

Fever Phobia in Korean Caregivers and Its Clinical Implications

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INTRODUCTION

Fever is one of the most common complaints among children brought to medical attention (1). Because fever is not a disease but a symptom, healthcare providers should focus on determining the probable cause(s) of the fever, rather than controlling the body temperature. However, previous studies have shown that caregivers and healthcare providers have unrealistic fears regarding the consequences of fever (2-5).

According to a cornerstone survey conducted in the United States, a substantial number of caregivers have the unrealistic idea that fever can result in brain damage or even death (2). The survey showed that 12% of parents had an incorrect definition of clinically important fever, and surprisingly, 46% and 8% of parents believed that fever, in itself, could cause 'brain damage'

and 'death' respectively. Consequently, 63.5% of parents answered that they were very worried about fever. Schmitt (3) coined a descriptive term for this misconception as 'fever phobia' in the early 1980s. Since then, some studies have described universal 'fever-phobic' ideas in parents, and even healthcare providers, in several countries in diverse clinical settings (4-8). Although 'fever phobia' seems to be a result of the lack of awareness of scientific facts, the clinical implications can be substantial. An uncorrected fever phobic idea in parents and healthcare providers may lead to unhealthy practices and poor management of febrile children. For example, undue concerns regarding fever may cause caregivers to give antipyretic agents more frequently than recommended and to inappropriately wake a sleeping child just to give antipyretics. Fever-phobic ideas may also result in

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inappropriate use of medical resources. O'Neill-Murphy et al. (9) reported that appropriate education could reduce fever phobia in caregivers.

The social burden of fever phobia should be studied in order to provide appropriate awareness and education regarding fever phobia in parents and healthcare providers. However, the extent and the level of fever phobia in guardians of young children have not been examined in Korea. The aim of this study was to determine the implication of fever phobia in Korean caregivers. We investigated the diverse features and effects of fever-phobic ideas, including knowledge, experience, practice, and management of fever. We also sought to determine probable sociodemographic factors associated with fever phobia.

MATERIALS AND METHODS

Study design, setting, and population

This study was a prospective multi-center survey of Korean caregivers who brought a child (aged between 6 months and 7 yr) to a participating emergency department (ED) due to febrile illnesses. From May to August 2008, a cross-sectional survey was conducted in six tertiary referral hospitals in the Seoul metropolitan area, Gyeonggi-do, and Chungcheongnam-do in the Republic of Korea. The selected areas included the two areas with the largest pediatric population in the country, Seoul metropolitan area and Gyeonggi-do.

Study protocol

Trained research assistants (resident physicians or nurses) approached the parents/guardians, mainly during the day time (from 9 am to 5 pm). Caregivers who agreed to participate were enrolled. We excluded subjects who brought critically ill children to the ED or declined to participate in the survey. We also excluded foreign guardians, because the questionnaire was written in plain Korean.

After verbal consent to participate was obtained, a 30-item questionnaire was administered to the caregivers during their stay at the ED. When the survey was completed, the questionnaires were collected by the attending physicians on duty. After the completion of the questionnaires, brief educational sessions on appropriate fever management, such as the correct way to measure body temperature, cut-off values for clinically significant fever, and probable complications of fever and their proper management (2, 3) were provided to the caregivers.

Key outcome measures

The questionnaire was developed after a review of similar previous studies (2, 4, 6, 7). The newly developed questionnaire contained multiple-choice questions on the following items: 1) socioeconomic and demographic data of subjects (age, gender, number of children, relationship to the children, educational

and economic levels), 2) the children's clinical history (febrile convulsions, hypothermia caused by antipyretics), 3) knowledge of fever and antipyretics (definition of fever, possible maximum body temperature due to the fever, possible adverse events in fever, commercial/generic names of antipyretics used), and 4) practice and management of febrile children (correct use of a thermometer, fever-measuring method and frequency, use of a tepid bath and the liquid used for a tepid bath, and management of persistent fever despite antipyretics).

We also analyzed whether the sociodemographic factors of the respondents may influence their 'ideas on fever, such as the major concern on the consequences of fever' and 'management of fever, such as the way antipyretics are administered'.

Data analysis

We used the chi-square test and the Cochran-Mantel-Haenszel test for categorical variables. All tests were two-tailed and a *P* value of 0.05 was considered to indicate statistical significance. All statistical analyses were performed using the SAS software (ver. 9.2; SAS Institute, Inc., Cary, NC, USA).

Ethics statement

This study was approved by the institutional review board of the Seoul National University College of Medicine (No. H-0803-045-238). The researchers at each hospital obtained an informed consent before conducting the survey.

RESULTS

Demographics of subjects

In total, 746 subjects were enrolled (Table 1). All caregivers were

Table 1. Demographic data of the participating guardians

Variables	No. of subjects	%	
Age of child (yr)	0-1	104	13.9
	1-3	164	22.0
	> 3	149	20.0
	Not answered	329	44.1
Sibling(s) No. of a child	None	249	33.4
	≥ 1	497	66.6
Educational background of caregivers	≤ High school	196	26.3
	≥ College	527	70.6
	Not answered	23	3.1
Relationship to child	Mother	558	74.8
	Father	11	1.5
	Relatives, other	112	15.0
	Teacher, etc.	35	4.7
	Not answered	30	4.0
Monthly income (US \$) of the family	≤ \$2,000	80	10.7
	\$2,000-3,500	294	39.4
	\$3,500-5,000	205	27.5
	≥ \$5,000	126	16.9
	Not answered	41	5.5
Attending day care	Yes	319	42.8
	No	389	52.1
	Not answered	38	5.1

Koreans, and their mean age was 34.7 yr (SD \pm 5.0, range 18-61). The female to male ratio was 1.8:1 (62.6% vs 34.3%). The numbers of mothers, fathers, grandparents, and other relatives among the subjects were 476 (63.8%), 234 (31.4%), 26 (3.5%), and 10 (1.3%), respectively. The final educational levels of the caregivers were graduates of high school ($n = 196$, 26.3%), college ($n = 527$, 70.6%), and the remaining 23 (3.1%) guardians did not answer the question. Average monthly household incomes were less than 2,000 US dollars (USD, 1 USD is 1,110 KRW, as of July 2013) in 80 (10.7%), between 2,000 and 3,500 USD in 294 (39.4%), between 3,500 and 5,000 in 205 (27.5%), more than 5,000 in 126 (16.9%), and 41 (5.5%) of the subjects did not answer the question.

The mean age of children was 2.8 yr (SD \pm 2.5). In total, 249 (33.4%) children were the only child and 319 (42.8%) of the children attended day-care centers. The number of children who had experienced febrile convulsion(s) or hypothermia due to antipyretics were 79 (10.6%) and 23 (3.2%), respectively.

Knowledge of fever and antipyretics among Korean caregivers

Most of the caregivers responded that the cut-off value of clinically significant fever was equal to or higher than 38°C ($n = 516$, 69.2%). A total of 103 (13.8%) guardians answered that not less than 38.3°C of body temperature indicates fever. However, 106 interviewees (14.2%) considered a body temperature of less than 37.5°C to be a fever.

About half of the caregivers ($n = 360$, 48.3%) believed that the body temperature of febrile children can reach higher than 42.0°C without treatment. Seventy-eight (10.5%) were worried that the body temperature of a child could reach higher than 44°C. On the possible adverse effects of fever, 295 (39.5%), 66 (8.8%), and 58 (7.8%) caregivers answered that fever could cause brain damage, unconsciousness, or loss of hearing/vision, respectively (Table 2). Since multiple answers to this question was accepted, 41 (5.4%) interviewees answered 'yes' twice or more and 402 (53.9%) of the respondents answered positively to any one of the three—improbable—consequences of fever.

Five hundred fifty-four (74.3%) of the respondents knew the

trade names while 70 (9.4%) knew the generic names of the antipyretics used in managing fever. Significant number of guardians were also worried about—improbable—adverse events of antipyretic agents, such as 'resistance to antipyretics' (41.9%) and 'over-dependency on antipyretics' (39.7%).

Practice and management of febrile children by Korean caregivers

The usual practice and management of fever in Korean parents were determined. The most common body temperature measurement interval was 30 min ($n = 299$, 40.0%), followed by 1-2 hr ($n = 179$, 24.0%), and just 15 min ($n = 165$, 22.1%; Fig. 1). For fever control, 649 (93.0%) used tepid bath/massage at home and 610 (81.8%) correctly used lukewarm water, rather than cold ($n = 46$, 6.2%) or hot water ($n = 12$, 1.6%).

The great majority of respondents ($n = 692$, 92.8%) checked the body temperature of the child before giving an antipyretic agent. An eardrum thermometer using infrared rays was the most commonly used instrument to check the body temperature. An eardrum thermometer was used by 430 (57.6%) respondents, followed by an electronic thermometer ($n = 169$, 22.4%) and a mercury thermometer ($n = 43$, 5.8%).

In total, 494 (66.2%) guardians woke the child to give antipyretics. About half of the interviewees ($n = 354$, 47.5%) followed a 4-hr scheduled interval for administering the medication. As to the alternating use of two kinds of antipyretic agents, 479 (64.2%) denied using the method, but 219 (29.4%) respondents intermittently practiced such alternating use.

If the child remained febrile after the appropriate dose of antipyretic agent, 368 (49.3%) caregivers chose to give a tepid bath/massage, and 266 (35.7%) answered that they visited the hospital (outpatient clinic or ED).

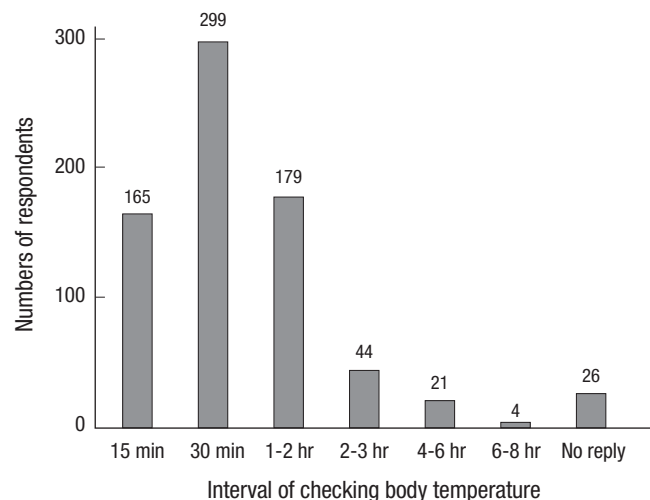


Fig. 1. Interval of body temperature measurement time for febrile child in Korean caregivers. The numbers above the bars represent the number of respondents who answered the corresponding time interval.

Table 2. Possible adverse events of fever that are of concern for the guardians

Possible adverse events of concern	No. of guardians	%
Brain damage*	295	39.5
Febrile convulsion	266	35.7
Dehydration	98	13.1
Loss of consciousness	66	8.8
Vision or hearing loss	58	7.8
Others†	15	2.0
Total	746	100.0

*Such as learning or developmental disorder; †Such as infectious diseases, nausea, vomiting, organ injury, other serious illness. The sum of all the answers exceeded the total number of respondents because multiple choices were allowed.

Table 3. Relationship between caregivers' concerns on adverse events of fever and their education level

Caregivers' concerns		Education level								P value
		Less than high school		College graduate		Postgraduate		Total		
		No.	%	No.	%	No.	%	No.	%	
Brain damage*	(+)	73	37.2	182	39.8	32	45.7	287	39.7	0.52
	(-)	123	62.8	275	60.2	38	54.3	436	60.3	
Febrile convulsion	(+)	74	37.8	164	35.9	20	28.6	258	35.7	0.34
	(-)	122	62.2	293	64.1	50	71.4	465	64.3	
Dehydration	(+)	32	16.3	54	11.8	8	11.4	94	13.0	0.20
	(-)	164	83.7	403	88.2	62	88.6	629	87.0	
Loss of consciousness	(+)	15	7.7	45	9.8	6	8.6	66	9.1	0.74
	(-)	181	92.3	412	90.2	64	91.4	657	90.9	
Vision or hearing loss	(+)	14	7.1	38	8.3	4	5.7	56	7.7	0.86
	(-)	182	92.9	419	91.7	66	94.3	667	92.3	
Others	(+)	3	1.5	9	2.0	3	4.3	15	2.1	0.72
	(-)	193	98.5	448	98.0	67	95.7	708	97.9	

*Such as learning or developmental disorder.

Table 4. Specific concern on the possible adverse events of fever by the guardians with or without prior encounter with febrile convulsion

Specific concern on possible adverse events of fever		Experience of febrile convulsion				P value
		(+)		(-)		
		No.	(%)	No.	%	
Brain damage*	(+)	26	32.9	256	40.4	0.20
	(-)	53	67.1	378	59.6	
Febrile convulsion	(+)	42	53.2	214	33.8	< 0.001
	(-)	37	46.8	420	66.2	
Dehydration	(+)	6	7.6	86	13.6	0.14
	(-)	73	92.4	548	86.4	
Loss of consciousness	(+)	4	5.0	61	9.6	0.18
	(-)	75	95.0	573	90.4	
Vision or hearing loss	(+)	3	3.8	53	8.4	0.16
	(-)	76	96.2	581	91.6	
Others	(+)	0	0	15	2.4	0.17
	(-)	79	100.0	619	97.6	

*Such as learning or developmental disorder.

The differences in the knowledge of fever according to the sociodemographic factors of the respondents

We analyzed whether the specific concern on the consequences of fever was influenced by sociodemographic factors of the guardians or the child (Table 1). We found that none of the factors related with the guardians or the child was associated with the different levels of concern on the consequences of fever. We also found that the proportion of guardians with unlikely concerns (brain damage, loss of consciousness, vision/hearing loss) on the adverse event of fever was not different among guardians with different educational attainment (Table 3).

Even though a higher proportion of guardians who were worried about seizure due to fever had previously encountered a child that had a febrile convulsion, a prior encounter with febrile convulsion was not related to the higher proportion of unrealistic concern on the improbable adverse events of fever (Table 4).

Table 5. Difference in the interval of checking the body temperature of a child among guardians with or without concern of brain damage due to fever

Interval of checking body temperature	Concern of brain damage due to fever						P value
	(+)		(-)		Total		
	No.	%	No.	%	No.	%	
15 min	91	31.2	98	22.2	189	25.8	0.022
30 min	113	38.7	186	42.1	299	40.7	
≥ 1 hr	88	30.1	158	35.8	246	33.5	
Total	292	100.0	442	100.0	734	100.0	

The differences in the management of fever according to the sociodemographic factors of the respondents

Guardians of children that previously had a febrile seizure were more likely to 'wake a sleeping child up to give antipyretics' (66.2% vs 46.8%, $P = 0.017$). Guardians with an only child replied more frequently that 'they would bring their child to a hospital after two hours of no response to antipyretics' than those with multiple children (44.6% vs 34.0%, $P = 0.037$). About half of the parents with more than two offsprings (45.8%) resorted to tepid massage rather than to seek medical attention in the above situation. When we divided the guardians into a group with unrealistic concern of brain damage as a consequence of fever and a group without the same idea, those who were worried of brain damage more frequently checked the body temperature of the child (Table 5).

DISCUSSION

In this multi-center survey, we showed that a substantial number of Korean caregivers have fever-phobic idea and unrealistic concerns. Although there is no scientific basis for the belief that fever itself can cause brain damage, unconsciousness, or hearing or vision loss, more than half of the surveyed Korean caregivers were worried about at least one of these improbable adverse events. This study also found that a significant number of

caregivers' practices were inappropriate, such as giving medications to a child whose body temperature was less than 38°C, administering antipyretic medication at intervals of less than 3 hr, and waking a child up to give him/her the medication. A recent study collectively named these ideas and practices as 'fever phobia components' (10). We believe that 'fever phobic' ideas in parents would be closely related to unhealthy practices in the management of febrile children.

A great majority of Korean caregivers (92.8%) used a thermometer to determine the body temperature of a febrile child. This proportion seemed to be higher than the studies conducted in Israel (76.2%) and other developing countries (10). However, 14.2% of caregivers had incorrect ideas of clinically meaningful fever; and 12.9% of them administered antipyretics to a child with a body temperature of less than 38°C. According to a recent study conducted in Japan (5), an inappropriately high (62.0%) proportion of guardians regarded a body temperature of less than 37.8°C as having fever. However, in the Japanese report, no parent responded that body temperature of the child could reach higher than 43.3°C.

These findings collectively suggest that the knowledge of guardians regarding fever is inconsistent and incomplete. These results also indicate that comprehensive education on fever management, such as measurement of temperature, definition of fever, and proper use of antipyretics and tepid baths, is warranted to improve the understanding and practices of parents/guardians of febrile children. Some previous studies have emphasized education and the development of instruments to eliminate fever-phobic ideas in parents (9, 11).

For the management of febrile children, the results of a Canadian study (12) on the proportion of guardians who do not measure the body temperature before giving antipyretics (6.4%) was comparable with the results of our study (5.5%). However, more Korean guardians re-checked the body temperature within a very short (less than a 1-hr) interval (66.5%) than in Canadian (55.7%) and Japanese (19.0%) guardians. Moreover, more Korean guardians (39.5%) were concerned about brain damage than in Canadians (less than 30%). We also showed that the concern about brain damage due to fever was also prevalent, even in caregivers with high household incomes and high education levels, indicating that fever-phobic attitudes in Korean guardians are widespread, regardless of educational or economic background.

When we consider that the major causes of febrile illness in young children are self-limiting viral syndromes and that the serious bacterial infection rate has decreased substantially following the introduction of effective vaccination (especially *H. influenzae* and *S. pneumoniae* vaccines) (13, 14), the possibility of serious consequences due to fever in this post-vaccine era is relatively low. A recent study conducted in Canada showed that fever-phobic parents treated febrile children aggressively and

often sought medical attention (12). There is a possibility that fever phobia can contribute to the over-use of the ED by non-urgent cases. Another recent survey conducted in Australia reported that many caregivers of children with non-urgent causes brought their children to the EDs based on their perception of the seriousness of the illness and injury ("parental triage") (15). Appropriate education regarding fever phobia should be considered to reduce non-urgent ED visits.

Our study had some limitations. First, some subjects did not respond to all questions, resulting in incomplete data. Second, these data may not be a true reflection of the national situation because this survey was conducted in a small number of hospitals in Korea and the data were generated from a relatively homogenous ethnic population. However, these data may still be representative of Korea because the regions (the Seoul metropolitan area and Gyeonggi-do) were selected by their high pediatric population.

In conclusion, this multi-center survey showed that a significant proportion of Korean caregivers have fever phobia. Appropriate education regarding fever management should be emphasized to reduce non-urgent ED visits and unwarranted caregiver concerns.

DISCLOSURE

The authors have no conflicts of interest to disclose.

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