Submitted: 15 December, 2025 Accepted: 09 March, 2026 Online Published: 08 April, 2026 DOI:10.22514/jocpd.2026.054

ORIGINAL RESEARCH

Journal of Clinical Pediatric Dentistry

Assessment of dental anxiety using the Child Drawing: Hospital scale and oral health-related quality of life in children diagnosed with Familial Mediterranean Fever

Alem Coşgun[1,*], Halenur Altan[2], Burcu Bölükbaşı Akgül[3], Merve Tatar[1], Müzeyyen Dilşah Demiray[2]

[1]Department of Pediatric Dentistry, Faculty of Dentistry, Tokat Gaziosmanpaşa University, 60100 Tokat, Turkey
[2]Department of Pediatric Dentistry, Faculty of Dentistry, Necmettin Erbakan University, 42090 Konya, Turkey
[3]Pediatric Dentistry Clinic, Dent Hekim Dental Clinic, 34490 Istanbul, Turkey

***Correspondence**
alem.cosgun@gop.edu.tr
(Alem Coşgun)

Abstract

Background: The assessment of dental anxiety in pediatric patients is essential for achieving successful dental treatment as it may negatively impact oral health-related quality of life (OHRQoL). This cross-sectional clinical observational study aimed to compare dental anxiety levels, assessed using the Child Drawing: Hospital (CD:H) scale, and OHRQoL between children diagnosed with Familial Mediterranean Fever (FMF) at an early stage and healthy controls. **Methods**: This study included 37 children aged 8–12 years diagnosed with FMF and 37 healthy children as controls. Their behavior during dental examination was evaluated using the Frankl Behavior Rating Scale, and their anxiety was assessed at the end of the examination using drawings interpreted with the CD:H scale. Dental anxiety and fear were measured with the Dental Anxiety and Fear Scale (IDAF-4C), and OHRQoL was assessed using the Child Oral Health Impact Profile-Short Form 19 (COHIP-SF19). Decayed, missing, filled teeth (DMFT/dmft) indices of all children were recorded. Disease severity in children with FMF was determined using the Modified Pras Severity Score based on symptoms reported in the patient history. Data were analyzed using Jamovi, and statistical significance was defined as $p < 0.05$. **Results**: There were no statistically significant differences between children with FMF and healthy controls in CD:H, COHIP-SF19, IDAF-4C, DMFT/dmft, or Frankl scores (all $p > 0.05$). Frankl scores were negatively correlated with IDAF-4C scores ($\rho = -0.355$, $p = 0.002$). CD:H scores were negatively correlated with COHIP-SF19 scores ($\rho = -0.241$, $p = 0.039$). Among children with FMF, Pras severity scores were negatively correlated with Frankl scores ($\rho = -0.341$, $p = 0.039$). **Conclusions**: Children diagnosed with FMF showed similar levels of dental anxiety, stress, behavior, and OHRQoL compared with healthy controls. This study offers a novel perspective for future research on psychological and behavioral aspects of chronic pediatric conditions in dentistry.

Keywords

Child Drawing: Hospital scale; Oral health-related quality of life; Dental anxiety; Familial Mediterranean Fever; Pediatric dentistry

1. Introduction

Familial Mediterranean Fever (FMF) is one of the most common autoinflammatory diseases worldwide. It is characterized by recurrent acute attacks lasting approximately 6–72 hours, which resolve spontaneously, and are typically accompanied by fever, peritonitis, pleurisy, pericarditis, arthritis, or erysipelas-like skin rashes [1].

The effects of chronic illnesses on children are not limited to physical symptoms as they also substantially affect psychological well-being, social functioning, and family dynamics [2, 3]. In a study by Gortmaker *et al.* [4], 10% of adolescents with chronic illness were reported to experience behavioral problems, such as social withdrawal, aggression, and depression, and psychiatric disorders were 1.55 times more common in these individuals than in healthy peers. Children with chronic illnesses and their parents have been reported to show greater depressive and anxiety symptom severity, and such psychosocial burden may directly influence healthcare access, treatment adherence, and the overall quality of clinical experiences [5].

Dental anxiety refers to fear- and anxiety-related responses that an individual develops towards dental procedures, and it is common in childhood [6]. This anxiety towards dental treatment may lead to postponement or even complete avoidance of care, resulting in serious consequences for oral

health [7, 8]. Evidence suggests that dental anxiety developed during childhood can persist into adulthood, thereby negatively influencing population-level oral health [9]. Therefore, early identification of dental anxiety in children is important for developing effective management and treatment approaches [10]. Furthermore, dental anxiety has been associated with poorer oral health-related quality of life (OHRQoL) in both pediatric and adult populations [11].

At present, there are various techniques that can be used to assess dental anxiety in children, including behavioral scoring, psychometric measures, physiological indicators, and projective techniques [12]. In projective techniques, the aim is to explore fear and anxiety by asking children to tell stories about purposefully designed pictures or to depict objects or living beings that they perceive as frightening. One such projective method, the Child Drawing: Hospital (CD:H) scale, enables children to express emotional states through drawings and has been used as an alternative approach for assessing dental anxiety [13]. In this method, the child is instructed to draw a picture of a person in a hospital setting, based on which a standardized procedure has been established to support consistent interpretation and scoring of the drawings, and recently, this method has been adopted in dentistry to evaluate dental anxiety [14–16].

Psychometric tests are among the most commonly used methods for assessing dental anxiety in children because they are easy to administer and standardized; however, the choice of instrument varies by age group. These methods are based on a question-and-answer format and depend on the child's ability to express themselves verbally [12]. One such instrument is the Dental Anxiety and Fear Scale (IDAF-4C+), developed by Armfield, which has been demonstrated to be a valid and reliable measure [17, 18].

Oral health-related quality of life (OHRQoL) is a multidimensional construct that assesses the impact of an individual's oral health on their daily life and is considered an integral part of overall health [19]. In children, one of the most commonly used instruments is the Child Oral Health Impact Profile (COHIP), which assesses oral health, functional status, and socio-emotional well-being. The short form (COHIP-SF19) offers practical advantages for clinical and epidemiological research [20].

In this prospective clinical observational study, we aim to compare dental anxiety levels using the CD:H scale, and OHRQoL between children diagnosed with FMF at an early stage and healthy controls.

2. Methods

2.1 Patient selection

This study comprised children aged 8–12 years who presented to the Department of Pedodontics, Faculty of Dentistry, Tokat Gaziosmanpaşa University, between 01 July and 03 October 2025, for routine dental examinations. Only dental examinations were performed in both groups. The study group consisted of children who were being followed with a diagnosis of FMF and who did not have any other systemic disease. The control group consisted of an equal number of systemically healthy children with similar age and gender to the study group, to facilitate balanced group comparisons. Both groups underwent only dental examinations.

The inclusion criteria for both groups were: parents and children who agreed to participate, children aged 8–12 years, and children with no mental or physical disabilities. For the study group, an additional inclusion criterion was that FMF patients were in an attack-free period at the time of evaluation.

The exclusion criteria for both groups consisted: parents and children who provided incomplete or no answers to the questions, children with color blindness, children who were unwilling to draw, and drawings that were not suitable for analysis (*i.e.*, drawings that did not conform to the drawing instructions specified in Section 2.3.2). For the study group, an additional exclusion criterion was children being followed with a diagnosis of FMF who had other systemic diseases.

A total of 100 children were initially recruited for this cross-sectional clinical observational comparison between children with FMF and healthy controls; however, only 74 were included in the final analysis after exclusions (Fig. 1).

2.2 Measurements

Their behavior during the dental examination was evaluated using the Frankl Behavior Rating Scale, while anxiety levels were assessed at the end of the examination through drawings interpreted with the CD:H scale. Dental anxiety and fear were measured using the IDAF-4C questionnaire, and oral health-related quality of life was assessed with the COHIP-SF19. The DMFT/dmft indices of all children were recorded. For children diagnosed with FMF, disease severity was determined based on symptoms obtained during anamnesis using the Modified PRAS Severity Score.

2.2.1 Frankl behaviour rating scale

For both the study and healthy groups, the children's behavior was observed during the examination, and at the end of the examination, each child's behavioral status was recorded using the Frankl Behavior Rating Scale (definitely negative, negative, positive, or definitely positive) [21].

2.2.2 Child Drawing: Hospital scale

After the examination, children in both the study and healthy groups were asked to draw a picture. Prior to drawing, the examiner instructed them as follows: "I examined your mouth today. Thinking about your experience and what happened during your visit, I would like you to draw a picture of me and you. You can use any of the crayons here. You can start drawing when you're ready and stop whenever you want. I'm not giving you a specific time. I want you to tell me when you think your drawing is finished.". The drawings were completed using A4 paper and crayons in eight colors (red, purple, blue, green, yellow, orange, black, and brown). The papers were collected once the drawing was finished (Fig. 2a–d). The drawings were evaluated by researchers (HA and MDD) trained and certified in Child Drawing Analysis. The evaluation process was based on the Child Drawing: Hospital (CD:H) scale, which consists of three parts:

- Section A includes 14 items (*e.g.*, location, action, figure

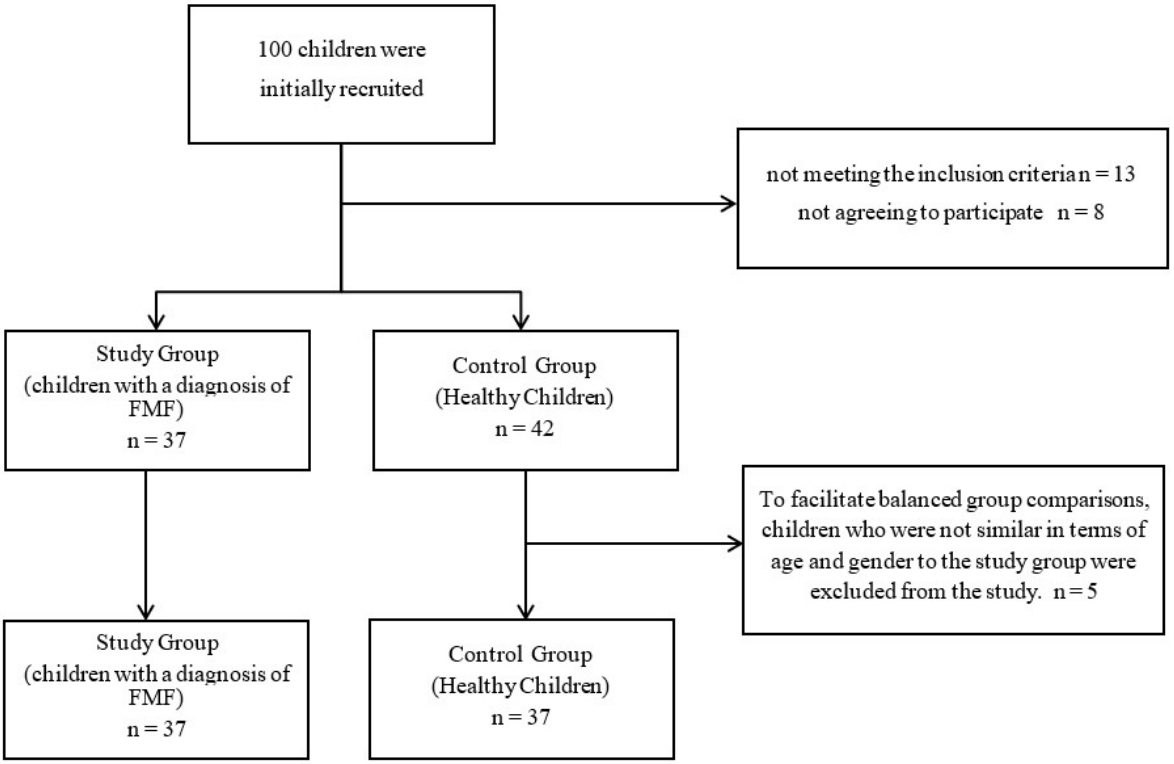

FIGURE 1. Study flow diagram and patient selection. FMF: Familial Mediterranean Fever.

FIGURE 2. Examples of children's drawings. (a) This picture indicates very low stress, and the CD:H score was 43. (b) This picture indicates low stress, and the CD:H score was 73. (c) This picture indicates average stress, and the CD:H score was 93. (d) This picture indicates average stress, and the CD:H score was 118.

size, facial expression, color use, and paper layout), with each item scored on a scale of 1–10.

- Section B includes 8 items regarded as pathological indicators; each indicator is assigned a score of 5 or 10, and a score of 0 is recorded if no symptoms are present.

- Section C is a "gestalt" score reflecting the child's general anxiety level and is scored on a scale of 1–10.

Children's anxiety levels were classified according to the total CD:H score as follows: scores ≤43 indicated very low stress, 44–83 low stress, 84–129 moderate stress, 130–167 above-average stress, and ≥168 very high stress [13], and this scale has been previously validated in Turkish settings by Özdemir *et al*. [14].

2.2.3 IDAF-4C+ dental anxiety scale

The Turkish version of the Dentist Anxiety and Fear Index (IDAF-4C+) was developed by Buldur *et al*. [17]. Based on the picture drawing, children in both the study and healthy groups were asked to complete the IDAF-4C questionnaire to assess dental anxiety and fear, and their responses to this five-point Likert-type questionnaire ranged from 1 (strongly disagree) to 5 (strongly agree). A mean score of 1.0–1.5 indicated "no or very little dental anxiety", 1.51–2.5 indicated "low", 2.51–3.5 indicated "moderate", and ≥3.5 indicated "high dental anxiety" [18].

2.2.4 Child oral health impact profile-short form 19

The COHIP-SF19 (Child Oral Health Impact Profile-Short Form 19) was administered to children in both the study and healthy groups. This scale consists of three subscales: oral health (5 items), functional health (4 items), and social-emotional well-being (10 items). The children were asked to rate problems related to their teeth, mouth, and face experienced over the past three months on a five-point Likert-type scale ranging from "never" to "almost always". The last two positively worded items were scored as stated, whereas the first 17 negatively worded items were reverse-scored to calculate the total score (range, 0–76) [20].

2.2.5 Severity of disease

The Modified Pras Disease Severity Score was used to determine FMF severity based on symptoms obtained during medical history collection for children in the study group. In this scoring system, disease severity is determined by the sum of scores assigned to each parameter. Total scores of 3–5 were classified as mild, 6–8 as moderate, and ≥9 as severe (Table 1) [22]. Hospitalization history due to FMF was also recorded for children in the study group.

2.3 Statistical analysis

Data were analyzed using Jamovi software, and statistical significance was set at $p < 0.05$. Normality was assessed using the Shapiro-Wilk test. Since the FMF group did not show a normal distribution ($p = 0.012$), non-parametric methods were used for group comparisons. Comparisons between children with FMF and healthy controls were performed using the Mann-Whitney U test for variables that were not normally distributed.

The relationships among behavioral outcomes (Frankl Behavior Rating Scale), Child Drawing: Hospital scale scores, dental anxiety (IDAF-4C), oral health-related quality of life (COHIP-SF19), caries experience (DMFT/dmft), and disease severity (Modified Pras Severity Score) were assessed using Spearman's rank correlation coefficients, given the ordinal and non-normally distributed nature of most variables.

3. Results

3.1 Demographic data

A total of 74 children were included in the study. The cohort comprised 39 boys (52.7%) and 35 girls (47.3%), with a mean age of 10.6 ± 1.97 years. There were 37 children (50%) with FMF in the study group and 37 healthy children (50%) in the healthy control group (Table 2).

3.2 Disease severity and hospitalization history data for children with FMF

Among the children with FMF, 24 (64.9%) had a history of hospitalization due to the disease, whereas 13 (35.1%) had not. Based on Pras disease severity scores, 16.2% of patients were classified as having mild disease, 67.6% as moderate, and 16.2% as severe (Table 3).

3.3 Frankl behaviour rating scores data

The mean Frankl score was 3.22 ± 0.75 in the FMF group and 3.16 ± 0.80 in the healthy group, with an overall mean of 3.19. These scores indicate predominantly positive behavior during the dental examination (Table 4).

3.4 IDAF-4C dental anxiety scale data

Analysis of the IDAF-4C scale showed no significant difference between children with FMF and healthy controls ($p = 0.658$). In both groups, most children were categorized as having mild dental anxiety (FMF: 54.1%; controls: 51.4%) (Table 4).

3.5 COHIP-SF19 data

The mean COHIP-SF19 score was 60.4 ± 7.38 in the FMF group and 63.4 ± 7.91 in the healthy group, and this difference was not statistically significant ($p = 0.09$) (Table 4).

3.6 DMFT/dmft data

The mean DMFT/dmft index was 5.57 ± 3.41 in the FMF group and 5.59 ± 3.09 in the healthy group, with no significant difference between the groups ($p = 0.841$) (Table 4).

3.7 Child Drawing: Hospital scale data

Analysis of the CD:H scale revealed no significant differences between children with FMF and healthy controls ($p = 0.665$). In both groups, most children were categorized as having low stress (FMF: 56.8%; controls: 54.1%). "Average stress" was observed slightly more frequently in the healthy group (35.1%) compared with the FMF group (27.0%), while "very

TABLE 1. FMF severity scoring systems.

Characteristics	Scores
Age of onset (yr)	
11–20	2
6–10	3
<6	4
Numbers of attacks per month	
<1	1
1–2	2
>2	3
Arthritis	
Acute	2
Protracted	3
Erysipelas-like erythema	2
Amyloidosis	3
Dose of colchicine	
Less than appropriate* dose	0
Appropriate dose	1
More than appropriate dose	2
Mild disease 3–5; Moderate disease 6–9; Severe disease >9	

**Starting colchicine doses for children <5 years 0.5 mg/day; 5–10 years 1.0 mg/day; >10 years 1.5 mg/day.*

TABLE 2. Distribution of demographic data by groups.

	FMF n (%)	Healthy n (%)	Total n (%)
Gender			
Female	19 (25.7%)	16 (21.6%)	35 (47.3%)
Male	18 (24.3%)	21 (28.4%)	39 (52.7%)
Age			
Mean ± SD	10.53 ± 1.84	10.65 ± 2.10	10.60 ± 1.97

n (%); Mean ± Standard Deviation (SD). FMF: Familial Mediterranean Fever.

TABLE 3. Distribution of disease severity and hospitalization data in children with FMF.

Variable	n (%)
Hospitalization history due to FMF	
Yes	24 (64.9%)
No	13 (35.1%)
Disease severity based on Pras score	
Mild	6 (16.2%)
Moderate	25 (67.6%)
Severe	6 (16.2%)
Pras Score (Mean ± SD)	6.89 ± 1.82

FMF: Familial Mediterranean Fever; SD: Standard Deviation.

TABLE 4. Distribution and Comparison of Frankl Behavior Rating Scale, CD:H, IDAF-4C, COHIP-SF19, DMFT/dmft categories data in children with FMF and healthy controls.

	FMF n (%)	Healthy n (%)	Total n (%)	*p*-value
Frankl Score				
Absolutely Negative	1 (1.4%)	1 (1.4%)	2 (2.7%)	
Negative	4 (5.4%)	6 (8.1%)	10 (13.5%)	
Positive	18 (24.3%)	16 (21.6%)	34 (45.9%)	0.915*
Absolutely Positive	14 (18.9%)	14 (18.9%)	28 (37.8%)	
Total (Mean ± SD)	3.22 ± 0.75	3.16 ± 0.80	3.19 ± 3.00	
CD:H Category				
Very low stress	6 (16.2%)	4 (10.8%)	10 (13.5%)	
Low stress	21 (56.8%)	20 (54.1%)	41 (55.4%)	0.665*
Average stress	10 (27.0%)	13 (35.1%)	23 (31.1%)	
Total (Mean ± SD)	2.11 ± 0.65	2.24 ± 0.64	2.18 ± 2.00	
IDAF-4C Category				
No or Minimal Dental Anxiety	8 (21.6%)	5 (13.5%)	13 (17.6%)	
Mild Dental Anxiety	20 (54.1%)	19 (51.4%)	39 (52.7%)	
Moderate Dental Anxiety	7 (18.8%)	11 (29.7%)	18 (24.3%)	0.658*
High Dental Anxiety	2 (5.4%)	2 (5.4%)	4 (5.4%)	
Total (Mean ± SD)	2.17 ± 0.68	2.27 ± 0.77	2.18 ± 2.00	
DMFT/dmft				
Very Low	15 (20.3%)	17 (20.3%)	32 (43.2%)	
Low	12 (16.2%)	12 (16.2%)	24 (32.4%)	0.841*
Mild	10 (13.5%)	8 (10.8%)	18 (24.3%)	
Total (Mean ± SD)	5.57 ± 3.41	5.59 ± 3.09	5.58 ± 3.23	
COHIP-SF19				
Total (Mean ± SD)	60.4 ± 7.38	63.4 ± 7.91	61.9 ± 7.74	0.090**
Median (IQR)	11.0 (2.0)	11.0 (3.0)	11.0 (2.0)	

**Chi-square test, **Mann Whitney U test.*
Descriptive Statics, Mann-Whitney U test, $p < 0.05$, 95% confidence interval (CI).
FMF: Familial Mediterranean Fever; COHIP-SF19: Child Oral Health Impact Profile-Short Form 19; SD: Standard Deviation; IDAF-4C: Dental Anxiety and Fear Scale; DMFT/dmft: Decayed, missing, filled teeth; IQR: Inter Quartile Range; CD:H: Child Drawing: Hospital.

low stress" was identified in 16.2% of children with FMF and 10.8% of healthy controls (Table 4).

3.8 CD:H scale items data

In Section A of the CD:H scale, Item 1 was found to be the most prominent stress score of 8, as it was reported by most participants. This score was observed in 40.5% of the total study population within the FMF group and 35.1% within the healthy control group. When analyzed within their respective groups, 81.1% of children in the FMF group and 70.3% of children in the healthy control group exhibited this score (Fig. 3). For Item 8, the most frequent stress score was 10 (FMF: 13 children, 17.6%; healthy: 17 children, 23%) (**Supplementary material**).

In Section B, Item 18 was found to be a predominant stress score of 10, observed in 86.4% of all participants. This distribution corresponded to 40.5% of the total participants belonging to the FMF group and 45.9% belonging to the healthy control group. Looking at the internal distribution of each group, this high stress score was present in 81.1% of children with FMF and 91.9% of healthy controls (Fig. 4a,b) (**Supplementary material**).

For Item 19, the most common score was also 10, recorded in 27 children (36.5%) in the FMF group and 30 children (40.5%) in the healthy group. Among children with FMF, score 10 was followed by score 0 (13.5%), whereas in healthy controls, score 10 remained the most frequent (40.5%) with very few scoring 5 or 0 (Fig. 5) (**Supplementary material**).

For Item 21, a stress score of 10 was most frequently reported by 25 children (33.8%) in both the FMF and healthy groups. Across these items, boys generally exhibited higher stress scores than girls (**Supplementary material**).

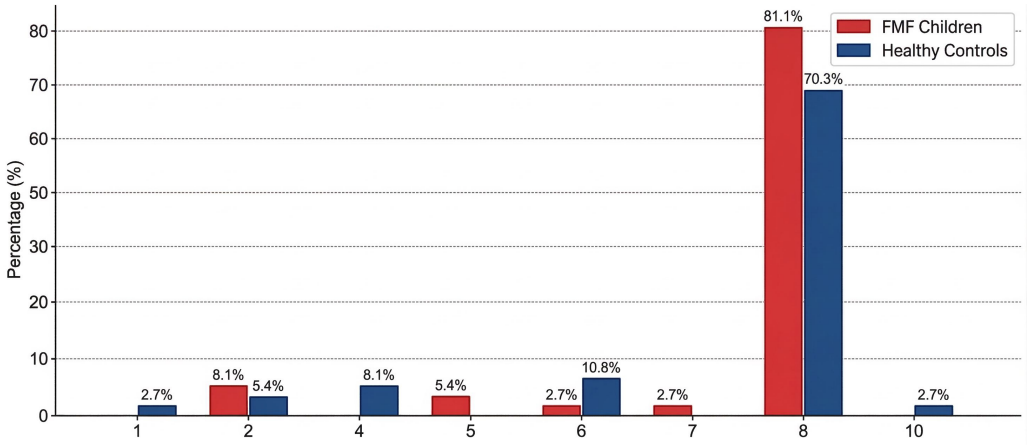

FIGURE 3. Distribution of CD:H Item A1 scores. FMF: Familial Mediterranean Fever.

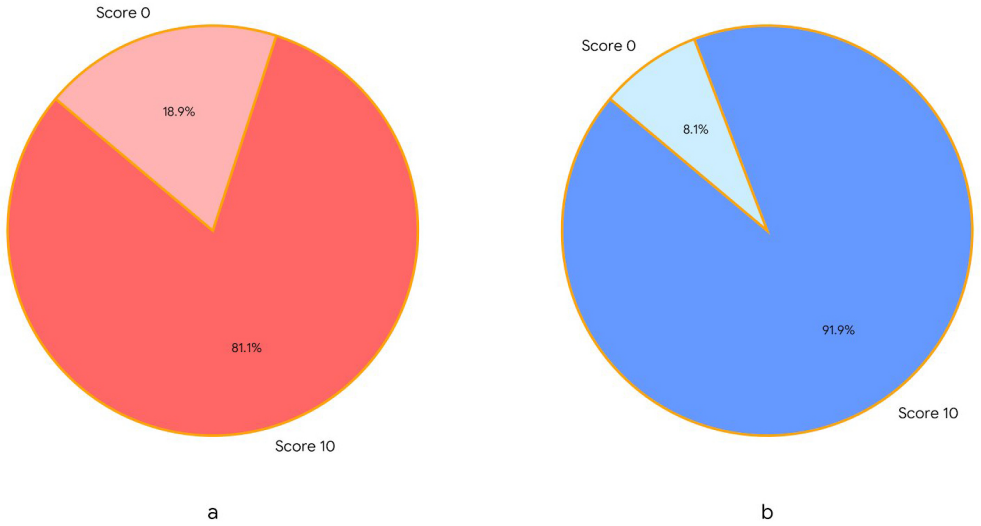

FIGURE 4. Distribution of CD:H Item B18 scores. (a) CD:H Item B18 scores in children with FMF. (b) CD:H Item B18 scores in healthy controls.

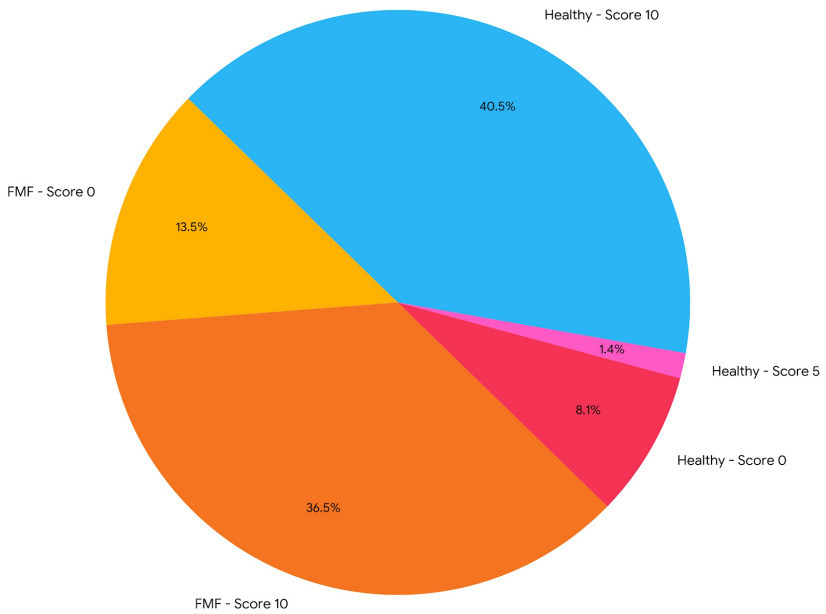

FIGURE 5. Distribution of CD:H Item B19 scores in children with FMF and healthy controls. FMF: Familial Mediterranean Fever.

3.9 Correlation analysis data

Correlation analysis demonstrated several significant associations among the study variables. A negative correlation was observed between Frankl Behavior Rating Scale scores and IDAF-4C scores ($\rho = -0.355$, $p = 0.002$), indicating that more cooperative behavior during the dental examination was associated with lower levels of dental anxiety (Table 5).

In addition, CD:H scores were negatively correlated with COHIP-SF19 scores ($\rho = -0.241$, $p = 0.039$), suggesting that higher levels of hospital-related anxiety were associated with poorer oral health-related quality of life (Table 5).

Moreover, age was found to be positively correlated with Frankl scores ($\rho = 0.470$, $p < 0.001$), indicating that older children tended to show more cooperative behavior, while a negative correlation was observed between age and DMFT/dmft scores ($\rho = -0.254$, $p = 0.029$). A gender-associated pattern was also noted, with boys presenting higher CD:H anxiety levels than girls ($\rho = -0.240$, $p = 0.040$). Among children with FMF, higher Pras severity scores were associated with less cooperative behavior (Frankl score) ($\rho = -0.341$, $p = 0.039$). Age also showed an inverse relationship with disease severity ($\rho = -0.432$, $p = 0.008$), indicating that older FMF patients tended to have lower Pras severity scores (Table 5).

3.10 Inter-rater reliability analysis

The inter-rater reliability of the Child Drawing: Hospital (CD:H) scale total scores was evaluated using the Intraclass Correlation Coefficient (ICC) with a two-way random effects model. The analysis was based on independent evaluations by two observers in a sample of 10 participants.

The mean total scores were 109 ± 20.6 for Observer A and 113 ± 25.9 for Observer B. The ICC for the total score was 0.799, with a 95% CI of 0.780 to 0.838. Inter-rater agreement was statistically significant ($p < 0.001$), indicating good reliability between observers (Table 6). Overall, these findings suggest that the CD:H scale yields consistent total scores when applied by different raters.

TABLE 5. Correlation data.

Variables	CD:H Categorical	Frankl	IDAF-4C Categorical	COHIP-SF19	DMFT/dmft	Age	Gender	Pras Disease Severity Score
Frankl								
r	0.034							
p	0.775							
IDAF-4C Categorical								
r	−0.066	−0.355**						
p	0.578	0.002						
COHIP-SF19								
r	−0.241*	−0.158	0.111					
p	0.039	0.179	0.345					
DMFT/dmft								
r	0.111	−0.037	0.087	0.091				
p	0.347	0.755	0.460	0.442				
Age								
r	−0.005	0.470***	0.015	−0.074	−0.254*			
p	0.968	<0.001	0.898	0.532	0.029			
Gender								
r	−0.240*	0.000	0.146	−0.081	0.189	−0.013		
p	0.040	1.000	0.215	0.491	0.107	0.914		
Pras Disease Severity Score								
r	−0.034	−0.341*	0.063	0.018	0.056	−0.432**	−0.113	
p	0.841	0.039	0.712	0.915	0.741	0.008	0.507	
Hospitalization history								
r	0.250	0.218	−0.181	−0.221	−0.277	0.067	−0.185	−0.014
p	0.136	0.194	0.284	0.189	0.097	0.692	0.272	0.936

**p < 0.05, **p < 0.01, ***p < 0.001. CD:H: Child Drawing: Hospital; COHIP-SF19: Child Oral Health Impact Profile-Short Form 19; IDAF-4C: Dental Anxiety and Fear Scale; DMFT/dmft: Decayed, missing, filled teeth.*

TABLE 6. Inter-rater reliability of CD:H scale total scores.

Variable	Observer	N	Mean	SD	Median	Min–Max	ICC	95% CI	*p*
CD:H Total	Observer A	10	109	20.6	109	77–138	0.799	0.780–0.838	<0.001
	Observer B	10	113	25.9	116	95–135			

ICC: Intraclass Correlation Coefficient (two-way random effects model, absolute agreement). ICC values ≥0.75 were considered good agreement, and values ≥0.90 were considered excellent agreement. CD:H: Child Drawing: Hospital; N: Population Size; SD: Standard Deviation; Min: Minimum; Max: Maximum; CI: Confidence Interval.

4. Discussion

FMF is a chronic inflammatory disease characterized by recurrent, self-limiting attacks lasting 12–72 hours, separated by symptom-free remission periods [23]. Current literature reports that FMF symptoms mostly begin in childhood, with the most cases presenting their first clinical findings before the age of 20. Although oral colchicine remains the standard long-term therapy, children with FMF have early and repeated contact with healthcare services, which may support treatment adherence, while also influencing the psychosocial burden associated with living with a chronic condition.

Medical doctors, dentists, psychologists, researchers, educators, and parents can use drawing analyses to gain insight into children's social, emotional, physical, and intellectual development [24]. In this context, the CD:H Scale is a non-threatening, engaging, and easy-to-administer projective measure that allows assessment of the emotional state of school-aged children in relation to their experiences with hospitals and illness [13]. Based on a literature review, we found that no previous study had evaluated stress levels in children with FMF using the CD:H Scale. In our study, higher CD:H anxiety was associated with poorer oral health-related quality of life, and greater FMF severity was linked to less cooperative behavior during dental examination.

Recent studies emphasize the importance of understanding children's emotional expressions through drawing [24]. In our study, there was no statistically significant difference between healthy children and children with FMF in terms of IDAF-4C and CD:H scores, indicating that dental anxiety and stress levels were similar between the two groups. Consistent with our findings, Altan *et al*. [25] also reported comparable dental anxiety levels in children with FMF and healthy children based on the Frankl Behavioural Rating Scale and the Children's Fear Survey Schedule-Dental Subscale. One possible explanation is that FMF is an autoinflammatory disease in which children can usually continue their daily activities outside of attacks, with symptoms occurring episodically. In this respect, it differs from other chronic diseases that require continuous hospitalization or are associated with serious, life-threatening complications (*e.g.*, congenital heart disease, neurological disorders, and hematological diseases) [26]. Children with FMF generally appear physically healthy outside of attacks and can often be managed with home-administered medication (colchicine) [27]. Therefore, their contact with hospitals is typically limited to regular outpatient follow-up. As a result, they may experience fewer stress-inducing exposures such as repeated invasive procedures, prolonged hospital stays, or intensive care needs. It is plausible that this pattern of healthcare exposure may shape children's perceptions of hospitals and healthcare workers, making these environments feel less threatening and more familiar, and thereby helping them cope more effectively with the hospital experience.

Based on biopsychosocial interpretations, long-term management of a chronic condition can lead to a form of "medical habituation", as frequent exposure to clinical environments and routine medical care from an early age may contribute to gradual desensitization, thereby reducing the stresses often associated with dental visits. Clinically, these findings suggest that children with FMF may develop a distinct pattern of psychological adaptation based on their chronic disease experience. Thus, rather than assuming increased vulnerability, pediatric dentists should consider that these patients may be more familiar with healthcare settings and procedures. Building on this existing medical familiarity may facilitate a stronger therapeutic alliance and improve cooperation during dental treatment. In addition to chronic illness, traumatic dental injuries, toothache, and limited access to dental care are important risk factors for dental fear and anxiety in children and should be considered [8].

One of the highest scores in our study was obtained for Item A1. Item 1 in Section A of the CD:H scale ("the person's position") assesses how children position the person on the paper in their drawings [14]. High scores (8–10) on this item indicate that the figure is placed at the edge of the page, in a corner, or in an isolated area. Such placements are generally interpreted as reflecting anxiety, perceived threat, or social isolation within the hospital or clinic environment [28]. In our study, healthy children had higher CD:H scores than children with FMF; however, this difference was not statistically significant.

In the CD:H scale, Item 18 is scored based on whether any part of the body is depicted as damaged or detached, whereas Item 19 is scored based on omissions such as two hands, two eyes, or a hand or foot in the drawing [13, 14]. In our study, although Section B Items 18 and 19 yielded high scores in both healthy children and those with FMF, the mean scores were higher among healthy participants. High scores on these two items may be regarded as relatively objective indicators of emotional distress reflected in children's drawings. In this context, the CD:H scale not only captures overall anxiety levels, but also helps to identify the specific characteristics of emotional difficulties expressed through visual representation [29]. When interpreting the CD:H scale, it is essential to recognize that children must have a certain level of drawing ability. Incomplete or exaggerated drawings are often dis-

cussed under the hypothesis that "as anxiety increases, children tend to enlarge body parts or omit certain features". However, some children may not actually be anxious, but may appear so because of limited drawing skills. Therefore, insufficient drawing ability may create the impression of anxiety, underscoring the need for caution when relying solely on projective drawing methods to assess children's emotional states.

In this study, the CD:H scale was implemented as a structured screening instrument, rather than a definitive diagnostic tool for clinical anxiety. The conceptual framework of our assessment was based on quantifying situational stress using a validated scoring manual, with emphasis on observable drawing features such as figure proportions, color selection, and line quality. By applying this standardized protocol, we aimed to translate qualitative visual expression into quantitative data, thereby reducing the risk of subjective over-interpretation. In this study, we used scales along with drawings to assess clinical anxiety, making the assessment evidence-based. The drawings and scales served as a kind of validation tool in our study. Studies by Özdemir *et al*. [14] and Guner *et al*. [15] suggest that the CD:H scale can be used to assess dental anxiety in children.

Our study identified a statistically significant, but weak, negative correlation between Frankl behavior scores and both IDAF-4C and Pras Disease Severity scores. Children with more positive behavior (higher Frankl scores) had lower levels of dental anxiety (higher IDAF-4C scores). These findings indicate that greater disease severity may be associated with reduced cooperation during dental examination. Similarly, Sönmez *et al*. [30] reported a positive correlation between FMF disease severity and anxiety in children with FMF. Altan *et al*. [25] also found that higher FMF severity significantly increased dental fear, as measured by the CFSS-DS. Taken together, these findings suggest that children with more severe FMF may experience greater dental anxiety [31]. Therefore, when considering treatment compliance in children with chronic illnesses such as FMF, disease severity, not only the presence of the condition, should be taken into account.

Studies indicate that OHRQoL is often lower in children with chronic diseases. For example, COHIP-SF19 scores have been reported to be significantly lower in children with chronic renal failure than in healthy peers [32]. Similarly, children with type 1 diabetes may show reduced OHRQoL, partly related to oral complications [33]. However, Sönmez *et al*. [30] reported no difference in quality of life scores between FMF and healthy groups. In our study, although mean COHIP-SF19 scores were lower in the FMF group, the difference was not statistically significant. This suggests that age, gender, FMF severity, and hospitalization history did not have a significant impact on OHRQoL among children with FMF in our sample. Importantly, we identified a significant negative correlation between CD:H and COHIP-SF19 scores, indicating that higher hospital-related anxiety was associated with lower OHRQoL. This finding suggests that anxiety within clinical settings may influence children's perceptions of their oral health and overall well-being. Therefore, addressing psychological factors in pediatric dental care is important, as reducing anxiety may improve both treatment cooperation and quality of life. In addition, the non-invasive oral administration of colchicine as the mainstay treatment for FMF may help limit potential adverse effects on OHRQoL by reducing the need for intensive medical care [34].

In our study, DMFT/dmft values were similar in children with FMF and healthy controls, suggesting that FMF itself does not appear to increase the risk of dental caries. Younger children exhibited a greater caries burden, which may be related to less established oral hygiene habits, dietary patterns, and the greater need for parental supervision at earlier ages. Moreover, DMFT/dmft was not significantly correlated with dental anxiety (IDAF-4C scores), Child Drawing: Hospital anxiety (CD:H scores), or behavioral cooperation (Frankl scores), implying that caries experience was largely independent of these psychological and behavioral measures in this cohort. Taken together, these findings suggest that although FMF does not appear to exacerbate caries risk, preventive strategies emphasizing oral hygiene and dietary counseling may be particularly important for younger children, regardless of systemic health status.

A strength of this cross-sectional clinical study is that, to the best of our knowledge, it is the first to assess anxiety in children with FMF using the CD:H scale. However, several limitations should be acknowledged, including the relatively small sample size, the single-center setting, and the assessment of FMF patients only during remission. Evaluating children both during attacks and in remission would provide a more comprehensive understanding of the psychological effects of FMF. Future studies with larger samples are also needed to examine the relationship between CD:H scores and gender in greater details.

5. Conclusions

In our study, no significant differences were observed in dental anxiety, stress, behavior, or oral health-related quality of life between children diagnosed with FMF and their healthy peers. This finding suggests that, despite the chronic nature of FMF, children's psychological adjustment may remain relatively stable, possibly because attacks are brief and treatment is largely based on non-invasive oral colchicine therapy. Moreover, the CD:H scale provided valuable insight by generating quantitative data while also reflecting children's emotional experiences from their own perspectives.

AVAILABILITY OF DATA AND MATERIALS

The data analyzed in this study are available from the corresponding author on reasonable request, subject to ethical approval.

AUTHOR CONTRIBUTIONS

AC—designed the research study. AC, BBA and MT—performed the research. HA—analyzed the data. MDD—wrote the manuscript. All authors reviewed and revised drafts and approved the final version for submission.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

All methods were performed in accordance with the guidelines and regulations contained in the Declaration of Helsinki and the STROBE guidelines. This study was approved by the Tokat Gaziosmanpaşa University Faculty of Medicine Non-Interventional Scientific Research Ethics Committee (Reference No: 25-MOBAEK-233). Signed consent forms were obtained from parents and children who agreed to participate.

ACKNOWLEDGMENT

The authors have no acknowledgments to report for this study.

FUNDING

The study was self-funded. No public or private funding source was used for this research.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found, in the online version, at https://oss.jocpd.com/files/article/2041767671739891712/attachment/Supplementary%20material.docx.

REFERENCES

[1] Ben-Chetrit E, Touitou I. Familial Mediterranean fever in the world. Arthritis Care & Research. 2009; 61: 1447–1453.
[2] Eksi A, Molzan J, Savasir I, Güler N. Psychological adjustment of children with mild and moderately severe asthma. European Child & Adolescent Psychiatry. 1995; 4: 77–84.
[3] Claridge AM, J Powell O. Children's experiences of stress and coping during hospitalization: a mixed-methods examination. Journal of Child Health Care. 2023; 27: 531–546.
[4] Gortmaker SL, Walker DK, Weitzman M, Sobol AM. Chronic conditions, socioeconomic risks, and behavioral problems in children and adolescents. Pediatrics. 1990; 85: 267–276.
[5] Van Dongen-Melman JE. Developing psychosocial aftercare for children surviving cancer and their families. Acta Oncologica. 2000; 39: 23–31.
[6] Klingberg G, Broberg AG. Dental fear/anxiety and dental behaviour management problems in children and adolescents: a review of prevalence and concomitant psychological factors. International Journal of Paediatric Dentistry. 2007; 17: 391–406.
[7] Armfield JM, Spencer A, Stewart JF. Dental fear in Australia: who's afraid of the dentist? Australian Dental Journal. 2006; 51: 78–85.
[8] Kvesić AJ, Hrelja M, Lovrić Ž, Šimunović L, Špiljak B, Supina N, *et al*. Possible risk factors for dental fear and anxiety in children who suffered traumatic dental injury. Dentistry Journal. 2023; 11: 190.
[9] Locker D, Shapiro D, Liddell A. Negative dental experiences and their relationship to dental anxiety. Community Dental Health. 1996; 13: 86–92.
[10] Klingberg G. Reliability and validity of the Swedish version of the Dental Subscale of the Children's Fear Survey Schedule, CFSS-DS. Acta Odontologica Scandinavica. 1994; 52: 255–256.
[11] Bhatia MS, Goyal A. Anxiety disorders in children and adolescents: need for early detection. Journal of Postgraduate Medicine. 2018; 64: 75–76.
[12] Humphris G, King K. The prevalence of dental anxiety across previous distressing experiences. Journal of Anxiety Disorders. 2011; 25: 232–236.
[13] Clatworthy S, Simon K, Tiedeman ME. Child Drawing: Hospital—an instrument designed to measure the emotional status of hospitalized school-aged children. Journal of Pediatric Nursing. 1999; 14: 2–9.
[14] Özdemir Çelik DS, Deniz E, Demir O, Altan H. Validation of Child Drawing Hospital (CD:H) scale and the role of drawing in the evaluation of dental anxiety. BMC Oral Health. 2025; 25: 274.
[15] Guner Onur S, Tonguc Altin K, Demetgul Yurtseven B, Haznedaroglu E, Sandalli N. Children's drawing as a measurement of dental anxiety in paediatric dentistry. International Journal of Paediatric Dentistry. 2020; 30: 666–675.
[16] Pala SP, Nuvvula S, Kamatham R. Expression of pain and distress in children during dental extractions through drawings as a projective measure: a clinical study. World Journal of Clinical Pediatrics. 2016; 5: 102–111.
[17] Buldur B, Armfield J. Development of the Turkish version of the index of dental anxiety and fear (IDAF-4C+): dental anxiety and concomitant factors in pediatric dental patients. Journal of Clinical Pediatric Dentistry. 2018; 42: 279–286.
[18] Armfield JM. Development and psychometric evaluation of the index of dental anxiety and fear (IDAF-4C+). Psychological Assessment. 2010; 22: 279–287.
[19] Sischo L, Broder H. Oral health-related quality of life: what, why, how, and future implications. Journal of Dental Research. 2011; 90: 1264–1270.
[20] Broder HL, McGrath C, Cisneros GJ. Questionnaire development: face validity and item impact testing of the child oral health impact profile. Community Dentistry and Oral Epidemiology. 2007; 35: 8–19.
[21] Frankl S. Should the parent remain with the child in the dental operatory? Journal of Dentistry for Children. 1962; 29: 150–163.
[22] Pras E, Livneh A, Balow JE III, Pras E, Kastner DL, Pras M, *et al*. Clinical differences between North African and Iraqi Jews with familial Mediterranean fever. American Journal of Medical Genetics. 1998; 75: 216–219.
[23] Makay B, Emiroğlu N, Unsal E. Depression and anxiety in children and adolescents with familial Mediterranean fever. Clinical Rheumatology. 2010; 29: 375–379.
[24] Fabris MA, Lange-Küttner C, Shiakou M, Longobardi C. Children's drawings: evidence-based research and practice. Frontiers in Psychology. 2023; 14: 1250556.
[25] Altan H, Sonmezgoz E, Belevcikli M, Kasap T. Assessment of dental anxiety and fear levels of pediatric patients diagnosed with familial Mediterranean fever. Annals of Medical Research. 2022; 29: 831–835.
[26] Tong A, Lowe A, Sainsbury P, Craig JC. Experiences of parents who have children with chronic kidney disease: a systematic review of qualitative studies. Pediatrics. 2008; 121: 349–360.
[27] Ozen S, Demirkaya E, Erer B, Livneh A, Ben-Chetrit E, Giancane G, *et al*. EULAR recommendations for the management of familial Mediterranean fever. Annals of the Rheumatic Diseases. 2016; 75: 644–651.
[28] Custódio NB, Mathias FB, Cademartori MG, Goettems ML. Translation and cross-cultural adaptation of the "Child Drawing: Hospital" (CD:H) scale for paediatric dentistry in Brazil. Brazilian Research in Pediatric Dentistry and Integrated Clinic. 2023; 23: e210229.
[29] Malchiodi CA. Understanding children's drawings. Guilford Press: New York. 2022.
[30] Sönmez AÖ, Sönmez HE, Çakan M, Yavuz M, Keskindemirci G, Aktay Ayaz N. The evaluation of anxiety, depression and quality of life scores of children and adolescents with familial Mediterranean fever. Rheumatology International. 2020; 40: 757–763.
[31] Cianetti S, Lombardo G, Lupatelli E, Pagano S, Abraha I, Montedori A,

et al. Dental fear/anxiety among children and adolescents. A systematic review. European Journal of Paediatric Dentistry. 2017; 18: 121–130.

[32] Silva TMC, Alves LAC, Garrido D, Watanabe A, Mendes FM, Ciamponi AL. Health and oral health-related quality of life of children and adolescents with chronic kidney disease: a cross-sectional study. Quality of Life Research. 2019; 28: 2481–2489.

[33] Mohseni Homagarani Y, Adlparvar K, Teimuri S, Tarrahi MJ, Nilchian F. The effect of diabetes mellitus on oral health-related quality of life: a systematic review and meta-analysis study. Frontiers in Public Health. 2023; 11: 1112008.

[34] Makay B, Ünsal E, Arslan N. Quality of life of school-age children with familial Mediterranean fever: a preliminary study. Pediatric Rheumatology. 2008; 6: P206.

How to cite this article: Alem Coşgun, Halenur Altan, Burcu Bölükbaşı Akgül, Merve Tatar, Müzeyyen Dilşah Demiray. Assessment of dental anxiety using the Child Drawing: Hospital scale and oral health-related quality of life in children diagnosed with Familial Mediterranean Fever. Journal of Clinical Pediatric Dentistry. 2026. doi: 10.22514/jocpd.2026.054.