

ORIGINAL RESEARCH

The in-home management of childhood fever associated with dental issues: a cross-sectional study of parental knowledge in Saudi Arabia

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Abstract

Background: Childhood fever originating from dental issues is a potentially serious health concern affecting numerous children. This study aims to investigate its prevalence in Saudi Arabia and parental knowledge regarding its management. **Methods:** Using a self-administered questionnaire, 951 parents attending various centers in Saudi Arabia were recruited in this cross-sectional study between 01 September and 31 December 2023. **Results:** The questionnaire includes parents' demographic characteristics and fever management practices. Nearly 65% of parents expressed concern about fever's harmful effects, including potential loss of consciousness, dehydration and brain damage. Moreover, 64.2% of parents report consistently using antibiotics without a prescription. **Conclusions:** Our findings demonstrated a lack of knowledge among parents when it comes to managing their children's dental-related fever. A proactive educational approach to addressing this concern is required by healthcare professionals, as well as the community at large.

Keywords

Fever; Dental problems; Consciousness; Brain damage; Antibiotics; Parental practice

1. Introduction

Fever, defined as body temperature above 98.6 °F (37 °C), is crucial to detect in young children as it indicates illness [1–3]. *Streptococcus pyogenes* uses glucose as a carbon source and ferments fructose, present when sucrose is digested [4]. *Streptococcus mutans*, linked to dental caries, suggests a potential relationship between acute rheumatic fever (ARF) and sugar intake as indicated by the high prevalence of dental caries in children susceptible to ARF [5]. Primary teeth eruption (PTE) begins between 4 and 10 months after birth, with a complete set of 20 primary teeth appearing at 30 months [6]. PTE is strongly believed to be the cause of such local and systemic manifestations by parents and health care professionals [7]. It is common to experience irritability, gingival irritation, increased salivation, restless sleep, diarrhea, loss of appetite, and fever as a result of primary tooth eruption [8–10]. Among these symptoms, fever is commonly reported by both mothers [11, 12] and healthcare professionals [13, 14].

Dental clinic patients can suffer from a wide range of infections, including (I) odontogenic fever, (II) adenogenic fever, (III) hematogenous fever, (IV) traumatic fever, (V) iatrogenic fever, and others. Odontogenic fever typically occurs in association with acute periapical periodontitis, *opsigenes* pericoronitis, pyogenic osteomyelitis of the jaws, and oral and maxillofacial space infection [15, 16]. Adenogenic fever is characterized by high temperatures, chills and systemic symp-

toms of infection along with redness, swelling, heat and pain in the affected area. Hematogenous fever causes a sudden onset of high-grade fever, chills, and possible vomiting. Traumatic fever results from bacterial invasion and secondary infection following damage to the skin and mucous barrier due to maxillofacial trauma [16].

The term “fever phobia”, coined by Dr. Barton Schmitt in 1980, refers to parents' excessive fear of fever [17]. It has been found that parents often lack adequate knowledge of fever and how to measure and diagnose it [18, 19]. As well, educational level, socioeconomic status and cultural background contribute significantly to their understanding and assessment of childhood fever [20]. In Saudi Arabia, about 10% of children (under 4 years of age) suffer from fever due to dental issues [21]. Over 70% of parents in Saudi Arabia failed to comprehend the definition of both fever and high fever and did not know the maximum temperature of untreated fever or the temperature threshold necessitating antipyretics [21].

1.1 Study purpose

This study aims to examine the understanding of fever among Saudi Arabian parents whose children were hospitalized for fever associated with dental problems such as infections, dental caries and teething, as well as the factors that affect their decisions, actions and concerns regarding fever treatment.

1.2 Hypothesis

Socioeconomic status, education level, previous experiences with childhood illness, and cultural beliefs are significant influences on parents' decisions, actions, and concerns regarding fever treatment for their hospitalized children.

2. Material and methods

2.1 Study design

We conducted a cross-sectional study on parents of preschool children visiting primary healthcare clinics in Saudi Arabia between 01 September and 31 December 2023. 998 participants were invited to participate using a convenience non-random sampling technique, with 951 (95.2%) responding. Thus, an adequate sample size was determined. Data were collected by conducting semi-structured open-ended interviews guided by a questionnaire, whose content and structure will be clarified in a subsequent section.

2.2 Inclusion criteria

Study participants included parents of preschool children who completed the questionnaire and agreed to participate.

2.3 Pilot study

Study questionnaires were developed based on a review of relevant literature and tailored to the study's specific objectives. To ensure its effectiveness, a pilot study with 100 participants was conducted. Analysis of the final data excluded the questionnaire used in the pilot study.

2.4 Study tool

The questionnaire comprises two sections: (1) Parents' demographic characteristics: age, current occupation, maternal education and number of children. (2) Fever management practices: temperature measurement methods (*e.g.*, immediate hospitalization if a high fever is detected), fever treatment administered without medical advice or prescription (*e.g.*, administering antibiotics without a doctor's prescription), and information sources on fever.

2.5 Bias minimization

Diverse representation across demographics, geographical locations, and socioeconomic backgrounds was ensured to minimize convenience sampling bias. Statistical techniques were also used in this cross-sectional study to adjust for possible selection bias and enhance generalizability.

2.6 Statistical analysis

Data analysis was performed using SPSS 23.0 (IBM Corp., Armonk, NY, USA). We computed descriptive statistics, including frequencies and percentages for categorical variables, and means with standard deviations (SD) for continuous variables. A Chi-square test was performed with $p < 0.05$ indicates statistically significant differences. Verbal consent was obtained from participants before distributing questionnaires. Data were treated confidentially and used only for research purposes.

3. Results

This study included 951 participants. Mothers comprised 36 (3.8%) under 20 years old, 301 (31.7%) 20–30 years old, 401 (42.2%) 31–40 years old, 171 (18%) 41–50 years old, and 42 (4.4%) over 50 years old. The number of children is 214 (22.5%) with one, 196 (20.6%) with two, 184 (19.3%) with three, 166 (17.5%) with four, and 191 (20.1%) with five or more. Education wise, the majority (56.3%) held a bachelor's degree or higher. Among participants, 94% were married, while 32 (3.4%) divorced, and 25 (2.6%) widowed. Further, 557 (58.6%) were housewives, while 394 (41.4%) were employed. Regarding fathers' occupations, 783 (82.3%) were employed, 64 (6.7%) were unemployed, and 104 (10.9%) were retired. A significant proportion (72.6%) did not have healthcare insurance (Table 1).

TABLE 1. Demographic details of the participants.

Measure	Items	Frequency	Percentage (%)
Mother's Age			
	<20 yr	36	3.8
	20–30 yr	301	31.7
	31–40 yr	401	42.2
	41–50 yr	171	18.0
	>50 yr	42	4.4
Number of Children			
	1	214	22.5
	2	196	20.6
	3	184	19.3
	4	166	17.5
	>5	191	20.1
Education Level			
	Primary School	74	7.8
	Secondary School	50	5.3
	High School	180	18.9
	Diploma	112	11.8
	Bachelor> or Higher	535	56.3
Marital Status			
	Married	894	94.0
	Divorced	32	3.4
	Widowed	25	2.6
Mother's Profession			
	Employed	394	41.4
	Housewife	557	58.6
Father's Profession			
	Employed	783	82.3
	Unemployed	64	6.7
	Retired	104	10.9
Healthcare Insurance			
	Yes	261	27.4
	No	690	72.6

Parents' practices regarding the management of fevers resulting from dental problems are illustrated in Table 2. Out of 951 participants, 619 (65.1%) consistently reflected on the cause of their child's fever, whereas only 5 (0.5%) never did (mean = 1.83; SD = 1.407; p -value = 0.02). Most (54.6%) parents reported always preventing their children from being exposed to colds all the time, while 27 (2.8%) seldom did, and 43 (4.5%) never did so (mean = 1.98; SD = 1.409; p -value = 0.110). Approximately half (52.5%) of the respondents reported always taking their children to the hospital immediately if the fever was high, with only 14 (1.5%) indicating they never did (mean = 2.12; SD = 1.527; p -value = 0.185). 39% reported never using herbal medicines to reduce fever, while 46 (4.8%) always did (mean = 3.53; SD = 1.070; p -value = 0.700). Analgesic medication was always administered by 525 (55.2%) following a doctor's prescription, while 31 (3.3%) never did (mean = 2; SD = 1.439; p -value = 0.686). A significant proportion (64.2%) admitted giving antibiotics to their children without a doctor's prescription (mean = 1.86; SD = 1.358; p -value = 0.001). Moreover, 84.3% reported always checking their child's fever during the night (mean = 1.26; SD = 0.771; p -value = 0.814), and 82.4% preferred to sleep with their sick child (mean = 1.32; SD = 0.870; p -value = 0.641). Additionally, 756 (79.5%) participants typically woke their children for medication during the night, while 17 (1.8%) never did (mean = 1.38; SD = 0.944; p -value = 0.127). Lastly, 496 (52.2%) participants consistently relied on doctors as their information source on fever management (mean = 2.03; SD =

1.447; p -value = 0.011).

Analgesic administration, such as "Diclofenac-Paracetamol" or "paracetamol-ibuprofen", for effective management of dental-related fever among children is reported at rates ranging from 0.1% to 4.7%. Paracetamol is the most prescribed analgesic by parents to manage fever, accounting for 55.6% of cases (Table 3). Parental administration of non-prescribed antibiotics to children suffering from dental fever is listed in Table 4. Around 7.8% of "Augmentin" prescriptions are given without a doctor's guidance. According to the previous paragraph, Saudi Arabian parents were prone to this behavior.

4. Discussion

Parental knowledge of childhood fevers, including those associated with dental problems, as well as the in-home management of the latter was examined in this study. The survey was conducted while participants waited for appointments in healthcare centers to capture their genuine knowledge and experiences.

Fever and tooth eruption have consistently been linked in studies. Several studies have reported controversial results regarding teething and fever [22, 23]. In addition, this association was observed in a study that measured axillary and tympanic temperature [11].

Approximately half (52.5%) of the participants in this study reported taking their children to the hospital immediately in

TABLE 2. Practices of parents regarding dental origin fever management among children.

When child has fever	Always	Mostly	Never	Rarely	Sometimes	Mean \pm SD	p -value
Start recalling the reason why child developed fever	619 (65.1)	168 (17.7)	5 (0.5)	29 (3.0)	130 (13.7)	1.83 \pm 1.407	0.020
Prevent by child from having cold items	519 (54.6)	227 (23.9)	43 (4.5)	27 (2.8)	135 (14.2)	1.98 \pm 1.409	0.110
Take him to hospital immediately if the fever is high	499 (52.5)	223 (23.4)	14 (1.5)	44 (4.6)	171 (18.0)	2.12 \pm 1.527	0.185
Use herbal medicines to reduce fever	46 (4.8)	76 (8.0)	371 (39.0)	247 (26.0)	211 (22.2)	3.53 \pm 1.070	0.700
Give child analgesic medication by doctor prescription	525 (55.2)	220 (23.1)	31 (3.3)	33 (3.5)	142 (14.9)	2.00 \pm 1.439	0.686
Give antibiotic dose without doctor prescription	611 (64.2)	101 (10.6)	102 (10.7)	35 (3.7)	102 (10.7)	1.86 \pm 1.358	0.001
Checking child fever during night	802 (84.3)	110 (11.6)	4 (0.4)	8 (0.8)	27 (2.8)	1.26 \pm 0.771	0.814
Sleep in the same room when child is not feeling well	784 (82.4)	106 (11.1)	15 (1.6)	12 (1.3)	34 (3.6)	1.32 \pm 0.870	0.641
Usually wake them up during the night for medication	756 (79.5)	122 (12.8)	17 (1.8)	14 (1.5)	42 (4.4)	1.38 \pm 0.944	0.127
Sources of information about fever management is the doctor	496 (52.2)	268 (28.2)	6 (0.6)	28 (2.9)	153 (16.1)	2.03 \pm 1.447	0.099
Fear of brain damage dehydration febrile convulsions	623 (65.5)	179 (18.8)	21 (2.2)	30 (3.2)	98 (10.3)	1.74 \pm 1.290	0.011

SD: standard deviations.

TABLE 3. Analgesics used by parents.

Analgesics	Frequency	Percent (%)
Paracetamol	2	0.2
Diclofenac	1	0.1
Diclofenac-Paracetamol	1	0.1
Ibuprofen	36	3.8
Paracetamol	529	55.6
Paracetamol-Ibuprofen	44	4.7
Don't Know	338	35.5
Total	951	100.00

TABLE 4. Antibiotics administered to children with dental origin fever without doctor's prescription.

Antibiotic/Analgesic	Frequency	Percent (%)
Amoxicillin (penicillin-type)	23	2.4
Amoxil (penicillin-type)	3	0.3
Augmentin (potassium clavulanate)	74	7.8
Augmentin-Azithromycin (azithromycin-amoxicillin)	2	0.2
Azithromycin (macrolide-type)	10	1.1
Azithromycin-Amoxicillin (amoxicillin)	1	0.1
Azomycin (macrolide-type)	1	0.1
Banabol (acetaminophen)	1	0.1
Cefixime (cephalosporin)	1	0.1
Cefuroxime (cephalosporin)	1	0.1
Cephalosporin	5	0.5
Julmentin (penicillin-type)	1	0.1
Kalafox	2	0.2
Kelvox	2	0.2
Puromycin	2	0.2
Magan	2	0.2
Flavin (Vit C-Rutin-Hesperidin-Bioflav)	1	0.1
MyMacamox	1	0.1
Newmax	1	0.1
Clavi (Amoxicillin)	1	0.1
Zithromax (Azithromycin)	3	0.3
Haemon	2	0.2
Sprax	1	0.1
Glomentin	1	0.1
Don't Know	72	7.6
I don't use	721	75.8
Don't Remember	15	1.6
Total	951	100.00

case of high fever. A previous study revealed that 75% of parents administer non-prescription fever medication to their children, while 64% seek medical attention promptly for fever-stricken children [23]. Among our participants, 64.2% always used non-prescribed antibiotics. This finding contrasts with Shalam M. *et al.* [21] (2020) at King Saud Hospital in Saudi Arabia, where only 15.7% of mothers reported using antibiotics to treat high fever without a prescription. Our study found a notable prevalence of parents giving non-prescribed antipyretics to their children, suggesting a tendency to treat mild fevers with unnecessary medication. The easy availability of antibiotics, lack of awareness about antibiotic resistance, self-medication habits, and inadequate healthcare access or advice may all contribute to the use of antibiotics without prescription.

4.8% of study participants used herbal remedies for fever relief. Several other countries have reported similar practices, including Taiwan and Palestine [24, 25], but Shalam M. *et al.* [21] did not document these findings. We found that paracetamol was most commonly used as an analgesic in this study. In Italy, paracetamol (acetaminophen) is widely recommended by pediatricians for managing febrile children, and its usage seems to be rising among caregivers, as reflected in our study [26, 27].

Saudi Arabian parents are frequently anxious and misunderstanding fever, according to this study. It was observed that parents in all socioeconomic groups [28]; 65.5% expressed concern about brain damage, dehydration, and febrile convulsions associated with fever.

Around half of parents administer antipyretics when temperatures are below 38 °C, often administering incorrect doses of these medications or excessive amounts of paracetamol and ibuprofen [29]. It would be beneficial to provide parents with control over decisions pertaining to their child's health by promoting parent empowerment in fever management [30, 31].

Further studies should be conducted in the Saudi context to shed light on how parents manage childhood fever caused by dental problems and their efficacy. By suggesting avenues for parental education, these studies could contribute to improving pediatric healthcare in Saudi Arabia.

5. Conclusions

This study reveals a lack of knowledge among Saudi parents about dental-related fever management in children. Using non-prescribed fever medications excessively could lead to a misuse of healthcare resources, according to the study. Proactive educational interventions (*i.e.*, workshops, seminars, and other training programs) that target parents as well as the broader community are essential for addressing this issue. Children's health and well-being are at stake when these interventions promote safe and appropriate medication practices.

It will be beneficial to the health of current and future generations if we support educational activities within healthcare institutions as well as through verbal and visual media, so that mothers become aware of the practices that are effective and those that could be detrimental.

This study has some limitations. Due to the majority of participants being mothers, the findings on prevalent practices

may have been skewed. Considering that the study was conducted in different healthcare centers with different patient characteristics and practices, the results may not generalize to the Saudi population. As a result of self-reported data, recall bias cannot be excluded.

AVAILABILITY OF DATA AND MATERIALS

The data will be available from the corresponding author on request.

AUTHOR CONTRIBUTIONS

AAA—designed the research study, collected the data and prepared the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The research was approved by the Deanship of Scientific Research, Najran University (443-40-38859 DS) and consent form to use the participant's data for study purposes was signed by each participant.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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