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Fever Attribution to Teething Among Final-Year Medical Students: A Cross-Sectional Study Revisiting “The Teething Virus”

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Abstract

Background Teething is a physiological process, but many local and systemic symptoms may be incorrectly attributed to it. This study aimed to evaluate final-year medical students' knowledge, perceptions, and management approaches regarding teething, with particular focus on the attribution of fever to teething.

Methods This descriptive cross-sectional study included 276 final-year medical students who had completed their pediatric rotation. Data were collected using a structured questionnaire assessing demographic characteristics, educational exposure to teething, perceived knowledge level, basic knowledge about primary tooth eruption, symptoms attributed to teething, and management recommendations. Factors associated with attributing fever ≥38°C to teething were evaluated using univariable and multivariable logistic regression analyses.

Results The mean age of participants was 24.0 ± 1.17 years, and 51.8% were male. Only 26.8% reported receiving education about teething, and 90.2% described their knowledge as insufficient. Although most students correctly identified basic facts about primary tooth eruption, 86.6% attributed fever to teething. In multivariable analysis, female sex (OR: 3.72; 95% CI: 1.58–8.78; p=0.004) and higher basic knowledge score (OR: 1.76; 95% CI: 1.20–2.58; p=0.004) were independently associated with attributing fever to teething. Students who perceived their knowledge as sufficient were more likely to recommend systemic analgesic-antipyretics for symptom control.

Conclusions Misconceptions about teething, especially attributing fever to teething, are common among final-year medical students. Undergraduate medical education should address teething within the context of febrile child evaluation, safe symptom management, and caregiver counseling.

Background

The teething period (6–30 months) is a normal and predictable physiological process in which primary teeth move from their position in the alveolar bone, pass through the gingiva, and erupt into the oral cavity. Although Illingworth's statement in 1975 that "teething produces nothing but teeth" emphasizes the essence of this process, in clinical practice teething may be used as an explanation for many symptoms observed in children during this period (1–3). This tendency may seem to reduce parental anxiety about illness, but it may also lead to overlooking underlying pathologies and delaying appropriate medical evaluation. Moreover, this misinterpretation has been reported not only among parents but also commonly among physicians (3, 4).

Although eruption of primary teeth may be associated with various symptoms, one of the symptoms most frequently reported by parents and physicians is fever (1). However, although teething may be associated with a mild increase in body temperature, it is not accepted to cause clinically significant fever (body temperature ≥ 38°C) (1, 3). Various speculative explanations have historically been proposed to explain the relationship between teething and fever; even an ironic publication entitled "the teething

virus” has appeared in the literature, critically reflecting the widespread nature of this false attribution (5). Attributing fever to teething may delay presentation to a healthcare facility, diagnostic evaluation, and appropriate treatment, thereby increasing morbidity, especially in young children (3, 6). Therefore, considering the potentially serious consequences, common infectious causes such as respiratory tract infections, urinary tract infection, acute otitis media, and acute gastroenteritis should be excluded before explaining fever as “teething” (1, 2). Findings statistically associated with teething in the literature are mostly mild and local in nature. These include decreased appetite for solid foods, increased drooling, ear rubbing or pulling, rubbing or scratching of the gums, increased biting tendency, irritability, increased sucking, and difficulty sleeping (2).

In Turkey, within the framework of the National Core Curriculum for Undergraduate Medical Education 2020 (7), medical students are expected to acquire basic medical competencies, including providing counseling to caregivers on oral and dental health in clinical practice. Therefore, the aim of this study was to determine the prevalence of misconceptions and myths related to teething among final-year medical students and to evaluate the need for medical education in this area.

Methods

Study design and setting

This descriptive cross-sectional study targeted a total of 416 final-year medical students enrolled at XXX University Faculty of Medicine during the 2023–2025 academic years. To be eligible, students were required to have completed their pediatric rotation in the final year. Since personal parenting experience may affect knowledge and perceptions about teething, students who had children were excluded from the study.

Sample size

The required sample size was calculated based on the total number of final-year medical students at the faculty. Assuming that 50% of students would have correct knowledge regarding the timing of primary tooth eruption, the minimum sample size was estimated using the following formula:

$$n = (N \times t^2 \times p \times q) / [d^2 (N - 1) + t^2 \times p \times q]$$

where t = 1.96 for a 95% confidence interval, p = 0.50, q = 0.50, and the margin of error (d) was set at 0.05. With N = 416, the minimum required sample size was calculated as approximately 200 students. In the present study, a total of 276 students participated, exceeding the minimum required sample size.

The study was conducted at XXX University Faculty of Medicine between August 1, 2023 and December 31, 2025.

Data collection tools

The data collection form was developed based on a previously published study (8) and was reviewed by faculty members from the Department of Pediatrics to ensure content appropriateness. The questionnaire consisted of items assessing knowledge level, symptom attribution, and management practices, and responses were recorded in a three-option format: “agree”, “disagree”, or “do not know”. The questionnaire evaluated demographic characteristics (age and sex), educational exposure to teething during medical education, perceived adequacy of knowledge about teething, knowledge of basic developmental facts related to primary tooth eruption, perceptions regarding symptoms attributed to teething, and practices related to the management of teething-related symptoms/findings.

To quantitatively evaluate knowledge level, scoring was performed for the items in the basic knowledge domain (4 items) and the symptom/finding knowledge domain (11 items). For each item, a correct answer was scored as 1 point, while an incorrect answer and a “do not know” response were scored as 0 points. Thus, a basic knowledge score and a symptom knowledge score were calculated for each participant.

Data collection

Data were collected through face-to-face interviews. Participants were informed about the aim of the study, and verbal consent was obtained before participation. No minimum or maximum time limit was set for completing the questionnaire. Participants were asked to take as much time as they needed; the average completion time was 5–8 minutes.

Data analysis

Data were analyzed using IBM SPSS Statistics for Windows, version 20.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were presented as number (n), percentage (%), mean ± standard deviation, or median (interquartile range), where appropriate. Categorical variables were compared using the chi-square test or Fisher’s exact test. Continuous variables were compared using the Student’s t-test or Mann–Whitney U test according to distribution characteristics. To determine the factors associated with attributing fever ≥ 38°C to teething, univariable logistic regression analyses were first performed, followed by multivariable logistic regression analysis. Variables considered to be potential confounders from clinical and theoretical perspectives were included in the multivariable model, regardless of their statistical significance in univariable analyses. Results were expressed as odds ratios (ORs) and 95% confidence intervals (CIs). A two-sided p value of < 0.05 was considered statistically significant.

Results

Characteristics of the Participants

A total of 276 final-year medical students were included in the study. The mean age of the participants was 24.0 ± 1.17 years (range, 22–30 years), and 51.8% (n = 143) were male. The proportion of students who reported receiving education about teething during medical school was 26.8% (n = 74), while 8.7% (n = 24) stated that they had read a textbook chapter on this subject. When perceived knowledge level was evaluated, 90.2% of the participants (n = 249) described their knowledge about the teething period as “insufficient”, whereas only 9.8% (n = 27) considered their knowledge to be “sufficient”.

Basic Knowledge Level

When the basic knowledge items were evaluated, the majority of participants correctly stated that primary teeth usually begin to erupt at 6–7 months of age (81.2%) and that the first erupted teeth are the mandibular central incisors (83.3%). In contrast, the proportion of participants who correctly answered that primary dentition is completed around the age of two years remained at 56.5%; 23.9% of the participants reported that they were unsure about this statement. In addition, the statement that delayed teething may be associated with an underlying systemic disease was correctly accepted by 78.6% of the participants (Table 1). The mean basic knowledge score of the participants was 2.99 ± 0.89 (range, 0–4). The basic knowledge score was statistically associated with sex, with a higher mean score among females than males (3.11 vs. 2.87, p=.026). However, there was no statistically significant association between the basic knowledge score and age, receiving education about teething, reading a textbook chapter on this subject, or perceived knowledge level (p=.551, p=.976, p=.436, and p=.873, respectively).

Symptoms and Findings

Among the symptoms/findings attributed to teething by the participants, the most notable finding was that 86.6% considered fever to be a symptom/finding related to teething. Attribution of fever to teething was statistically associated with sex (94.0% in females vs. 79.7% in males, p=.001) and basic knowledge score (3.06 among those who attributed fever to teething vs. 2.51 among those who did not, p=.008). However, no statistically significant association was found with age, receiving education about teething, reading a textbook chapter on this subject, or perceived knowledge level (p=.231, p=.407, p=.445, and p=.335, respectively). In contrast, the rates of attributing other systemic symptoms with controversial association to teething were lower: 34.8% for vomiting, 30.1% for diarrhea, and 26.8% for rhinorrhea. Symptoms/findings known to be associated with teething, such as sleep disturbance (92.8%), biting tendency (88.8%), loss of appetite (88.3%), gingival redness/swelling (88.0%), irritability (81.5%), and increased drooling (80.8%), were attributed to teething at high rates (Table 2). The mean symptom/finding knowledge score of the participants was 6.11 ± 1.89. No statistically significant association was found between the symptom/finding knowledge score and sex, age, receiving education about teething, reading a textbook chapter on this subject, perceived knowledge level, or basic knowledge score (p=.946, p=.182, p=.292, p=.106, p=.394, and p=.646, respectively).

Table 1
Distribution of Responses to Basic Knowledge Statements on Teething

Statement	Agree, n (%)	Disagree, n (%)	Don't know, n (%)
Primary teeth begin erupting at 6–7 months	224 (81.2)	9 (3.3)	43 (15.5)
First erupted teeth are mandibular central incisors	230 (83.3)	15 (5.4)	31 (11.3)
Primary dentition is completed **around** 2–2.5 years	156 (56.5)	54 (19.6)	66 (23.9)
Delayed teething can indicate a systemic disease	217 (78.6)	17 (6.2)	42 (15.2)

Table 2
Participants' Knowledge and Perceptions of Teething-Related Symptoms

Symptom / Finding	Agree, n (%)	Disagree, n (%)	Don't know, n (%)
Fever	239 (86.6)	20 (7.2) *	17 (6.2)
Diarrhea	83 (30.1)	107 (38.8) *	86 (31.1)
Sleep disturbance	256 (92.8) *	9 (3.2)	11 (4.0)
Loss of appetite	241 (87.3) *	18 (6.5)	17 (6.2)
Biting tendency	245 (88.8) *	16 (5.8)	15 (5.4)
Drooling	223 (80.8) *	18 (6.5)	35 (12.7)
Rhinorrhea	74 (26.8)	110 (39.9) *	92 (33.3)
Vomiting	96 (34.8)	96 (34.8) *	84 (30.4)
Irritability	225 (81.5) *	25 (9.1)	26 (9.4)
Ear pulling	174 (63.0) *	41 (14.9)	61 (22.1)
Gingival redness/swelling	243 (88.0) *	14 (5.1)	19 (6.9)
Note: An asterisk (*) indicates the correct response.			

Management Approaches

When approaches for relieving teething-related symptoms were evaluated, the most frequently accepted recommendations were giving adequate fluids to prevent dehydration (88.4%) and applying gum massage without medication (76.1%). In contrast, management with systemic analgesic-antipyretics was accepted at a low rate (21.4%) (Table 3). There was no statistically significant association between recommending systemic analgesic-antipyretics and sex, age, receiving education about teething, reading a textbook chapter on this subject, or basic knowledge score (p=.543, p=.211, p=.687, p=.880, and

p=.502, respectively). When its association with perceived knowledge level was evaluated, the proportion of participants who defined their knowledge as “sufficient” was higher among those who stated that they would recommend systemic analgesic-antipyretics (18.6% vs. 8.8%; p=.018).

Table 3
Participants’ Knowledge and Attitudes Regarding Methods for Relieving Teething-Related Symptoms

Recommendation	Agree, n (%)	Disagree, n (%)	Don’t know, n (%)
Allow biting on hard objects	111 (40.2)	128 (46.4)	37 (13.4)
Use chilled (not frozen) objects	127 (46.0)	99 (35.9)	50 (18.1)
Recommend night-time feeding	148 (53.6)	63 (22.8)	65 (23.6)
Recommend systemic analgesic-antipyretics	59 (21.4)	159 (57.6)	58 (21.0)
Use topical analgesics on gums	118 (42.8)	104 (37.7)	54 (19.6)
Massage gums without medication	210 (76.1)	31 (11.2)	35 (12.7)
Give fluids to prevent dehydration	244 (88.4)	12 (4.3)	20 (7.2)

Factors Associated with Attributing Fever to Teething

Univariable and multivariable logistic regression analyses were performed to evaluate factors associated with attributing fever to teething. In the univariable analysis, female sex was associated with an increased likelihood of attributing fever to teething (OR: 3.97; 95% CI: 1.74–9.05; p = 0.001), and an increase in the basic knowledge score also increased this likelihood (OR: 1.88; 95% CI: 1.30–2.71; p = 0.001). Both variables remained significant in the multivariable analysis. Female sex was identified as an independent risk factor (OR: 3.72; 95% CI: 1.58–8.78; p = 0.003), and a higher basic knowledge score was also determined as an independent factor increasing the likelihood of attributing fever to teething (OR: 1.76; 95% CI: 1.20–2.58; p = 0.004) (Table 4).

Table 4
Factors Associated with Attributing Fever to Teething

Variable	Univariable OR (95% CI)	p	Multivariable OR (95% CI)	p
Female sex	3.97 (1.74–9.05)	0.001	3.72 (1.58–8.78)	0.003
Age	0.88 (0.64–1.21)	0.438	1.25 (0.88–1.78)	0.212
Not receiving education about teething during medical school	1.37 (0.64–2.89)	0.408	1.58 (0.69–3.62)	0.271
Not reading a textbook chapter on teething	1.77 (0.39–7.87)	0.451	0.85 (0.16–4.47)	0.845
Perceiving knowledge level as insufficient	0.48 (0.11–2.15)	0.345	0.49 (0.09–2.50)	0.392
Basic knowledge score	1.88 (1.30–2.71)	0.001	1.76 (1.20–2.58)	0.004

Discussion

Three main findings stand out in this study. First, the majority of final-year medical students felt insufficient about teething-related symptoms and findings. Second, most participants associated fever with teething. This result is important because it shows that misconceptions related to teething continue not only among parents or at the community level, but also among future physicians who are at the transition stage to clinical practice. Third, it was noteworthy that students who perceived their knowledge about teething as sufficient were more likely to recommend systemic analgesic-antipyretics to control symptoms. In the following paragraphs, these three findings are discussed in the light of our results and the existing literature.

Students' feeling of insufficiency regarding teething-related symptoms and findings suggests that oral and dental health topics, which are frequently encountered but often considered secondary in undergraduate medical education, may not be sufficiently transformed into clinical counseling skills. In our study, the low proportion of students who reported receiving education about teething or reading a textbook chapter on this subject supports that this perceived insufficiency may be related to limited educational exposure. Similarly, in the literature, it has been reported that although medical students frequently encounter oral health problems during their clinical training, they consider the quality of oral health education to be limited and support the inclusion of these topics more clearly in the medical curriculum (9). On the other hand, structured oral health education for medical students has been shown to improve oral health knowledge, comfort in performing oral examination, and competence in providing preventive counseling to patients (10). These findings indicate that a seemingly simple topic such as teething should not be reduced only to the question of "when do primary teeth erupt?"; rather, it should

be taught together with differential diagnosis in the febrile child and skills for managing caregiver anxiety. The inclusion of oral and dental health, maternal and child health, and health promotion topics in the National Core Curriculum for Undergraduate Medical Education 2020 in Turkey (7) also supports that this subject should be considered as part of basic medical and counseling competencies. Therefore, students' feeling of insufficiency is a concrete indicator of an educational gap that should be addressed in preparing future physicians for child health counseling.

The association of fever with teething is clinically critical; because although mild complaints such as irritability may be observed during the teething period, explaining clinically significant fever by teething is not a safe approach (2, 11). The absence of a significant association between tooth eruption and fever in a systematic review supports that a febrile child should not be excluded from medical evaluation with the assumption that "the child is teething" (1). This false attribution is especially important from the perspective of pediatric infectious diseases, because infectious diseases such as pneumonia and urinary tract infection should be excluded first in a febrile infant (2, 11). At the community level, considering fever as a natural part of teething may lead to inappropriate treatments and delays in seeking healthcare (4, 12). However, attributing fever to teething has been reported not only among parents but also among healthcare professionals (6). Therefore, the high rate of fever attribution in our study suggests that there is a critical gap in clinical reasoning in undergraduate medical education regarding the safe evaluation of the febrile child.

Current recommendations suggest that systemic analgesics such as paracetamol or ibuprofen should be used for teething-related symptom control only in the presence of significant pain or irritability, for a short period and at an appropriate dose (2, 11) contrast, attributing fever to teething and suppressing it with antipyretics is risky, because no relationship has been shown between primary tooth eruption and clinically significant fever, and excluding infectious causes remains a priority in a febrile child (1). In addition, the limited and low-certainty evidence regarding treatments used to relieve teething symptoms shows that students should learn not only when to recommend medication, but also when not to recommend medication and when to refer the child for evaluation (12, 13). Therefore, the higher frequency of recommending systemic analgesic-antipyretics among students who perceived their knowledge as sufficient should not be interpreted directly as a better level of knowledge, but rather as a possible association between perceived competence and a tendency toward pharmacological intervention. In undergraduate medical education, the management of teething should be taught around the question "which child can be comforted, and which child should be evaluated for infection?" rather than simply "can paracetamol be given?"

The strength of this study is that it evaluated not only knowledge about teething among medical students at the final stage of undergraduate education, but also approaches that may directly affect clinical safety, such as misattribution of fever and the tendency to recommend pharmacological treatment for symptom management. However, this study also has some limitations. First, it was conducted in a single center and included only final-year students from one medical faculty; therefore, the generalizability of the results to all medical students is limited. Second, since the data were collected

by self-report, there is a possibility of social desirability bias and a difference between students' questionnaire responses and their actual clinical behaviors.

Conclusion

In conclusion, this study shows that the problem related to teething is not limited only to lack of knowledge; perceived insufficiency, false attribution of fever to teething, and tendency toward pharmacological intervention for symptom control among final-year medical students point to an undergraduate medical education gap that should be addressed together.

Declarations

Ethics approval and consent to participate

This study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was obtained from the Çanakkale Onsekiz Mart University Clinical Research Ethics Committee (Date: 26 July 2023; Approval No: 10-14). All participants were informed about the purpose of the study before enrollment, and written informed consent was obtained prior to participation.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare no competing interests.

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Authors' contributions

TÇ, FB, and MT conceived and designed the study. TÇ, FB, MT, YS, YET, GS, ZK, YCB, BÖ and BB contributed to data collection. YS, YET, GS, ZK, YCB, BÖ and BB contributed to data entry and preliminary data analysis. TÇ performed the final statistical analyses and interpreted the results. TÇ drafted the manuscript. FB, MT, YS, YET, GS, ZK, YCB, BÖ and BB critically reviewed and edited the manuscript. All authors read and approved the final manuscript.

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Authors' information

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