received orthodontic treatment and who refused to participate in the study were excluded. Overall, 203 volunteers were included in the study. Each parent/guardian indicated their agreement to participate by signing a consent form while the children provided their verbal consent.

2.2 Data collection

Demographic data and parent-perceived orthodontic treatment need were obtained by interviews prior to clinical examination. Parents were asked whether their children needed orthodontic treatment. Subsequently, all participants were examined according to Baby-ROMA index (Table 1) by a single calibrated operator with seven years of clinical experience (ECT) using a mirror and probe on a dental chair. Dental caries status was evaluated using the decayed, missing and filled teeth (dmft) index. The presence of primate spaces, molar relationship and canine relationship were also recorded.

The Baby-ROMA index is categorized into four main groups: Systemic, craniofacial, dental and functional (Table 1). Each group is assigned a number indicating severity and a letter representing distinct types of malocclusions. The Baby-ROMA index provides indicators regarding the optimal timing for orthodontic treatment: Scores 4 and 5 require an immediate orthodontic therapy; score 3 indicates the presence of a malocclusion which has potential to persist or worsen; therefore, patients need to be assessed again prior to the onset of the growth spurt; scores 1 and 2 need only routine check-ups to monitor the occlusion, with score 2 indicating more exposure to the action of risk factors.

In the functional problems section of the Baby-ROMA index, bruxism was identified based on parental reports of audible teeth grinding during sleep. Oral breathing/OSAS (Obstructive Sleep Apnea Syndrome) (2x) were assessed by asking parents whether their child snored or breathed through the mouth when resting. Poor oral hygiene (2t) was recorded if visible plaque was present on the child's teeth and parents reported a brushing frequency of less than once per day. Overbite and overjet were systematically measured for all participants during the clinical examination by a single calibrated examiner using a dental calliper and ruler. These measurements were recorded in millimetres and documented in the appropriate section of the Baby-ROMA index form.

2.3 Statistical analysis

With a 0.5 effect size, 90% power and 0.05 margin of error, the total sample size was found to be n = 172 with G*Power program 3.1 (Heinrich Heine University Düsseldorf, Düsseldorf, NRW, Germany) [15]. Statistical analysis of the data was performed with the IBM SPSS version 20 package program (IBM Corp., Armonk, NY, USA). Descriptive statistics were expressed as mean and standard deviation for discrete numerical variables, while categorical variables were expressed as percentages (%). Either the Pearson Chi-Square test or the Kruskal-Wallis test were used to compare index results with different parameters including age groups, gender, dmft, molar relationship, canine relationship, presence of primate spaces and parent-perceived treatment need. The most influential factors in distinguishing between the group with a Baby-ROMA score of 1–2 and the group with a Baby-ROMA score of 3, as well as between the group with a Baby-ROMA score of 1–2 and the group with a Baby-ROMA score of 4, were determined through multinomial logistic regression analysis. All variables identified through univariate statistical analyses with a significance level of $p < 0.025$ were included as candidate risk factors in the multinomial logistic regression model.

TABLE 1. Baby-ROMA index.

Main categories of problems	The specific feature of malocclusion	Risk Score (Number) Malocclusion Type (Letter)
Systemic problems		
Maxillo-facial trauma	With condylar fracture	5a
	Without condylar fracture	2b
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 of the cranio-facial district		5j
Maxillary hypoplasia/Mandibular hyperplasia	OVJ <0 mm	4k
	OVJ >0 mm	2k
Dental problems		
Maxillary hyperplasia/Mandibular hypoplasia	OVJ >6 mm	3h
	3 mm < OVJ < 6 mm	2h
Caries and early loss of deciduous teeth		4I
Scissor bite		4m
Crossbite	>2 mm or lateral shift	4n
	<2 mm or no lateral shift	2n
Displacement	>2 mm displacement	3o
	>1 mm—absence of diastema	2o
Open bite	>4 mm	3p
	>2 mm	2p
Hypodontia	Up to 2 teeth	3q
	More than 2 teeth	4q
Supernumerary teeth		4q
OVB >5 mm		2r
Poor oral hygiene		2t
Functional Problems		
Parafunctions (bruxism, jaw clenching)		2v
Thumb/finger sucking habit		2w
Oral breathing/OSAS		2x
None of the problems listed above		N

Each category has a number which corresponds to the risk severity and an alphabet letter for each different type of malocclusions. TMJ: Temporomandibular joint; OVJ: Overjet; OVB: Overbite; OSAS: Obstructive Sleep Apnea Syndrome.

3. Results

A total of 203 children aged between 4–6 years participated in the study. The demographic variables and dental characteristics of study population are presented in Table 2. The mean age was 4.6 and 55.2% of the participants were female. The most prevalent molar and canine relationship on both sides was flush terminal plane (63.5% on the right and 68% on the left) and Class I relation (69% on the right and 71.9% on the left), respectively.

The intra-examiner correlation was assessed using replicate examinations of 30 subjects at a 20-day interval. The kappa value for the Baby-ROMA index was 0.782, indicating a high level of reproducibility. In addition, the reliability for other clinical variables, including dmft scores, molar relationship and canine relationship was also tested, yielding a kappa value of 0.798, confirming consistent intra-examiner agreement across all assessments. The results showed that 80.8% of the participants exhibited conditions associated with an increased risk of developing malocclusion. 50.3% had score

TABLE 2. Characteristics of the study population.

Variables		N	%	Mean ± SD
Gender				
	Female	112	55.2	
	Male	91	44.8	
Age				4.6 ± 0.04
dmft				8.6 ± 0.33
Molar relationship (Right)				
	Flush terminal plane	129	63.5	
	Mesial step	61	30.0	
	Distal step	13	6.4	
Molar relationship (Left)				
	Flush terminal plane	138	67.9	
	Mesial step	58	28.6	
	Distal step	7	3.4	
Canine relationship (Right)				
	Class I	140	68.9	
	Class II	18	8.9	
	Class III	45	22.2	
Canine relationship (Left)				
	Class I	146	71.9	
	Class II	16	7.9	
	Class III	41	20.2	
Presence of primate spaces				
	Yes	130	64.0	
	No	73	35.9	
Parent-perceived orthodontic treatment need				
	Yes	48	23.6	
	No	155	76.4	

dmft: decayed, missing and filled teeth; SD: standard deviation.

2, 3.4% had score 3 and 27.1% had score 4 (Fig. 1). No participant had a Baby-ROMA index score of 5. On the basis of these results, it is important to emphasize that not all the participants within the 80.8% prevalence required immediate intervention. The Baby-ROMA index stratifies malocclusion severity and recommends treatment only for specific cases, depending on the risk level.

The most common risk factors for malocclusion were parafunctions such as bruxism or jaw clenching (2v) (27.6%), poor oral hygiene (2t) (27.1%), caries and early loss of deciduous teeth (4l) (25.1%) and oral breathing/OSAS (2x) (19.7%). The prevalence of inheritance of malocclusion and overbite greater than 5 mm (2e and 2r) were 7.9%. Also, class III malocclusion with negative overjet (4k) and cross-bite up to 2 mm (2n) were found in 6.9% and 6.4% of children, respectively. The remaining scores in the index had a prevalence of less than 5% (Fig. 2).

Percentages of parent-perceived orthodontic treatment need are presented in Table 3. Among the parents of children who have malocclusion risk, a substantial proportion (76.2%) reported that their children did not require orthodontic treatment.

Table 4 illustrates the association between Baby-ROMA index scores and gender and dental characteristics, as well as parent-perceived treatment need. The results indicate that there were statistically significant differences in the index scores based on age groups ($p = 0.004$), right molar relationship ($p = 0.019$), and dmft ($p < 0.001$).

According to the multinomial logistic regression analysis (Table 5), age and dmft score were identified as statistically significant predictors in differentiating between the reference group (index scores 2) and higher risk groups (score 3 and score 4). Specifically, for children with an index score of 4, both increasing age (Odds Ratio (OR) = 2.17, 95% Confidence Interval (CI) = 1.30–3.65, $p = 0.003$) and higher dmft scores (OR = 1.12, 95% CI = 1.12–1.32, $p < 0.001$) were significantly associated with greater risk. No statistically significant predictors were found for index score 3.

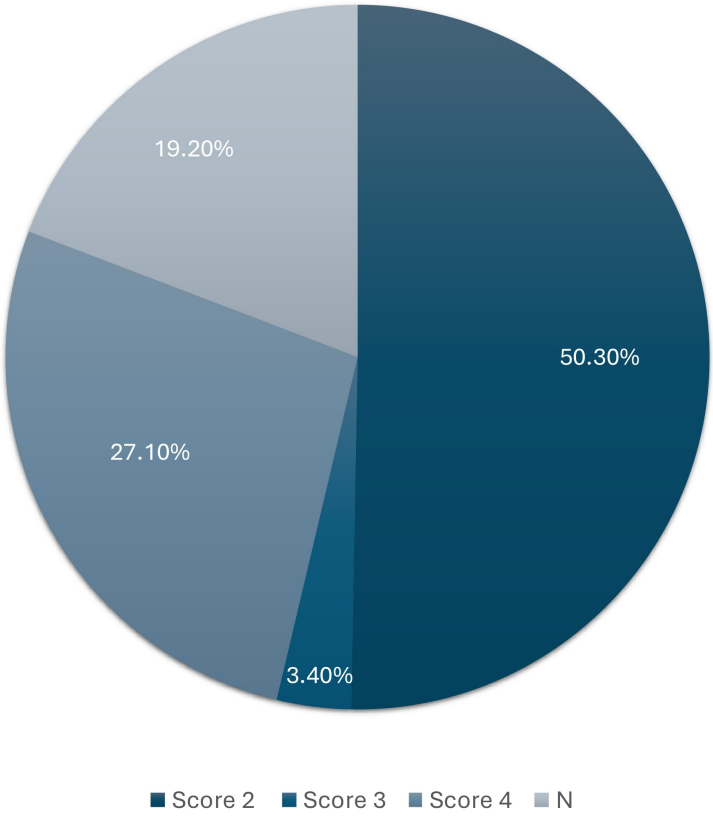

FIGURE 1. Prevalence in percentage of the risk score in study population.

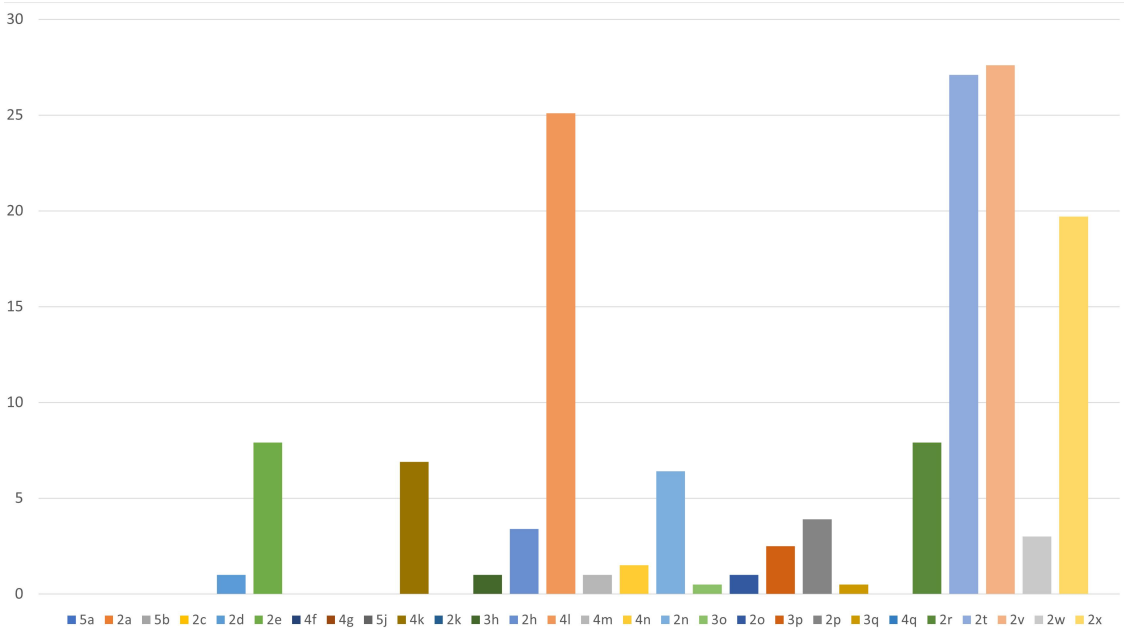

FIGURE 2. Prevalence of the Baby-ROMA index values in the study population.

TABLE 3. Distribution of parent-perceived orthodontic treatment need by the presence of malocclusion risk based on Baby-ROMA index.

Parent-perceived orthodontic treatment need	Malocclusion risk exists		Normal	
	n	%	n	%
Yes	39	23.8%	9	23.1%
No	125	76.2%	30	76.9%

TABLE 4. Association between Baby-ROMA index scores and gender, dental characteristics and parent-perceived treatment need.

	Index score 2	Index score 3	Index score 4	*p* value
Gender (n)				
Female	78	2	32	0.332*
Male	63	5	23	
Age (n)				
4-year-old	70	2	17	
5-year-old	63	4	25	**0.004***
6-year-old	8	1	13	
Right molar relationship (n)				
Flush terminal plane	88	4	37	
Mesial step	48	3	10	**0.019***
Distal step	5	0	8	
Left molar relationship (n)				
Flush terminal plane	97	4	37	
Mesial step	42	3	13	0.085*
Distal step	2	0	5	
Right canine relationship (n)				
Class I	102	3	35	
Class II	9	1	8	0.217*
Class III	30	3	12	
Left canine relationship (n)				
Class I	104	4	38	
Class II	9	0	7	0.305*
Class III	28	3	10	
Primate spaces (n)				
Yes	86	3	41	0.102*
No	55	4	14	
dmft (mean)	7.58	7.1	11.4	<**0.001**¶
Parent-perceived orthodontic treatment need (n)				
Yes	34	2	12	0.899*
No	107	5	43	

**Chi-square.*
¶Kruskall-Wallis.
Bold p values indicate statistically significant difference.
dmft: decayed, missing and filled teeth.

TABLE 5. Factors influencing the Baby-ROMA index score increment from reference scores 2 to score 3 and score 4.

	OR	95% CI	Wald	*p*-value*
Score 3				
Intercept			4.369	0.037
Age	2.165	0.656–7.113	1.612	0.205
dmft	0.961	0.797–1.158	0.176	0.674
Right molar relationship	1.053	0.295–3.768	0.006	0.936
Score 4				
Intercept			22.198	<**0.001**
Age	2.176	1.299–3.645	8.889	**0.003**
dmft	1.120	1.120–1.324	21.606	<**0.001**
Right molar relationship	1.271	0.731–2.208	0.723	0.395

**Multinomial Logistic Regression.*
Bold p values indicate statistically significant difference.
OR: Odds Ratio; CI: Confidence Interval; dmft: decayed, missing and filled teeth.

4. Discussion

In the present study, the Baby-ROMA index showed that there is a high prevalence of malocclusion risk and high need for orthodontic treatment within the Turkish paediatric population. Moreover, dmft and age seemed to have an impact on the Baby-ROMA treatment need scores. Therefore, the null hypothesis was rejected.

To the best of the authors' knowledge, this is the first study to use Baby-ROMA index to explore the prevalence of potential risk factors for orthodontic disorders in children within the Turkish population. In the study, the most common risk factor for malocclusion was parafunctions (bruxism, jaw clenching) (2v) (27.6%). A systematic review reported that prevalence of bruxism varies from 5.9% to 49.6% among children aged between 0 and 12 years [16]. In another study, bruxism was identified in 20.7% of children between 0 and 6 years old [17]. Discrepancies in the prevalence of bruxism may stem from differences in participants' socioeconomic statuses, cultural backgrounds and the diagnostic criteria for identifying bruxism. In the present study, the predominant risk factors after bruxism were identified as poor oral hygiene (2t) (27.1%) as well as caries and early loss of deciduous teeth (4l) (25.1%). In the literature, studies utilizing the Baby-ROMA index have demonstrated variations in the prevalence of caries and early loss of deciduous teeth. For instance, in Italian children, the prevalence of caries and early loss of deciduous teeth was observed to be 14.5% [4], whereas in a study conducted by Singh *et al.* [18] among Indian children, this rate was found to be 37.7%, and in a study by Jahanimoghadam *et al.* [14] among Iranian children, it was observed to be 7.5%. The mean dmft score in our sample was 8.6, which is considerably higher than the national averages reported for Turkish children aged 5 years, where mean scores typically range from 3.6 to 3.7 [19]. This suggests a substantial caries burden in our study population. Given that the children included in this study had already sought dental care at a paediatric dental clinic, it is plausible that the prevalence of poor oral hygiene, along with the associated rates of dental caries and early loss of primary teeth, may have been relatively elevated. Additionally, regional factors such as dietary habits, exposure to fluoride, and oral hygiene practices may have influenced the prevalence of caries. Premature loss of deciduous teeth can lead to space loss and crowding in mixed and permanent dentition and, if left untreated, these may require complex orthodontic treatments [20]. Moreover, proximal cavities in primary molars may also have an impact on the space loss in dental arches [21]. Therefore, it is crucial to prevent early primary molar loss and its associated consequences on arch length. Several strategies can be employed for this purpose, such as maintaining good oral hygiene, restoring interproximal cavities or utilizing space maintainers [22].

In the current study, the prevalence of oral breathing/OSAS (2x) was determined to be 19.7%, consistent with the 22.8% reported in Grippaudo *et al.*'s [13] study. Mouth breathing is an important issue and has been found to be strongly associated with an increased or reduced overjet, anterior or posterior crossbite, open bite and displacement of contact points [23]. If left untreated, children with chronic mouth breathing may develop several morphological disorders, including maxillary constriction [24]. Therefore, early detection and management of mouth breathing play a vital role in ensuring the healthy development of dentofacial structures and functions.

The prevalence of inherited malocclusion (2e) and overbite greater than 5 mm (2r) was 7.9%. Using the Baby-Roma index, Jahanimoghadam *et al.* [14] reported an inherited malocclusion prevalence of 8%, aligning with our findings, while Grippaudo C. *et al.* [4] found a prevalence of 0%. Regarding increased overbite, both studies reported lower prevalence rates of less than 5%, specifically 1.9% and 3%, respectively. These differences may be attributed to variations in the participants' ethnic and cultural backgrounds.

Class III malocclusion with negative overjet (4k) and crossbite up to 2 mm (4n) were observed in 6.9% and 6.4% of the children, respectively. While, Italian children exhibited a higher prevalence, with 24.5% for crossbite up to 2 mm and 12% for class III malocclusion with negative overjet [4], Jahanimoghadam *et al.* [14] reported a prevalence of 1.7% for both conditions. This difference may be attributed to the participants in Grippaudo *et al.*'s [4] study, who were patients referred by paediatricians for orthodontic assessment.

In the present study, none of the participants had a Baby-ROMA score of 5. This may be attributed to the rarity of the conditions classified under index score 5, such as maxillofacial trauma with condylar fracture (5a), congenital syndromes or malformations (5b), and outcomes of trauma or surgery involving the craniofacial region (5j). These conditions are relatively uncommon in the general paediatric population. For instance, Grippaudo *et al.* [13] reported that index score 5 was poorly represented, with only 0.3% of 1405 children falling into this category.

It is crucial to interpret certain occlusal features observed in the primary dentition with caution, as some may reflect normal developmental stages rather than true malocclusion. For instance, the flush terminal plane was the most frequently observed molar relationship in our study, consistent with previous findings among Turkish preschool children [25]. Although this occlusal pattern is commonly classified within malocclusion indices, it often represents a transitional stage. Longitudinal studies have shown that more than half of children with a flush terminal plane in the primary dentition develop a Class I molar relationship in the permanent dentition, while the remainder may shift toward Class II [26]. Similarly, minor spacing or crowding and slight anterior open bite are also frequently encountered in early childhood and may resolve spontaneously with growth and dental eruption [27, 28]. Therefore, while the Baby-ROMA index appropriately flags these conditions as potential risk factors for future malocclusion, clinicians must exercise judgment in interpreting their clinical significance. Overemphasis on transient conditions can lead to unnecessary concern or overtreatment. A nuanced understanding of normal occlusal development is essential to distinguish between cases requiring early intervention and those that merely warrant observation over time.

No statistically significant relationship was found between the children's index scores and the parents' perception of the need for orthodontic treatment. This discrepancy may be attributed to several factors, including limited awareness of early

orthodontic indicators, varying levels of parental education and socioeconomic status. In many cases, parents may not recognize subtle occlusal deviations as problematic or may prioritize treatment only in the presence of aesthetic concerns. To bridge this gap, strategies such as early orthodontic consultations, community-based educational campaigns, and the distribution of accessible printed or digital informational materials could be implemented to improve parental understanding and promote timely intervention when necessary [29, 30]. These resources should include caries prevention strategies, such as oral hygiene instruction and topical fluoride use, and provide guidance on habit-breaking appliances and space maintainers.

The findings of the multinomial logistic regression analysis highlight the critical roles of age (OR = 2.17; 95% CI = 1.29–3.64) and the dmft (OR = 1.12; 95% CI = 1.12–1.32) score as key determinants in differentiating between groups with lower and higher index scores. The OR of 2.17 for age suggests that with each additional year, the odds of being in a higher-risk group (score 4) increase by more than two-fold. This trend may reflect the cumulative impact of untreated oral health issues and prolonged exposure to risk factors such as parafunctional habits, poor oral hygiene or environmental influences. Similarly, the dmft score showed a significant association with higher Baby-ROMA scores. An OR of 1.12 indicates that for each unit increase in the dmft score, the likelihood of falling into the higher-risk group rises by 12%. This reinforces the critical link between caries experience and orthodontic treatment need. A high dmft may indicate poor oral health maintenance, premature loss of primary teeth and subsequent occlusal disturbances. Together, these findings suggest that dmft score and age can serve as early indicators of more severe malocclusion risk in primary dentition. These insights support the need for integrated preventive strategies focusing on oral hygiene and early dental visits, particularly as children approach the later years of primary dentition.

Unlike earlier studies conducted in Italy, Iran and India, this study also examined associations with specific dental characteristics such as dmft scores, molar and canine relationships, and parental perception of treatment need. These additions provide a more comprehensive understanding of risk factors in primary dentition and highlight areas for targeted early intervention. Although the present study provides valuable data regarding the orthodontic treatment needs of children with primary dentition, one of its limitations is that it was conducted exclusively on patients attending for routine check-ups at the paediatric dentistry clinic. Furthermore, data on participants' socioeconomic background and geographic origin were not collected, limiting the generalizability of the findings. To obtain more representative and objective data, further studies involving more diverse populations are required. While the Baby-ROMA index is advantageous in terms of evaluating primary dentition, it has some limitations compared to established indices like the IOTN and DAI, which are considered the gold standards for assessing malocclusion. Unlike the Baby-ROMA, these indices also incorporate an aesthetic component. Further prospective studies are needed to evaluate the predictive validity of the Baby-ROMA index.

5. Conclusions

This study highlights the high prevalence (80.8%) of malocclusion risk and the significant orthodontic treatment needs among Turkish children aged 4–6 years, as assessed using the Baby-ROMA index. The primary risk factors included parafunctional habits, inadequate oral hygiene, dental caries, early loss of primary teeth and oral breathing/obstructive sleep apnea syndrome, all of which are manageable through appropriate interventions. Furthermore, the study underlines the need to raise parental awareness about orthodontic needs and the benefits of early detection and treatment. Within the limitations of this study, it can be concluded that the Baby-ROMA index demonstrated its practicality and ease of use in evaluating early orthodontic treatment needs.

AVAILABILITY OF DATA AND MATERIALS

The data presented in this study are available on reasonable request from the corresponding author.

AUTHOR CONTRIBUTIONS

NY and ECT—designed the research study. ECT—performed the research. EGA and EGEA—analyzed the data. NY and EGEA—wrote the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved the ethics committee of the Faculty of Dentistry at Ankara Yıldırım Beyazıt University (protocol number: 2023-140) and was performed in full accordance with Declaration of Helsinki, as revised in 2013. Each parent/guardian indicated their agreement to participate by signing a consent form, while the children provided their verbal consent.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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