

BMJ Open Fever among preschool-aged children: a cross-sectional study assessing Lebanese parents' knowledge, attitudes and practices regarding paediatric fever assessment and management

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ABSTRACT

Objectives This study investigated parental knowledge, attitudes and practices towards fever in preschool children to help address gaps in public health and provide information with the aim of supporting clinical reports for parental education.

Design A cross-sectional study design was used to explore parental experiences with fever.

Setting Participants were recruited randomly from schools all over Lebanon targeting the preschool divisions.

Participants Parents of children aged 5 years or less.

Interventions An electronic self-administered questionnaire was sent to the parents through the schools' emails and e-learning mobile applications.

Primary and secondary outcomes The primary outcome measure was to assess parental knowledge about the precise definition of fever, correct use of medications and to evaluate the impact of sociodemographic factors on this knowledge. The secondary outcome measures were to assess parental attitudes and practices of fever management, sources of information and reasons to seek primary medical attention.

Results A total of 733 parents were included in the study. Only 44% identified fever correctly according to the recognised definition by international guidelines. A significant association between parents' knowledge of antibiotics and years of parenting experience was found (adjusted OR, ORa=4.23, 95% CI 1.41 to 12.68, p=0.01). Other sociodemographic factors that were significantly associated with parents' knowledge of antibiotics were age (ORa=3.42, 95% CI 1.09 to 10.73, p=0.036) and education level (ORa=7.99, 95% CI 3.71 to 17.23, p<0.001). Greater than 75% usually give their children antipyretics without consulting a doctor. Approximately one-quarter of parents (26.3%) consulted different doctors at the same time, of which more than half (58.4%) had received different medical information.

Conclusions This research determines deficiencies in parents' knowledge of fever with some malpractices in its management particularly regarding antipyretic use. It provides insight for healthcare providers to empower parental experiences by offering the necessary information to enhance general outcomes of febrile sickness.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Large sample size and high response rate are important strengths of this study.
- ⇒ The sample was randomly selected from districts to provide conclusive results.
- ⇒ The assessment setting minimised anxiety and reflected realistic practices.
- ⇒ A main limitation of this study is related to the cross-sectional design.
- ⇒ The self-administered questionnaire may be associated with a risk of information bias.

INTRODUCTION

Fever is well defined as a regulated elevation in the rectal body temperature of 38°C or more.^{1,2} It is normal in childhood and rarely indicates a serious illness, although it highly concerns parents and causes anxiety.^{3–6} Fever phobia is characterised by parents' overconcern and exaggerated unrealistic misconception around fever.⁷ Parental reporting of febrile sickness and seeking medical attention are common. In fact, feverish conditions remain one of the common reasons for visiting paediatricians, general practitioners and emergency departments, as well as out-of-hours care to seek medical advice and reassurance.^{8,9}

Paediatric fever is frequently treated improperly and unnecessarily, resulting in misuse of public healthcare facilities or safety problems that might endanger children.¹⁰ Parents may resort to various non-pharmacological and pharmacological measures including warm baths, ice water, alcohol wiping, antipyretics and antibiotics to manage fever.¹¹ Antipyretics and antibiotics are extensively used for treating febrile children.^{12–15} Eldalo reported that the most frequent medications

Table 1 Sociodemographic characteristics of participants

Participants	N (%)
Survey respondents	
Fathers	68 (9.3)
Mothers	665 (90.7)
Age classes	
≤25 years	27 (3.7)
26–30 years	193 (26.5)
31–35 years	265 (36.4)
36–40 years	175 (24.0)
>40 years	69 (9.5)
Educational level	
University	437 (67.2)
High school	153 (23.5)
Other level	60 (9.2)
Nationality	
Lebanese	616 (93.3)
Non-Lebanese	43 (6.5)
Specialty	
Medical	26 (4.4)
Para-medical	88 (14.9)
Non-medical	474 (80.5)
Marital status	
Married	705 (96.6)
Divorced or widowed	25 (3.4)
No of children	
1	135 (18.4)
2	350 (47.8)
3	170 (23.2)
4	53 (7.2)
5	13 (1.8)
>5	11 (1.5)
First child age	
≤3 years	56 (7.7)
4 years	117 (16.2)
5 years	125 (17.3)
6 years	102 (14.1)
>6 years	324 (44.8)
Child/children health status	
Presence of underlying chronic condition (eg, congenital heart/lung disease, Down's syndrome or other condition that may cause more often or serious sickness)	67 (9.3)

self-used to manage paediatric fever in Saudi Arabia are paracetamol followed by antibiotics.¹⁶ Parents routinely lessen mild fever to prevent complications. Nonetheless, fever should be managed accurately, and international guidelines advise the careful use of antipyretics

only when necessary.^{17 18} The substantial misuse of antibiotics to manage paediatric fever is frequently associated with antimicrobial resistance, a global issue that has been reported in developing countries.¹⁹ Moreover, a considerable number of medication errors in children are attributable to antipyretics, and subsequent parental apprehension is increasing.⁹ Some parents have deficient knowledge regarding antipyretic administration, adverse events, dosing and toxicity.²⁰ Lack of this necessary knowledge can lead to negative outcomes on the child's health and the healthcare system. For instance, acetaminophen (paracetamol) underdosing might lead to unsatisfactory management of fever and additional needless medical consultations, consequently resulting in higher healthcare expenses and the overuse of antibiotics.²¹

The American Academy of Pediatrics has issued a clinical report about fever and antipyretic use in children to educate parents about precise management and to minimise fever phobia.²² Research indicates parental misuse of antipyretics by being overdosed or underdosed or inaccurately alternated while managing a fever.^{8 12 23} There are limited studies assessing the knowledge, attitude and beliefs of parents regarding fever. Most published studies have been carried out in secondary care, in which acute distress of children and parents may possibly yield biased perceptions and impact responses.^{9 24} Studies assessing paediatric self-care behaviours are still recommended to ensure the careful management of fever safely and effectively and to minimise unnecessary primary care visits.

The UK National Institute for Health and Care Excellence guidelines development group for the assessment and management of febrile sickness in young children suggests studying parental perception and practice in managing fever and using home-based medications.³ Lebanon is an upper-middle-income country that is currently confronting a devastating socioeconomic and financial crisis that conceivably ranks among the top three most severe crisis episodes worldwide and, therefore, depreciates the national public and health necessities.^{20 25 26} Multiple classes of medications are available for over-the-counter use in the Lebanese community for self-care, including antibiotics and antipyretics.^{15 20 27 28} Nevertheless, there is a scarcity of data around paediatric fever and parental knowledge and practices regarding its management. This study investigated parental knowledge, attitudes and practices towards fever in preschool children to help address all pointed gaps and provide information with the aim of supporting clinical reports for parental education.

METHODS

Study design and setting

A cross-sectional study design was used to explore parental experiences about fever. Participants were recruited from schools all over Lebanon targeting the preschool divisions to include parents of children aged 5 years or less. Schools were selected by a multistage cluster sampling technique

Table 2 Association between sociodemographic predictors and good parental knowledge on the dependent variable 'every child with fever needs antibiotic'

Variable	Adjusted OR	95% CI	P value
Gender			
Mother*			
Father	1.62	0.75 to 3.52	0.223
Age classes			
≤25*			
26–30	2.91	0.92 to 9.24	0.07
31–35	3.42	1.09 to 10.73	0.036†
36–40	3.27	0.99 to 10.83	0.053
>40	1.68	0.44 to 6.36	0.448
Education level			
Other*			
University	7.99	3.71 to 17.23	<0.001†
High school	1.86	0.82 to 4.23	0.137
Nationality			
Lebanese*			
Non-Lebanese	0.55	0.20 to 1.52	0.246
Specialty			
Nonmedical*			
Medical	1.57	0.38 to 6.46	0.536
Paramedical	1.22	0.63 to 2.35	0.56
Marital status			
Married*			
Divorced or widowed	2.44	0.84 to 7.11	0.102
No of children			
1*			
2	0.78	0.38 to 1.57	0.48
3	0.98	0.41 to 2.32	0.956
4	0.87	0.29 to 2.66	0.808
5	0.3	0.05 to 1.67	0.168
>5	0.81	0.12 to 5.42	0.827
First child age			
≤3*			
4	1.41	0.54 to 3.68	0.48
5	4.23	1.41 to 12.68	0.010†
6	1.02	0.39 to 2.69	0.966
>6	1.07	0.42 to 2.70	0.893

*Reference.
†Statistically significant.

from all over Lebanon to minimise selection bias. Sample variation was maximised by including large and small schools that could be public or private in urban and rural settings. Selected schools were approached through phone calls and emails to elucidate the study purpose and procedure. Participating schools had to approve the study proposal and help deliver the study survey to the parents. Surveying took place from November 2020 to June 2021. A total of 12 schools were enrolled in the study following their administrative approval. The schools were distributed over Lebanon, including four schools in

the capital Beirut, two in the North governorate, two in the South governorate, two in Bekaa and two in Mount Lebanon. The total number of parents who were targeted exceeded 1000. An electronic self-administered questionnaire through Google Forms was sent to the parents through the schools' emails and e-learning mobile applications. This approach was chosen because it is the most common school-house communication pattern in Lebanon following repetitive lockdowns due to the COVID-19 pandemic. A separate message was also sent by each school to the parents, encouraging them to take time to fill out the survey carefully. The schools' messages uniformly highlighted the importance of contributions and their impact on nationwide childhood health.

Questionnaire and outcomes

A previously developed and validated questionnaire in the Netherlands and Ireland was used with permission.^{2 29} The questionnaire was translated into the Arabic language, the native language of Lebanon, by two authors using forward backward translation methods and customised to reflect the cultural pattern and practices in Lebanon. Conflicts were resolved by consensus. A sample of 15 parents was initially used to pilot the study. The survey consisted of 32 questions with subsets distributed over 4 parts. The first part included questions about the sociodemographic characteristics of the participants and the health status of their child/children including the presence of any underlying chronic conditions. The second part assessed parents' knowledge of fever and the correct use of antimicrobials. The third part evaluated parental attitudes and practices regarding fever assessment and management and the utilisation of antipyretics. Parents answered 'yes/no' and 'agree/disagree' questions and responses used Likert Scales. The last part evaluated prospects from pursuing medical attention and identified information resources. The primary outcome measure was to assess parental knowledge about the precise definition of fever, correct use of medications and to evaluate the impact of sociodemographic factors on this knowledge. The secondary outcome measures were to assess parental attitudes and practices of fever management, sources of information and reasons to seek primary medical attention.

Sample size calculation

Center for Disease Control and Prevention (CDC) Epi Info V.7.2.4. for population surveys was used to calculate the required minimal sample size. The expected frequency was kept at 50% to yield the largest minimum sample size. Accordingly, a minimum of 384 participants were required to allow for adequate power of statistical analysis and produce a 95% confidence level with an acceptable margin of error of 5%.

Statistical analysis

Responses were extracted from Google Forms into Microsoft Excel and then coded and analysed using IBM SPSS

Table 3 Association between sociodemographic predictors and good parental knowledge on the dependent variable ‘antibiotics are not used to cure infections caused by viruses’

Variable	Adjusted OR	95% CI	P value
Gender			
Mother*			
Father	1.02	0.50 to 2.11	0.955
Age classes			
≤25*			
26–30	0.8	0.25 to 2.56	0.702
31–35	0.79	0.25 to 2.52	0.691
36–40	0.55	0.16 to 1.85	0.332
>40	0.79	0.21 to 3.04	0.736
Education level			
Other*			
University	8.51	2.58 to 28.14	<0.001†
High school	4.02	1.14 to 14.19	0.031†
Nationality			
Lebanese*			
Non-Lebanese	2.69	0.86 to 8.48	0.09
Specialty			
Nonmedical*			
Medical	11.21	3.02 to 41.64	<0.001†
Paramedical	3.43	2.04 to 5.76	<0.001†
Marital status			
Married*			
Divorced or widowed	4.47	0.96 to 20.82	0.056
No of children			
1*			
2	1.29	0.73 to 2.27	0.388
3	1.26	0.62 to 2.57	0.526
4	2.27	0.82 to 6.23	0.113
5	1.74	0.35 to 8.73	0.499
>5	2.3	0.32 to 16.34	0.406
First child age			
≤3*			
4	1.26	0.55 to 2.88	0.585
5	0.98	0.42 to 2.29	0.963
6	0.68	0.28 to 1.63	0.387
>6	0.61	0.26 to 1.41	0.246

*Reference.

†Statistically significant.

V.26.0. The sociodemographic characteristics of the parents were assessed by descriptive statistics. Categorical variables were expressed as frequencies and percentages and were evaluated in the bivariate analyses using χ^2 or Fisher’s exact test. Multivariable analyses using three binomial logistic regression models were used to determine predictors of the dependent variables ‘good knowledge of fever definition’ and ‘good knowledge of antibiotic use’.

All covariates with a p value lower than 0.2 in the bivariate analyses were included in the models to preclude potential confounders. The results were reported as adjusted ORs (ORa) with a 95% CI. The OR of each variable was adjusted to all other variables that were included in the model. The level of significance was set at $p \leq 0.05$ and an acceptable margin of error = 5%.

Patient and public involvement

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

RESULTS

Sociodemographic characteristics

A total of 733 parents completed the survey, producing a response rate greater than 70%. The majority of respondents were Lebanese (93.3%, $n=616$), as parents representing other nationalities in Lebanon also participated in this study. More than 60% of the participating parents had a university degree, of which only 4.4% were in the medical field. Most of the participants (47.8%) had two children, followed by three children (23.2%). Only 9.3% of the parents had a child with an underlying chronic condition that may cause him/her to get sick more often or seriously than other children. The detailed sociodemographic characteristics are presented in [table 1](#).

Parental knowledge on paediatric fever and antimicrobial use

Less than half of the parents (44%) identified temperatures at which they defined fever according to the recognised definition of 38°C or more. Another 42% of parents spotted fever at a temperature above the identified definition, and 14% indicated it below this definition. Parents demonstrated variable knowledge regarding infections and use of medications. Almost half of the parents (46.9%) considered that every child with fever needs an antipyretic. Most parents (75.3%) believed that the majority of feverish illnesses do not require an antimicrobial prescription, and 66.2% were aware that antibiotics are used only to treat bacterial infections.

The multivariable logistic regression analysis between sociodemographic factors and ‘knowledge of parents on fever definition’ showed no significant associations (data not shown). A significant positive association between good parental knowledge on ‘using antibiotics for every child with fever’ and years of parenting experience where the first child’s age was 5 years old was found (ORa 4.23, 95% CI 1.41 to 12.68, $p=0.01$). The parental age group of 31 to 35 years had significantly better knowledge on the use of antibiotics for a child with fever (ORa 3.42, 95% CI 1.09 to 10.73, $p=0.036$). The education level of a university degree was also significantly associated with better knowledge (ORa 7.99, 95% CI 3.71 to 17.23, $p<0.001$). Regarding parental knowledge for ‘not using antibiotics to treat a viral infection’, positive significant associations were found with having a university degree (ORa=8.51,

Table 4 Parents' practices on fever

Statement	Answer	Frequency (%)
Do you ever treat your child with fever inhibitors like acetaminophen (paracetamol) when he/she has a fever?	Yes	727 (99.9)
	No	1 (0.1)
If so, above what temperature?	36	6 (0.8)
	36.5	1 (0.1)
	37	4 (0.5)
	37.5	55 (7.5)
	38	300 (40.9)
	38.5	249 (33.9)
	39	109 (14.9)
	40	10 (1.4)
Do you administer medication to your child like acetaminophen (paracetamol) without first consulting a doctor?	Yes	567 (77.6)
	No	161 (22.0)

95% CI 2.58 to 28.14, $p < 0.01$) or a high school degree ($OR_a = 4.02$, 95% CI 1.14 to 14.19, $p = 0.031$). Moreover, significant positive associations were observed for parents working in the medical or paramedical fields (OR_a 11.21, 95% CI 3.02 to 41.64; and 3.43, 2.04–5.76, respectively) with $p < 0.001$). The associations between the sociodemographic predictors and parents' knowledge of antibiotics are shown in [tables 2 and 3](#), respectively.

Attitudes and practices

Parents' practices on fever are reported in [table 4](#). A total of 727 parents, representing 99.9%, treated a feverish child with antipyretics. The initiation of the antipyretic was mostly identified at a temperature of 38°C followed by 38.5°C (40.9% and 33.9%, respectively). Greater than 75% stated that they usually give their children antipyretics without consulting a doctor. Reasons to consider antipyretics included less fluid intake (50.9% agree, 25.5% strongly agree); drowsiness (51.8% agree, 37.3% strongly agree); irritability or non-stoppable crying (44.8% agree, 28.5% strongly agree); and pain (48.9% agree, 38.9% strongly agree) ([table 5](#)).

Examination of practices towards antipyretics shows that less than half of parents (45.8%) believe that they cannot alternate between two different fever-reducing agents, or they are not sure (11.6%). The remaining 42.4% alternate between different antipyretics, but they do not mix them together. Acetaminophen (paracetamol) is the most commonly used antipyretic. It is utilised by 89.9% of parents, followed by ibuprofen and diclofenac. The majority of parents (89.2%) also thought that paracetamol is the most preferred antipyretic agent. Half of the parents (50.5%) preferred to use both syrups and suppositories, and 46.7% preferred to use syrups

Table 5 Parental attitudes toward antipyretic use

Statement	Answer	Frequency (%)
When my child has a fever and takes in less fluids	Strongly agree	163 (25.5)
	Agree	325 (50.9)
	Disagree	133 (20.8)
	Strongly disagree	18 (2.8)
When my child has a fever and is drowsy	Strongly agree	243 (37.3)
	Agree	337 (51.8)
	Disagree	60 (9.2)
	Strongly disagree	11 (1.7)
When my child has a fever and a skin rash	Strongly agree	137 (21.8)
	Agree	220 (35.0)
	Disagree	247 (39.3)
	Strongly disagree	24 (3.8)
When my child has a fever and is crying unstoppably	Strongly agree	182 (28.5)
	Agree	286 (44.8)
	Disagree	150 (23.5)
	Strongly disagree	21 (3.3)
When my child has a fever and is in pain	Strongly agree	262 (38.9)
	Agree	329 (48.9)
	Disagree	68 (10.1)
	Strongly disagree	14 (2.1)
When my child has a fever and is breathing differently (faster or moaning)	Strongly agree	176 (27.5)
	Agree	236 (36.9)
	Disagree	193 (30.2)
	Strongly disagree	32 (5.0)

alone. Approximately three-quarters of parents (73.5%) think that different forms of a drug have the same effect.

With respect to measuring temperature and monitoring fever, slightly more than half of the parents (55.9%) use a rectal thermometer. Other routes and methods of assessment mainly included using a tympanic thermometer or a thermometer under the armpit (26.1% and 8.2%, respectively). Whereas 6.1% depend on skin palpation only. The frequency of temperature measurement varied between three and more than five times daily. The frequencies of daily temperature measurements are shown in [figure 1](#).

Seeking medical care and parental satisfaction

A considerable percentage of parents (91.7%) had visited a paediatrician or general practitioner for their child's fever. Persistence of fever beyond 3 days and fever accompanied by breathing differently, skin rash, irritability or pain were the reasons for these visits. [Table 6](#) reports reasons for seeking medical care. Assessment of post visit satisfaction reveals that 70% are usually very satisfied, and they are given enough time and information. Approximately one-quarter of parents (26.3%) consulted different doctors at the same time, of which more than half (58.4%) had received different medical information.

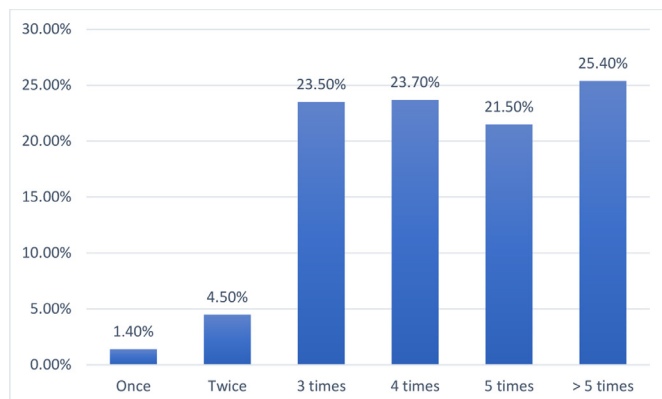


Figure 1 Frequencies of daily temperature measurements.

Sources of information

More than half of the parents (68.1%, n=491) preferred to obtain information about fever before their child gets sick. Paediatricians were identified by 69.1% of parents as the preferable source of information for children's fever. Other sources of information included general practitioners and the internet. Sources of information regarding paediatric fever are shown in figure 2.

DISCUSSION

This study indicates that parents' knowledge about the appropriate definition of fever is inadequate. This was reflected by identifying fever by many parents as a temperature that is either higher or less than the realised level. The sociodemographic characteristics were not prognostic of this knowledge. Acceptable knowledge about antibiotics, on the other hand, was observed. The majority of parents understand the rationale of prescribing antibiotics and their correct use.

Approximately half of the population in this study identified a false definition of fever when compared with existing research (22%–63.1%).^{27 9 11 29–36} The recognition of knowledge gaps among different proportions of each population could be attributable to variation in sample size. The larger sample size in this research and some other studies have elucidated more incorrect fever definitions. Those studies have reported a prognostic role of

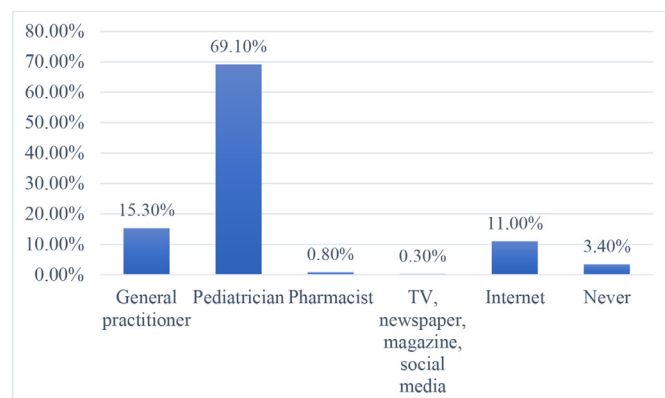


Figure 2 Sources of information regarding paediatric fever.

Table 6 Reasons for seeking medical care

Statement	Answer	N (%)
When my child has a fever and takes in less fluids	Never	31 (4.6)
	Rarely	100 (14.9)
	Sometimes	187 (27.9)
	Most of the times	165 (24.6)
	Always	188 (28.0)
When my child has a fever and is drowsy	Never	23 (3.4)
	Rarely	61 (9.0)
	Sometimes	170 (25.1)
	Most of the times	190 (28.1)
	Always	233 (34.4)
When my child has a fever and a skin rash	Never	19 (2.8)
	Rarely	18 (2.6)
	Sometimes	63 (9.2)
	Most of the times	152 (22.1)
	Always	435 (63.3)
When my child has a fever and is crying unstopably	Never	21 (3.1)
	Rarely	52 (7.6)
	Sometimes	103 (15.1)
	Most of the times	137 (20.1)
	Always	367 (54.0)
When my child has a fever and is in pain	Never	13 (1.9)
	Rarely	26 (3.7)
	Sometimes	86 (12.4)
	Most of the times	132 (19.0)
	Always	437 (63.0)
When my child has a fever and is breathing differently	Never	10 (1.5)
	Rarely	22 (3.2)
	Sometimes	48 (7.0)
	Most of the times	116 (17.0)
	Always	487 (71.3)
When my child has a fever for more than 3 days	Never	11 (1.5)
	Rarely	14 (2.0)
	Sometimes	16 (2.2)
	Most of the times	57 (8.0)
	Always	618 (86.3)

sociodemographic characteristics on parental knowledge of fever definition. Our multivariable analysis showed no significant association between sociodemographic factors and better or deficient knowledge regarding fever definition. Nonetheless, we found a better knowledge about antibiotic utilisation in febrile sickness that was significantly associated with years of parenting experience, age and level of education. Moreover, variation in fever definition could be also attributed to the location of temperature measurement, as previous research provided evidence that fever is rarely defined according

to the location at which the temperature is taken or the type of used thermometer.³⁷

Erkek *et al* reported a significant association between maternal level of education and knowledge on correct fever definition.³⁸ We found that the level of education does not appear to impact incorrect responses, as the inclusion of substantially educated people was not associated with a better link between education and health literacy. This implies that all parents should receive adequate information on fever description regardless of their level of education. Moreover, our results do not appear to be confounded by parental gender, as our multivariable analysis has shown no significant association between the gender of the responding parent and the level of knowledge.

Practices regarding antipyretic utilisation reflect that parents self-treat a feverish child with various antipyretic agents and dosage forms. In contrast to previous research reflecting the possibility of an association between a higher level of education and more frequent medication,²⁹ this research included a large proportion of highly educated individuals who did not recognise the concept of antipyretic alternation. We found that approximately half of the parents did not recognise the concept of alternating between two fever-reducing agents. Our results are consistent with the findings of previous research, which reported that less than one-quarter of the parents alternate between antipyretics.³⁹ This could be the result of consultations provided by paediatricians and general practitioners, as international guidelines advocate against alternating antipyretics to minimise the risk of dosing errors and toxicity.⁴⁰

Malpractices regarding antipyretics appear to be related to their indications, as parents initiate or continue antipyretic therapy if the child has accompanying symptoms, including reduced fluid intake, drowsiness and irritability. The high use of antipyretics might be alarming and could be attributed to fear of fever. Our study did not examine in-depth parental fears and fever phobia or the consequences on parental practices. Existing literature suggests that fever phobia is highly prevalent,^{41–44} and it may affect attitudes and patterns of use of antipyretics.^{29 44–46} The current study adds to the literature that parents tend to regularly seek medical care from a paediatrician when their child has febrile illness with alarming symptoms such as difficulty breathing, rash, pain or persistence of fever. They are usually satisfied following this visit, although one-quarter of parents tend to see or consult multiple doctors at the same time. Parents are also concerned that different doctors provide conflicting information regarding the same sickness, and they prefer to obtain information about fever when their children are not sick.

Implications for practice

Parents should be educated about the nature of fever and that it is a normal sign with different childhood sickness. This information should be provided before

and during illness. Parents should receive information about antipyretics and alternations between different medications. This information should be specific and in well-understandable language. Producing information resources that are clear and accessible would minimise unnecessary visits to physicians and enhance the utilisation of antipyretics. Awareness campaigns targeting parents in different settings, such as in community pharmacies, schools or through published media, would also provide effective parental education about fever and improve management outcomes. Future research may reassess knowledge and practices after providing parents with all necessary information. It may further evaluate the key factors in parental counselling that could influence the outcomes of reassessment.

Strengths and limitations of this study

The large sample size and high response rate are major strengths of this study. The sample was randomly selected from districts all over Lebanon to provide conclusive results. Furthermore, the parents' attitudes were assessed in a nonclinical setting, which minimised unnecessary anxiety and reflected more realistic responses around practices. On the other hand, a main limitation of this study is related to the cross-sectional design, which cannot provide temporality. The majority of participants were mothers, which may limit the generalisability of the findings. The electronic questionnaire may have excluded parents who lack adequate digital literacy. Despite the random sample, this may be associated with a possible risk of selection bias, as the study may have included parents with better literacy and thus better knowledge. In addition, a possible risk of reporting bias or recall bias cannot be excluded, as the questionnaire was self-administered. The current study also did not assess fever phobia, which could have confounded the results that are associated with high antipyretic use. Further research is suggested in this context to determine the impact of fever phobia on parental attitudes and practices regarding fever management. Finally, residual confounders related to COVID-19 may exist, as the impact of the pandemic was not assessed, as it was beyond the scope of this research. Future work will assess the mediating role of parental fear amid pandemics (COVID-19 and influenza) on attitudes and practices during febrile illness.

CONCLUSION

This research determines deficiencies in parents' knowledge of fever with some malpractices in its management. It provides insight for primary care and other healthcare providers on the knowledge gaps and malpractice that should be addressed carefully, as they directly or indirectly influence nationwide childhood health. Healthcare professionals should empower parental experiences by offering the necessary information to enhance general outcomes of febrile sickness. Providing and reinforcing

this information will help parents take better care of their children and will promote their well-being.

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