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Parents' knowledge and management of children's fevers in Saudi Arabia after the COVID-19 pandemic

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ABSTRACT

Introduction: Fever is a common childhood symptom that is considered to be the cause of around 70% of pediatric visits. *Objectives:* This study aimed to assess parents' knowledge about and management of fevers in children since the COVID-19 pandemic in Saudi Arabia. *Methods:* This cross-sectional study collected data from 488 Saudi Arabian parents using a self-administered questionnaire to assess the parents' knowledge about fevers and how to manage them in children. SPSS was used for analysis. *Results:* The mean total knowledge score was 8.85 ± 2.09 out of 18, indicating poor knowledge levels. Females had higher total knowledge scores than males. Only 3.69% of respondents identified the rectum as the best location for taking children's temperatures. A total of 59% knew that fever scan lead to seizures, but 65% believed it also leads to blindness. Most used ear thermometers (51.43%). A majority (76.43%) thought COVID-19 made them more concerned about fevers, with 65.98% becoming more worried about children's fevers after COVID-19. *Conclusion:* Saudi Arabian parents have low levels of knowledge about children's fevers after COVID-19, despite believing the pandemic improved their knowledge. More health-promoting campaigns are needed to boost knowledge about childhood fevers.

Keywords: Parents, Knowledge, Management, Fever, Children, COVID-19, Saudi Arabia

1. INTRODUCTION

Fever is defined as a temperature higher than 38 °C (Child et al., 2005). It is known to be one of the most symptoms in children and is considered the cause of around 70% of all pediatric visits (Bertille et al., 2013). In 1980, Schmitt invented the term "fever phobia," which describes the unrealistic fears parents have about fevers due to miscomprehension about its management and its role in sickness. Fever phobia in parents was the most

frequent cause of hospital visits, according to several studies in Italy, Ireland, Jordan, Nigeria, Canada, Morocco, and France (Al-Eissa et al., 2000; Chiappini et al., 2017; Gunduz et al., 2016). This was linked to extreme fears of complications such as febrile convulsions, brain damage, or even death (Arica et al., 2012; Crocetti et al., 2001).

In 2019, A new type of coronavirus, SARS-CoV-2 (COVID-19), originated in China and caused a worldwide pandemic (Gavriatopoulou et al., 2021). A study by Yasuhara et al., (2020) showed that the main clinical feature of pediatric COVID-19 cases was fever (64%). In another study, fever was a symptom in 47% of cases (Patel, 2020). A combination of knowledge and parents' decision-making abilities, values, and social beliefs can lead to positive behaviors for managing any disease (Heisler et al., 2004). Numerous health-care institutes have published guidelines for parents to help them detect, manage, and monitor fevers in children, helping to minimize fever phobia. These publications include those from the National Institute for Health and Care Excellence (Davis, 2013) and the Community Paediatrics Committee (Canadian Paediatric Society, 2015).

Numerous studies have aimed to assess parental knowledge, attitudes, and practices regarding fevers in, among other places, Jordan, Nigeria, Morocco, and France (Athamneh et al., 2014; Bertille et al., 2013; Oshikoya and Senbanjo, 2008; Rkain et al., 2014). These studies stated that parental knowledge was poor, which had resulted in errors in dealing with fevers. These errors include inappropriate use of medications (as high as 77%), improper use of physical methods to reduce fevers, and wrong methods for measuring fevers (Athamneh et al., 2014; Chiappini et al., 2012; Gohar et al., 2017).

Three studies were conducted in Saudi Arabia (Al Arifi and Alwhaibi, 2021; AlAteeq et al., 2018; Hussain et al., 2020) assessing parents' knowledge and practices managing fevers. One study showed poor knowledge and overuse of non-prescribed fever medications among parents in Riyadh (AlAteeq et al., 2018). Another study demonstrated that parental awareness was poor and variable among parents in Unaizah city, where the data were collected prior to the pandemic reaching Saudi Arabia, at the beginning of 2019 (Hussain et al., 2020). Conversely, another study conducted after the COVID-19 pandemic showed that parents had good knowledge, correctly identifying high temperatures using appropriate drug deliveries and tools (Al Arifi and Alwhaibi, 2021). Despite these studies, there is scant research encompassing many areas of Saudi Arabia since COVID-19.

Therefore, it is crucial to assess parents' knowledge and behaviors related to fevers in children to decrease the need to see a health-care practitioner. This study aimed to help fill that gap by assessing Saudi Arabian parents' knowledge about children's fevers and how they managed fevers amid the COVID-19 pandemic.

2. MATERIALS AND METHODS

This cross-sectional study used a self-administered online questionnaire and a convenience sampling method to collect data from Saudi parents with at least one child during the period June to July 2022, which was the inclusion criterion. The questionnaire was in Arabic. Informed consent was obtained electronically prior to availability of the survey. Anyone who did not sign the consent from was excluded.

The questionnaire was adopted from a previous study (Chiappini et al., 2012). It consisted of 37 items divided into four sections, with the first section of 10 questions used to collect sociodemographic data. The second section's18 multiple-choice questions measured parents' knowledge and management of fevers, including the best area, thermometer, and frequency to use for monitoring fevers in children, the definitions of low and high fevers, the consequences of fevers on children's health, methods of managing fevers, and fever's sources. These items had only one correct answer, and each correct answer was added to get a total score ranging from 18 as the highest score to 0 as the lowest. Section three assessed the parents' practices and attitudes regarding fever management. Section four had three questions related to the parents' perceptions of fever in children during COVID-19. The questionnaire took approximately 5 minutes to complete. The study was approved by the institutional review board of Umm Al-Qura University, number HAPO-02-K-012-2022-07-1146.

The questionnaire was validated by a pilot study of 20 parents. The data were collected, tabulated, and analyzed using SPSS version 25 (IBM Corp., Armonk, NY, USA). Descriptive analyses are presented as mean, standard deviation (SD), frequency, and percentage. The significance level was 0.05. All data were anonymized.

3. RESULTS

A total of 488 parents completed this study's survey. Data were taken from 22 different cities in Saudi Arabia: Abha, Afif, Ahsaa, Arar, Bisha, Dahran, Dammam, Dawadmi, Hafr Albaten, Hail, Jazan, Jeddah, Jouf, Jubail, Kharj, Khobar, Madinah, Makkah, Najran, Northen Border, Qassim, Qonfutha, Quryat, Rafhaa, Riyadh, Tabouk, Taif, and Yunbu. Most of the participants were mothers (81.15%). Participants had a mean (m) of 3.29 children, with SD of 1.71. Participant age was a mean of 38.00 (SD = 9.03). Participant demographic data are shown in Table 1.

Table 1 Participants' Demographic Data (N = 488)

Item	Responses	n	%
Gender	Male	92	18.85
	Female	396	81.15
Marital status	Married	453	92.83
	Divorced	35	7.17
Education	High school or less	98	20.08
	Bachelor's degree	340	69.67
	Higher education	50	10.25
Employment	Not working or housewife	180	36.89
	Employee	259	53.07
	Business or freelancer	23	4.71
	Retired	26	5.33
Employed in health-care field	Yes	49	10.04
	No	439	89.96
Region	Western	90	18.44
	Central	190	38.93
	Southern	13	2.66
	Eastern	48	9.84
	Northern	147	30.12
Nationality	Saudi	461	94.47
	Non-Saudi	27	5.53

The participants were asked 18 knowledge questions regarding fever and its management. The total knowledge score (sum of correct answers) was m = 8.85, SD = 2.09. Parents' correct answers are provided in Table 2 and Figure 1. Participants correctly selected the best sites for measuring a child's temperature as the armpit (33.2%), rectum (3.7%), groin crease (0.4%), mouth (12.1%), ear (36.3%), and forehead (14.3%). Participants answered a question about the cutoff temperature to be considered a fever in children as (in °C) 36.5 (1.6%), 36 (6.4%), 37.5 (25.2%), 38 (38.3%), 38.5 (15%), and 39 (13.5%).

According to a t-test, total knowledge scores among females (m = 8.95, SD = 2.1) were significantly higher (p = 0.041) than those for males (m = 8.46, SD = 2.06). However, according to simple linear regression, t-test, and ANOVA, the total knowledge score had no significant relationship to age (p = 0.218), marital status (p = 0.736), education level (p = 0.098), employment status (p = 0.354), working in health-care fields (p = 0.689), region (p = 0.961), or nationality (p = 0.56). The participants' beliefs, practices, and management about fevers in children are shown in Table 3.

Table 2 Parents' correct Answers Regarding Fever and Its Management in Children

Question (correct answer)	n	%
When taking your child's temperature, which is the best site? (Rectum)	18	3.69
Which body temperature cutoff point do you consider as indicating a fever? (38 °C)	187	38.32
Which body temperature do you consider the cutoff for high fever? (39–40 °C)	300	61.48
At what body temperature cutoff point do you administer antipyretics? (37.9–38.9 °C)	322	65.98
If your child had a fever you did not treat, how high could it go? (< 40.6 °C)	210	43.03
When your child has a fever, how often do you check their	35	7.17

Question (correct answer)	n	%
temperature? (> 120 minutes)		
When your child's temperature is not going down, is it useful to administer two or more antipyretic drugs? (Yes)	148	30.33
What must be considered to administer the correct dose of an antipyretic drug? (Weight)	320	65.57
Which is correct regarding the largest dose of an antipyretic drug during a high fever? (It is more dangerous)	298	61.07
What instrument do you use to determine the right dose of an antipyretic drug? (The specific dosimeter of the drug)	448	91.80
Side effects of fever in children		
Epileptic seizures (Yes)	291	59.63
Brain damage (No)	194	39.75
Death (No)	273	55.94
Dehydration (No)	162	33.20
Severe illness (No)	118	24.18
Coma (No)	240	49.18
Rave (Yes)	439	89.96
Blindness (No)	319	65.37

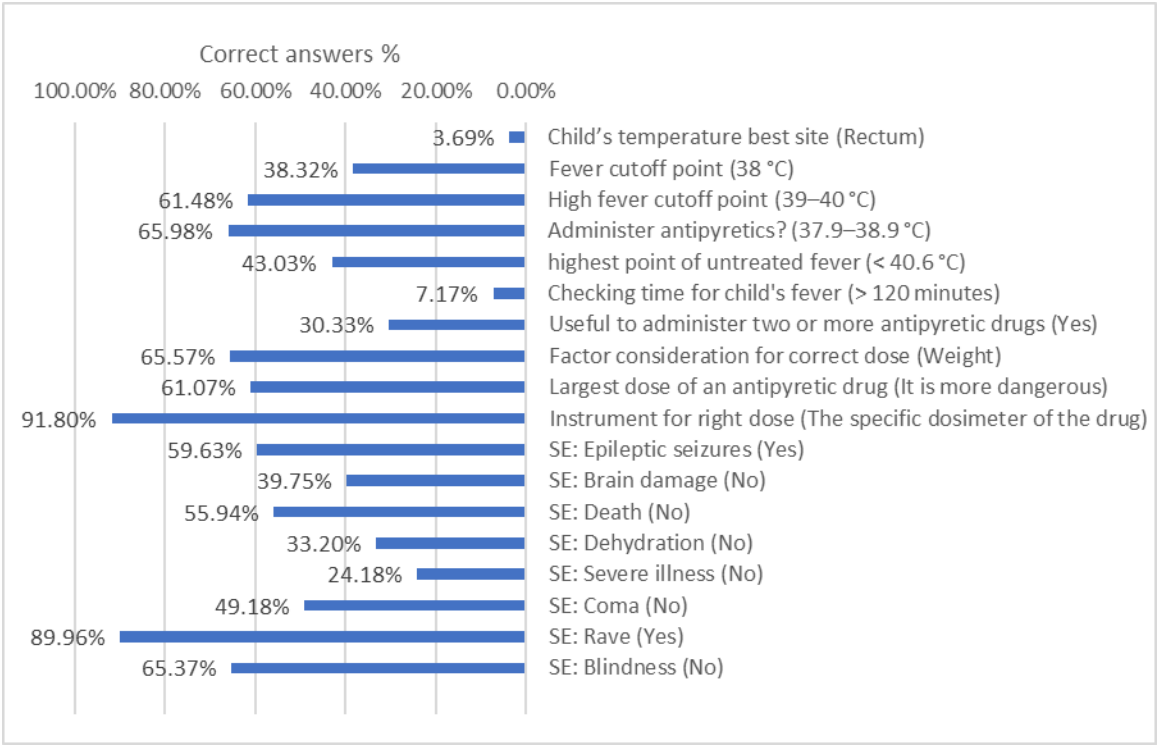

Figure 1 Parents' Correct Answers Regarding Children's Fever and Its Management; SE: Side effect

Table 3 Parental Beliefs and Practices Regarding Fever and Its Management in Children

Question Responses	n	%
What kinds of thermometers should you use to measure a child's temperature?*		
Mercury-in-glass	60	12.30%

Oral electronic	80	16.39%
Ear thermometer	251	51.43%
Skin infrared	44	9.02%
A band around the head	0	0.00%
Oral pacifier thermometer	8	1.64%
I don't have a thermometer	45	9.22%
Which antipyretic drugs should you administer for a child's fever?*		
Acetaminophen	446	91.39%
Ibuprofen	183	37.50%
Aspirin	47	9.63%
Other	125	25.61%
Which other remedies should you use in addition to antipyretic drugs to reduce a child's fever?*		
Cold towel or sponge	362	74.18%
Ice pack	188	38.52%
Tepid towel or sponge	291	59.63%
Other	278	56.97%
How do you administer an antipyretic drug?*		
Orally	474	97.13%
Rectally	331	67.83%
Why would you administer an antipyretic drug rectally?*		
More useful	289	59.22%
More practical	243	49.80%
According to the doctor's instructions	291	59.63%
Child refuses to take medicine orally	284	58.20%
Child vomits when taking medicine orally	315	64.55%
How do you calculate the correct dose of antipyretic drug to administer to your child?		
According to the doctor's instructions	332	68.03%
According to the drug's packaged leaflet/the manufacturer's advice line	67	13.73%
Consultation with someone else	6	1.23%
According to information I find online	2	0.41%
According to information I get from a doctor	47	9.63%
According to the pharmacologist's instructions	34	6.97%

*Multiple answers could be chosen.

In terms of the pandemic's influence on parents' perceptions of fevers in children, 76.43% thought COVID-19 had made them more concerned about fevers in their children. Also, 65.98% became more worried about fevers in children after COVID-19, and 63.11% thought that COVID-19 had made them more aware of dealing with fevers in children.

4. DISCUSSION

The present study aimed to explore parents' medical knowledge and management of fevers in Saudi Arabian children during the COVID-19 pandemic. In general, the participants had low knowledge levels and inadequate management of children's fevers. Females had higher total knowledge scores than males, but among all participants, only 3.69% identified the rectum as the best place for measuring children's temperatures, and only 7.17% knew to retake the child's temperature after 120 minutes. The most

common thermometer used was each thermometer (51.43%). High percentages of 76.43% think COVID-19 made them more concerned with fever symptoms and. Also, 65.98% became more worried about fever for their children after COVID-19. Total knowledge scores were low in our study, which was similar to the findings from other studies in Unaizah and Riyadh, Saudi Arabia (AlAteeq et al., 2018; Hussain et al., 2020).

However, this is in contrast to recent studies in Saudi Arabia and Egypt showing good knowledge and practices around children's fevers (Al Arifi and Alwhaibi, 2021; Waly and Bakry, 2022). An earlier study in France showed that 88.3% of parents had good knowledge about fevers, and nearly half showed good practices in managing fevers (de Bont et al., 2014). One Saudi study had the opposite results, suggesting that parents in Saudi Arabia have high knowledge levels (Al Arifi and Alwhaibi, 2021). The contrast might be due to differences in the questions used. The previous study (Al Arifi and Alwhaibi, 2021) did not mention in which cities their participants lived. Nonetheless, our results imply that parents are in need of more education to boost their knowledge, given that fevers are common during childhood (Barbi et al., 2017) and require parental action.

In the present study, only 38.32% of participants correctly identified the cutoff body temperature defining a child's fever as ≥ 39 °C (Athamneh et al., 2014; Canadian Paediatric Society, 2015). This percentage was better than a study from Morocco, where only 3.5% of participants correctly defined fever temperature (Rkain et al., 2014), and was similar to a study from Australia(34.3%), but lower than studies in Saudi Arabia (79.2%; Al Arifi and Alwhaibi, 2021), Turkey (57.8%; Arica et al., 2012), Greece (66.1%; Matziou et al., 2008), and Jordan (78.25%; Athamneh et al., 2014). The reason for the lower correct response rate in our study compared to others from Saudi Arabia might be that previous studies used the answer 38–39 °C rather than a single fixed number in our case. If we combine the participant responses for 38 °C to 39 °C, the percentage will increase to 68.8%, which is more in line with previous studies. However, we believe a distinct cutoff point is important so that parents know when to take action rather than just monitor their children. It should be noted that what is normal/abnormal for children's fevers can vary depending on the how the temperature is measured (Canadian Paediatric Society, 2015). It is recommended that future studies be more specific regarding the route of temperature measurement.

According to prior research, the rectum is the best site for measuring children's temperatures (Lava et al., 2012). Our study found that very few parents (3.69%) could identify this information, similar to other Saudi Arabian studies (3–3.4%; Al Arifi and Alwhaibi, 2021; Hussain et al., 2020). However, it is much lower than studies of parents in Egypt (50.5%; Waly and Bakry, 2022), Jordan (37%; Athamneh et al., 2014), and Italy (16%; Chiappini et al., 2012). Participants might answer according to their current practices; the majority of our respondents used ear thermometers (51.43%). Also, measuring temperature rectally might be unused because it is considered invasive and unhygienic, with risks of bacterial contamination. It is also difficult when stool or blood is present (Chaturvedi et al., 2004; Chiappini et al., 2012; Chiappini et al., 2017; El-Radhi and Barry, 2006). These differences reveal the variance in knowledge across cultures, which might indicate that different resources, educational systems, and health awareness results in better or worse levels of awareness, and health promotional campaigns should be tailored to fit the target population.

Several items in our study was found to be somehow comparable to the previous study in Saudi studies which was published at the beginning of COVID-19, for example, for the items, that investigated using of two or more antipyretics drugs to reduce body temperature, our study found 30.33% of parents do that, and parents in Unaizah, Saudi Arabia study reported somehow similar result (23%; Hussain et al., 2020). In our study, 59.63% identified that children's fevers could lead to seizures, which was identified by 80% of respondents in Unaizah (Hussain et al., 2020) and 79.7% in another Saudi Arabian study (Al Arifi and Alwhaibi, 2021). While the percentages are not identical, they fall within a similar range. This potentially increases the external validity of our results, but it also raises questions whether COVID-19 caused increased parental knowledge about children's fevers.

For pharmaceutical fever management, most parents in our study (91.39%) chose acetaminophen as the antipyretic drug of choice for fevers. This finding is similar to those from studies in Nigeria (96%; Oshikoya and Senbanjo, 2008), France (85%; Bertille et al., 2013), and Saudi Arabia (84.5%; Al Arifi and Alwhaibi, 2021). Also, in our study, 68.03% followed doctor's instructions, while only 13.73% reported reading the package leaflet or calling the medicine's advice line. Conversely, a study in urban India reported that41.4% consulted their doctor regarding the dosage of antipyretics (Thota et al., 2018). This could indicate that parents trust their general practitioners and pediatricians, implying favorable practices in Saudi Arabia.

In terms of the influence of COVID-19 on parents' perceptions of children's fevers, most of our participants believed that COVID-19 made them more concerned about fever symptoms, caused more worries about fevers in children, and made them more aware of dealing with fevers in children. A study from Jordan found that most participants saw fevers as a clinical sign of COVID-19 (Abuhammad, 2021). Despite our participants' beliefs about the influence of COVID-19, we could not discern that in the knowledge scores, which were low. Numerous articles have reported on the influences of COVID-19 on medical education (Alsoufi et al., 2020) and general lifestyles (Islam et al., 2021), but the influence of COVID-19 did not help the parents in our study to reach the correct conclusions. This may be related to the many articles investigating misinformation during COVID-19 (Brennen et al.,

2020), especially on social media platforms like Twitter (Shahi et al., 2021). This spread of misinformation may be the cause of our relatively low knowledge level results, but further research is needed to verify this claim. It is alarming if parents confidently believe they have high levels of knowledge about fevers but, in actuality, do not.

We suggest more health awareness campaigns to increase parental knowledge about fevers and potential complications, aiming to decrease panic (fever phobia) and improve skills for dealing with fevers. This kind of intervention has been suggested to result in positive outcomes with fewer mistakes and less unrealistic worries and fears (Chiappini et al., 2012). They may also overcome misinformation. In addition to simple awareness campaigns, such as with brochures, we can use the technology of mobile phone apps or telemedicine to improve knowledge about managing children's fevers, as suggested by some studies (Esposito et al., 2020; Kim et al., 2019). The social media accounts for the Ministry of Health in Saudi Arabia could also boost such important topics, as they had previously been used to promote health (Alhassan and Al Dossary, 2021).

This study is one of only a few focused-on parents' knowledge and management of fevers taking into consideration their worries and concerns after COVID-19 and using a validated questionnaire with participants from 22 cities across Saudi Arabia. There were a few limitations in the current study, including a cross-sectional study design, self-reported questionnaire, and unequal sample sizes in the cities of respondents' residence. These may reduce the external validity of our results.

5. CONCLUSION

Parents in Saudi Arabia have low levels of knowledge about fevers in children, resulting in poor management of fevers in Saudi children following the COVID-19 pandemic, despite parents' beliefs that the pandemic improved their knowledge. We highly recommend that health-care providers educate parents about the right ways to manage feverish children. This could be done using social media platforms and other health promotional venues.

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Author contributions

All authors contributed to the research and/or preparation of the manuscript. SA and KA: Study design, research idea, writing original draft preparation, statistical analysis, writing-review, and editing. SF, NA, EA, TA, AsA, AlbA, AliA, SA contributed to the study design, data collection and review and editing. All authors read and approved the final version of this manuscript.

Ethical approval

The study was approved by the institutional review board of Umm Al-Qura University, (Ethical approval code: HAPO-02-K-012-2022-07-1146).

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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