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Original Article

Assessment of the changing trends in maternal knowledge about management of fever and antibiotic use in the last decade in Türkiye

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ABSTRACT

Background. The wrong attitudes of parents on fever create a basis for unnecessary drug use and increased workload. The study was conducted to evaluate the knowledge and attitudes concerning fever and antibiotic use and demonstrate the changes in the last decade.

Methods. This cross-sectional study was composed of two parts, and a total of 500 participants were included. Group 1 (the new group, 50.0%) consisted of 250 participants who participated in the study between February 2020 and March 2020 and Group 2 (the old group, 50.0%) consisted of 250 participants who participated in the study between February 2010 and March 2010. All participants share the same ethnic properties and had been visiting the same center for similar reasons. A validated, structured questionnaire assessing the management of fever and antibiotic use was administered to all mothers.

Results. According to the fever assessment scoring, maternal knowledge of fever and its management in children significantly increased ($p < 0.001$). The antibiotic assessment score also increased in 2020 ($p = 0.002$).

Conclusions. The public spotlight on the erroneous use of antibiotics and the management of febrile illnesses seems to be promising. Improving maternal/parental educational status and informational advertisements can enhance parental knowledge concerning fever and antibiotic use.

Key words: fever, antibiotics, Mother's knowledge, the public spotlight.

Fever is a common reason for seeking medical attention, constituting up to 30% of visits to both primary care units and pediatric emergency departments.[1-3] Even though most febrile periods in children are benign, it remains a problem that most parents panic about. Inadequate provision of information to parents of children with febrile illnesses by healthcare providers may threaten trust in physicians, ultimately leading to treatment failures.[4,5] Wrong attitudes of parents on fever create a basis for unnecessary drug use and increased workload.[6] Wunderlich introduced the use of a mercurial axillary thermometer in 1851 and measured the axillary temperature in 25,000 patients and stated the average body temperature to be 37.0°C, ranging from 36.2°C to 37.5°C. Wunderlich defined temperatures above 37.5°C as "the territory of fever" and 38.0°C as fever. According to the World Health Organization (WHO), hyperpyrexia is defined as having a temperature above the normal range, and is accepted as 38°C and above for all age groups.[7]

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Antibiotic misuse is an ongoing problem in many countries. According to WHO, 80% of antibiotic consumption occurs in the community, with 20%–50% of such medications being improperly used.[8] This leads to antimicrobial resistance, defined as the ability of bacteria and other microorganisms to resist the effects of an antibiotic to which they were once sensitive.[9]

Unlike most physicians dealing with other specialties of medicine, pediatricians communicate not only with the patient but also with the parents. The insufficient knowledge of parents on the course of the disease may present as difficulty in history taking by the physicians. Several qualitative studies have shown evidence that on some occasions, parental anxiety in dealing with fever in a child increases by ineffective communication with healthcare workers.[10,11] Moreover, several medical reviews have indicated that parental knowledge of fever and antibiotics is insufficient in many countries.[12] To gain control, the Turkish Ministry of Health launched public service broadcasting to inform parents about fever and antibiotics in 2018. The study was conducted to evaluate the knowledge and attitudes concerning fever and antibiotic use and demonstrate the changes in the last decade.

Material and Methods

This cross-sectional study was composed of two parts, and 500 participants were included. The first part consisted of 250 mothers visiting outpatient pediatric clinics in Göztepe Training and Research Hospital, a large tertiary care clinic, between February 2010 and March 2010.[13] The second part consisted of 250 mothers sharing the same ethnic properties and visiting the same center between February 2020 and March 2020. The same validated questionnaire was employed among both populations. The questionnaire was adapted from several studies and consisted of six parts: (I) demographic characteristics of the parents, (II) parental attitude regarding antibiotic use, (III) parental knowledge about the definition of fever, (IV) parental knowledge on managing fever, (V) parental knowledge about complications of fever and fever phobia, and (VI) tools used by parents to measure body temperature.[14]

Three areas were assessed to determine the mothers' socio-educational level: the economic and occupational level of the mother, family income level, and the number of children in the family. The data obtained were classified as follows to determine the mothers' socio-educational level: low (0–2 points), moderate (3–4 points), and high (5–6 points).

Fever knowledge score (FKS)

The study questionnaire included five questions assessing the mothers' knowledge of fever, the existence of a temperature-measuring tool, body temperature regarded as fever, the management of high fever, and the drugs given to reduce fever. The answers obtained were classified as follows to determine the mothers' level of knowledge about fever (fever knowledge score): low (0–2 points) and high (3–5 points).

Antibiotic assessment score (AAS)

The study questionnaire included six questions assessing the mothers' knowledge of antibiotics. The answers obtained were classified as follows to determine the mothers' level of knowledge of antibiotic use: low (0–4 points) and high (5–7 points).

The participants were recruited using the convenience sampling method. The inclusion criteria of the study were as follows: (I) the mothers must understand Turkish, (II) the mothers should have at least one child older than 1 day of age, and (III) the mothers must not have attended any health-related education programs. The exclusion criteria were as follows: (I) mothers who are healthcare-related workers and (II) those who have a child with a chronic illness (e.g., spina bifida, chronic renal failure, and epilepsy).

The Turkish Republic of Health Ministry started public service broadcasting on television and prepared informative brochures in 2018. These advertisements inform the public about antibiotics and antibiotic misusage. The population in 2010 did not encounter the broadcasted spotlights. The population in 2020 declared that they encountered these public service broadcastings and understood their contents at least once in their life.

The questionnaire was applied by the physicians to the mothers in meeting rooms after a brief explanation. Each participant was given 15–20 min to complete the questionnaire.

The validity and reliability of the questionnaire were confirmed using the Kuder–Richardson Formula 21. Significance was evaluated at $p < 0.05$ level.

All data obtained from the questionnaires applied between February 2010 and March 2010 and between February 2020 and March 2020 were compared, and statistically analyzed.

This study was reviewed and approved by the Institutional Ethical Committee of İstanbul Medeniyet University Medical Faculty, (report number 2020/0159). Written consent was obtained from all participants before the study procedures were started.

Statistical analysis

The 2007 Number Cruncher Statistical System (Kaysville, Utah, USA) program was used for statistical analysis. The Shapiro–Wilk test was used to examine the suitability of quantitative data for the distribution of quantitative variables. The Mann–Whitney U-test was used to compare nonparametric variables. In the comparison of qualitative data, the Pearson chi-square test and Fisher–Freeman–Halton test were used. Significance was set at a level of $p < 0.05$.

Results

Demographic Characteristics of the Respondents:

Of the 550 questionnaires distributed, 500 were completed (90.9% response rate). Group 1 (new group, 50.0%) consisted of 250 participants who participated in the study between February 2020 and March 2020 and Group 2 (old group, 50.0%) consisted of 250 participants who participated in the study between February 2010 and March 2010. All respondents were mothers (100%) in the two groups. Moreover, 52.0% and 42.8% of the participants in groups 1 and 2, respectively, were more than 20 years of age. The mean ages of the mother–child pairs were similar between the groups ($p > 0.05$). A statistically significant difference in the degree of maternal education was observed between the groups ($p = 0.004$). The number of mothers with primary school educational level in Group 2 (68.4%) was higher than that in Group 1 (54.0%) ($p < 0.001$). No statistically significant difference in the number of children in families between the two groups ($p > 0.05$). The monthly income of the families in each group was also not statistically different ($p > 0.05$).

Socio-educational level scores were calculated. A statistically significant difference in the socio-educational level scores was observed between the two groups ($p = 0.005$): the scores in Group 1 were higher than those in Group 2.

Evaluation of maternal knowledge of fever and management

The device used to measure body temperature was significantly different between the two groups ($p < 0.01$). The proportion of mothers using a digital thermometer in Group 1 (74.4%) was higher than that in Group 2 (41.6%). In Group 2, the proportion of mothers who manually measure body temperature (36.6%) was higher than that in Group 1 (5.2%).

Statistically significant differences in the definition of fever and its management were observed between the two groups ($p < 0.01$). Salicylate usage as an antipyretic drug significantly decreased in 10 years. The proportions of mothers who use salicylate were 1.6% and 8.0% in groups 1 and 2, respectively (Table I). Fever knowledge scores were also calculated. (Table II). A statistically significant difference in the fever knowledge scores was observed between the two groups ($p < 0.01$); the scores in Group 1 were higher than those in Group 2.

Evaluation of knowledge and attitudes on antibiotic usage

The proportion of mothers who favored antibiotic use for viral infections was comparable between groups 1 and 2. No significant difference in the use of antibiotics for treating diarrhea or the common cold was observed between the two groups ($p > 0.05$). The duration of antibiotic use according to the prescription was statistically different between the two groups ($p < 0.01$). In Group 1 (88.4%), the number of mothers using antibiotics according to their prescription was higher than that in Group 2 (58.4%). Attitudes of mothers towards the expectancy of antibiotic prescription significantly changed in 10 years ($p < 0.01$). Furthermore, 94% of the participants in Group 1 use their prescriptions for other drugs even if they were not prescribed antibiotics. Proper usage of antibiotics significantly improved in Group 1 compared with that in Group 2 (Table III).

A statistically significant difference in AAS was observed between the two groups ($p < 0.01$). The scores in Group 1 were higher than those in Group 2 (Table IV).

Table I. Evaluation of fever knowledge, attitudes, and management.

		Total (n=500)	Group 1 (n=250)	Group 2 (n=250)	*p*
Device for measuring body temperature	Digital thermometer	290 (58.0)	186 (74.4)	104 (41.6)	[a]0.001*
	Mercury thermometer	75 (15.0)	22 (8.8)	53 (21.2)	
	Touching by hand (manual)	105 (21.0)	13 (5.2)	92 (36.8)	
	No fever measurement device	30 (6.0)	29 (11.6)	1 (0.4)	
Definition of fever	35°C	15 (3.0)	3 (1.2)	12 (4.8)	[a]0.001*
	36-36.9°C	44 (8.8)	20 (11.2)	24 (9.6)	
	37-37.9°C	157 (31.4)	70 (28.0)	87 (34.8)	
	38-39°C	259 (51.8)	148 (59.2)	111 (44.4)	
	≥39°C	25 (5.0)	9 (3.6)	16 (6.4)	
Causes of fever phobia	No complication	22 (4.4)	16 (6.4)	6 (2.4)	[a]0.001*
	Seizure	421 (84.2)	220 (88.0)	201 (80.4)	
	Stroke	13 (2.6)	1 (0.4)	12 (4.8)	
	Brain injury	34 (6.8)	12 (4.8)	22 (8.8)	
	I have no idea	10 (2.0)	1 (0.4)	9 (3.6)	
Managment of fever	Undressing	220 (44.0)	152 (60.8)	68 (27.2)	[a]0.001*
	Warm water bath	160 (32.0)	55 (22.0)	105 (42.0)	
	Giving antipyterics	86 (17.2)	34 (13.6)	52 (20.8)	
	Emergency room visit without intervention	30 (6.0)	9 (3.6)	21 (8.4)	
	Giving an antibiotic	4 (0.8)	0 (0)	4 (1.6)	
Use of anti-pyretic in management of fever	Ibuprofen	84 (16.8)	44 (17.6)	40 (16.0)	[a]0.001*
	Acetaminophen	328 (65.6)	183 (73.2)	145 (58.0)	
	Salicylate	24 (4.8)	4 (1.6)	20 (8.0)	
	No idea	64 (12.8)	19 (7.6)	45 (18.0)	

[a]Pearson Chi-Square Test, [c]Fisher Freeman Halton Test, *p<0.05

Table II. Fever knowledge scores.

	Total (n=500)	Group 1 (n=250)	Group 2 (n=250)	*p*
Min-Max (Median)	0-5 (3)	0-5 (4)	0-5 (3)	[b]*0.001***
Mean ± standard deviation	3.06±1.36	3.74±1.09	2.71±1.28	
Low score (0-2), n (%)	128 (25.6)	28 (11.2)	100 (40.0)	
High score (3-5), n (%)	409 (81.8)	222 (88.8)	150 (60.0)	

[b]Mann Whitney U Test, **p<0.01

Table III. Evaluation of knowledge and attitudes of antibiotic usage, n (%)

		Total (n=500)	Group 1 (n=250)	Group 2 (n=250)	*p*
Antibiotic indications	Diarrhea	48 (9.6)	25 (10.0)	23 (9.2)	[a]0.595
	Flu	121 (24.2)	65 (26.0)	56 (22.4)	
	All	56 (11.2)	24 (9.6)	32 (12.8)	
	None	275 (55.0)	136 (54.4)	139 (55.6)	
Antibiotics complications	No complications	12 (2.4)	4 (1.6)	8 (3.2)	[a]0.484
	Have complications	464 (92.8)	235 (94.0)	229 (91.6)	
	Should not be used	24 (4.8)	11 (4.4)	13 (5.2)	
Antibiotics usage attitudes	Use it as prescribed	367 (73.4)	221 (88.4)	146 (58.4)	[a]0.001**
	Use until the bottle runs out	72 (14.4)	16 (6.4)	56 (22.4)	
	Use until the fever subsides back to normal	61 (12.2)	13 (5.2)	48 (19.2)	
Antibiotics can treat all types of infections	Yes	34 (6.8)	15 (6.0)	19 (7.6)	[a]0.477
	No	466 (93.2)	235 (94.0)	231 (92.4)	
Attitudes when antibiotics were not prescribed	Change the doctor	71 (14.2)	14 (5.6)	57 (22.8)	[a]0.001**
	Use an antibiotic recommended.	10 (2.0)	1 (0.4)	9 (3.6)	
	Use the other drugs prescribed	419 (83.8)	235 (94.0)	184 (73.6)	
Antibiotic can prevent febrile seizure	Yes	141 (28.2)	79 (31.6)	62 (24.8)	[a]0.091
	No	359 (71.8)	171 (68.4)	188 (75.2)	

[a]Pearson Chi-Square Test, **p<0.05

Table IV. Antibiotic assessment scores.

	Total (n=500)	Group 1 (n=250)	Group 2 (n=250)	*p*
Min-Max (Median)	1-7 (5)	2-7 (6)	1-7 (5)	[a]*0.002***
Mean ± standard deviation	5.25±1.54	5.48±1.41	5.02±1.64	
Low score (0-4), n (%)	153 (30.6)	59 (23.6)	94 (37.6)	
High score (5-7), n (%)	347 (69.4)	191 (76.4)	156 (62.4)	

[b]Mann Whitney U Test, **p<0.01

Discussion

To the best of our knowledge, this is the first study that has compared data on maternal perspectives on fever, antibiotic knowledge, and attitudes in Türkiye between 2010 and 2020. Moreover, it is the first study that reveals a chance to see the effectiveness of public spotlights on antibiotic use since 2018 in Türkiye. Therefore, these findings can be useful for healthcare professionals and healthcare-related policymakers to better understand the level of knowledge on fever and antibiotic use in the local community, which may later help develop strategies to address related issues.

When we analyzed the data obtained between 2010 and 2020, monthly household income was comparable between the two groups. However, in group 1, a significant increase in maternal educational status was observed. As can be appreciated, mothers should have a sound understanding of what fever is so that they can act accordingly in managing their febrile children. The ratio of those who correctly determined fever in this study was 40% in 2010; this rate increased to 65% after 10 years. In 2010, the mothers' educational level and socio-educational level scores were risk factors for low fever knowledge scores. The increase in the socio-educational level scores over the past decade explains the significant increase in fever definition and fever knowledge score. Kelly et al.[15] in 2019 and AlAteeq et al.[16] in 2015 found this ratio to be 64% and 76% in English and Saudi populations, respectively. Although this improvement is promising, it remains insufficient compared with those observed in other countries. To prevent the wrong definition of fever, parents should avoid determining fever by touching. In 2010, 36% of the participants measured the fever of their children by touching, and this practice was employed by 5.1% of the participants in 2020. So, this study demonstrated that the determination of fever by touching significantly decreased after 10 years. Digital thermometers were the most preferred fever-measurement device in 2020 (74.4%). Taştan et al.[17] in 1998 have found that 28% of mothers used a thermometer compared with 72% in the study by Baysoy et al.[18] 2005. , 73% in the study by Kürügöl et al.[19] 1995, 15% in the study by Parmar et al.[20] 2001, 50% in the study by Arica et al.[21] 2011, and 45.8% in the study by Yavuz et al. 2017.[22] Fever phobia is the most important factor for parents to consult emergency rooms.[11] The prevention of fever phobia can decrease redundant emergency room applications In a seminal 1980 study by Schmitt, who originated the phrase "fever phobia," it was discovered that parents generally had a negative perspective of fever, with 94% of them feeling it could cause injury, 63% believing it could cause major harm, and 18% believing it may cause brain damage. A follow-up study by Crocetti et al. demonstrated that 91% of parents were "worried" and 56% were "anxious" about the potential harm of fever, with seizures (32%), brain damage (21%), and death (14%) frequently mentioned.[23-25] In this study, febrile seizures remain the most important cause of fever phobia (88.8%). Nevertheless, maternal perception of fever as a cause of death or brain damage significantly decreased in 2020 (4.8%) compared with that in 2010 (8.8%). Salicylate use as an antipyretic drug dramatically decreased from 8% to 1.6%. This finding is important since the avoidance of salicylate is vital in preventing Reye syndrome, an important cause of hepatic coma, hypoglycemia, and death during viral infections.[26,27] The increase in the education level of the mothers without an increase in the socioeconomic level made us think that there was an improvement in the quality of education in the population independent of the economy. This statistical increase in education level may have contributed to the increase in health literacy. This may have a positive effect on the AAS and FKS.

In the past decade, most respondents did not clearly understand the purpose of taking antibiotics. Moreover, most mothers also believed that antibiotics could be used to treat all types of infections, including viral infections, such as flu and diarrhea.[28] This study indicated that this misconception has not changed over

the last decade. Antibiotic prescription for viral infections remains expected from parents in 2020. In contrast, this study demonstrated that maternal pressure on physicians to prescribe antibiotics decreased. However, antibiotic misusage significantly decreased compared with data obtained in 2010; it remains an ongoing problem in 2020. This is a good but not enough improvement for preventing antimicrobial resistance. How to raise awareness among the public regarding antibiotic knowledge remains an important research topic. Wilson et al. 2019 have demonstrated that education given by healthcare professionals was inadequate to improve the status of parents about this issue.[29] The Turkish Republic of Health Ministry started broadcasting public spotlights on the television nearly every week since 2018. Moreover, informative brochures were prepared to encompass the entire country. All these seem promising and significantly increase the AAS ($p < 0.001$). In France, the same has been practiced since 2005. Warembourg et al. 2020 have demonstrated that the adherence rate of the pediatric population to anti-infective drugs prescribed was 89% in France.[30] In this study, the rate of adherence to prescription was 88.4% in 2020 and 58.4% in 2010 ($p < 0.001$). The increased degree of maternal education in the last decade may also have contributed to the positive outcomes assessed in this study. Additionally, improvement in the AAS and FKS are multifactorial, such as the increase in the level of education in the society, the ease of access to information resources over the years, and the effect of social media, together with the public service announcements. Because of this, further studies are needed to reach hard endpoint conclusions on the efficacy of the spotlights on fever and antibiotic use, which are actively broadcasted in the media.

The responses of the participants may not be totally unbiased owing to the closed questionnaire design. The possibility that the development of technological facilities over time and the existence of many environmental factors that we cannot control have affected our results should also be considered. This study demonstrated that fever knowledge and AAS increased in the last decade. Antibiotic misusage remains an ongoing problem in 2020. Spotlights broadcast on television about these issues may have a positive influence on the public. Mothers' fever and antibiotic use knowledge and attitudes are important for countries to refer the right treatment and prevent inadvertent use of medications. Improvement of maternal/parental educational status and informational advertisements can improve fever and antibiotic knowledge scores.

Ethical approval

This study was reviewed and approved by the Institutional Ethical Committee, Medical Faculty, Istanbul Medeniyet University (report number 2020/0159). Written consent was obtained from all participants.

Author contribution

The authors confirm contribution to the paper as follows: Study conception and design: SGS, ME; data collection: SGS, ME, EYK, UB,YÇ. Analysis and interpretation of results: SGS, UB, Draft manuscript preparation: SGS, ME, EYK, YÇ. All authors reviewed the results and approved the final version of the manuscript.

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Conflict of interest

The authors declare that there is no conflict of interest.

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