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Parents' knowledge of fever and management procedures in the case of its occurrence in children under 12 years of age**

Wiedza rodziców o gorączce i o zasadach postępowania w przypadku jej wystąpienia u dzieci do 12 roku życia

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Słowa kluczowe

fobia gorączkowa, paracetamol, ibuprofen

Summary

Introduction. Fever is often the first sign of both a viral or a bacterial infection. Parents are the first ones to notice the child's increased body temperature. They are also responsible for a reasonable antipyretic therapy at home. The basis of this therapy lies in the parents' knowledge of both the fever threshold and the administration of specified doses of antipyretics. "Fever phobia" a phenomenon defined as an unjustified fear of the consequences of fever, may cause parents' irrational behavior.

Aim. The aim of the study was to test the knowledge of parents about the management rules in case of fever in children, in comparison with the current recommendations of the American Academy of Pediatrics (AAP).

Material and methods. Patients' parents from the Department of Pediatrics at the Bielański Hospital in Warsaw were surveyed using a questionnaire between November 2013 and February 2014. Altogether, 200 parents of children aged 0-12 participated in this study. Parents were asked to define fever and their concerns associated with it, the methods of temperature measurement and fever management. The questionnaire consisted of 17 single and multiple choice questions.

Results. Only 35% of parents (70/200) correctly identified the fever threshold (38°C) in accordance with the guidelines. 86% of parents (172/200) declared antipyretic treatment for the temperature of 38.0°C, and 14% for a lower temperature. 52% of caregivers (104/200) combine acetaminophen and ibuprofen. Surprisingly, 12% of the respondents (24/200) continue to use aspirin in children aged below 12. Pediatricians were their primary source of information about the adequate doses of antipyretics. All parents were convinced that fever can cause at least one harmful side effect – the most commonly mentioned were seizures (76.5%), delirium (49%) and dehydration (40.5%). 10.5% of parents (21/200) declared using medications only, the remaining parents combine both pharmacological and physical treatment.

Conclusions. Parents' knowledge related to managing fever symptoms in children is insufficient and frequently differs from the AAP recommendations. The phenomenon of "fever phobia" remains widespread among parents and the vast majority believe that fever is harmful. Some of the parents' behaviors that were identified expose children to the risk of antipyretic drug overdose or misuse. Educational programs targeted at educating parents are needed to effectively manage fever in children.

Streszczenie

Wstęp. Gorączka jest często pierwszym objawem infekcji wirusowej czy bakteryjnej. Pierwszymi osobami, które stwierdzają podwyższoną ciepłotę ciała u dziecka są rodzice, którzy są odpowiedzialni za racjonalne leczenie przeciwgorączkowe w warunkach domowych. Dlatego też wiedza rodziców o lekach przeciwgorączkowych jest niezwykle istotna.

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„Fobia gorączkowa”, czyli bezpodstawny lęk przed następstwami gorączki, może wpływać na nieracjonalne postępowanie rodziców/opiekunów.

Cel. Celem pracy było sprawdzenie wiedzy rodziców o zasadach postępowania w przypadku gorączki u dzieci, w zestawieniu z aktualnymi zaleceniami Amerykańskiej Akademii Pediatrii (AAP).

Materiał i metody. W Klinicznym Oddziale Pediatrycznym Szpitala Bielańskiego w Warszawie, w okresie 4 miesięcy przeprowadzono badania ankietowe wśród 200 rodziców dzieci w wieku 0-12 lat. Kwestionariusz składał się z 17 pytań jedno- i wielokrotnego wyboru.

Wyniki. 35% (70/200) rodziców prawidłowo rozpoznało próg gorączki (38°C). Leczenie przeciwgorączkowe przy temperaturze ciała 38,0°C zadeklarowało 86% (172/200) rodziców, natomiast 14% przy temperaturze niższej. Łączenie paracetamolu i ibuprofenu stosuje 52% (104/200) rodziców. 12% (24/200) ankietowanych nadal stosuje kwas acetylosalicylowy (aspirynę) u dzieci poniżej 12 roku życia. Pediatrzy są głównym źródłem wiedzy na temat odpowiedniego dawkowania leków przeciwgorączkowych. Wszyscy rodzice byli przekonani, że gorączka może spowodować co najmniej jeden efekt uboczny. Najczęściej wymieniano drgawki (76,5%), majaczenie (49%) i odwodnienie (40,5%). 10,5% rodziców (21/200) kontroluje gorączkę wyłącznie przy pomocy leków, pozostali łączą metody farmakologiczne z fizykalnymi.

Wnioski. Wiedza rodziców na temat gorączki u dzieci jest niezadowolająca i daleka od zaleceń Amerykańskiej Akademii Pediatrii. Zjawisko „fobii gorączkowej” jest szeroko rozpowszechnione. Zdecydowana większość rodziców uważa, że gorączka jest szkodliwa. Niektóre z zaobserwowanych zachowań rodziców narażają dzieci na ryzyko zbędnej podaży bądź nawet przedawkowania leków przeciwgorączkowych. W celu skutecznego kontrolowania gorączki u dzieci, potrzebne są programy edukacyjne skierowane do rodziców i opiekunów.

INTRODUCTION

Fever in children is a symptom that always causes anxiety in parents and caregivers. Fever is a sign of an inflammatory process, most often induced by a viral or a bacterial infection. The increase of the body temperature is a physiological reaction controlled by the thermoregulatory center located in the anterior part of the hypothalamus. The mechanism is similar to the work of a thermostat, which under the influence of pyrogenic factors, such as interleukin 1 α and 1 β (IL-1), IL-6, INF- α , INF γ , and the tumor necrosis factor (TNF) causes an increase of the body temperature. It is a programmed answer of the organism to the appearance of a pathogen, supporting the defense by inhibiting the vital functions of the pathogenic microorganisms, a multiplication of T lymphocytes and an increased production of neutrophils (1). Not knowing the positive aspects of the febrile response, worried parents try to “normalize” the body temperature of their child at all costs. Parents’ concerns were described in 1980 by Barton D. Schmitt and called “fever phobia”, defined as an unjustified fear of fever and its possible severe complications (2). Pediatricians do not convince the parents about the actual role of fever effectively enough and do not always supervise antipyretic treatment of their patients. This favors the persistence of the phenomenon of fever phobia and mistakes when administering antipyretics at home.

AIM

Comparison of parental knowledge about fever and fever management with recommendations of the American Academy of Pediatrics (AAP), published in 2013 (3), and estimation of the prevalence of fever pho-

bia and incorrect practices concerning the use of antipyretics in children.

MATERIAL AND METHODS

The study was carried out for 4 months (from November 2013 to February 2014) at the Clinical Department of Pediatric Hospital in Warsaw using a questionnaire prepared for parents, the research by Schmitt et al. (2) and the guidelines of the American Academy of Pediatrics from 2013 (3). The questionnaire consisted of 17 single or multiple choice questions and referred to children under 12 years of age (fig. 1). It was developed in order to obtain information on the knowledge of the definition of fever and proper management in the event of its appearance, as well as concerns related to the potential complications of fever. Additional questions focused on the methods and the frequency of measuring fever, the sources of parental knowledge about the form of administration and the dosage of drugs. Parents were asked to choose the correct answer from among the proposed ones. In total, the responses of 200 out of 346 (57.8%) participants were included in the study. 23/346 (6.7%) questionnaires were rejected due to being improperly filled out, and 123 parents (35.5%) refused to participate in the study. The results are given in absolute numbers and as a percentage. The response rate to the questions was calculated based on the total number (200) of participants.

Although the studies were conducted at the city hospital in Warsaw, only 50.5% (101/200) of respondents were from Warsaw. The average age of the respondents was 31 years (20-44 years of age). 78.5% (157/200) of the respondents were mothers. Primary education was declared by 2.5% (5/200) of the respondents, secondary – by 24% (48/200), higher – by 73.5% (147/200).

Demographics	
Kinship: a) mother b) father c) other	
How old are you?	
How old are your children?	
Place of birth:	
What is your education level? a) primary b) secondary c) higher	
Single choice questions	
<p>1. Which is the best place to measure the temperature of a child?</p> <p>a) the armpit b) rectum c) the groin d) oral cavity e) ear f) forehead</p> <p>2. What body temperature would you consider a fever?</p> <p>a) 36.5°C b) 37°C c) 37.5°C d) 38°C e) 38.5°C f) 39°C</p> <p>3. What body temperature would you consider as high fever?</p> <p>a) < 38°C b) 38.0-39.0°C c) 39.1-40.0°C d) > 40°C</p> <p>4. What is the temperature of your child when you start to administer antipyretics?</p> <p>a) < 38°C b) 38.0-39.0°C c) 39.1-40.0°C d) > 40°C</p> <p>5. What would have been the maximum values of your child's body temperature without antipyretic medication?</p> <p>a) < 41°C b) 41.0-43.5°C c) > 43.5°C</p> <p>6. How often do you measure body temperature of your child during illness?</p> <p>a) < 15 min b) 16-30 min c) 31-60 min d) 61-120 min e) > 120 min</p> <p>7. Do you think that it is worth to give your child two or more antipyretics?</p> <p>a) yes b) no</p> <p>8. Which method of antipyretic administration do you prefer?</p> <p>a) orally b) rectally</p>	<p>9. If you administer drug rectally what is the reason?</p> <p>a) the drug works faster and better b) it is easier to administer c) the order of a physician d) if I am not able to give the drug orally because of the refusal of the child e) if the child vomits</p> <p>10. How do you calculate the appropriate dose of an antipyretic for your child?</p> <p>a) according to the indications of a pediatrician b) I read the package leaflet of the drug c) I ask friends d) according to the information gathered in the media, for example. internet, television, newspapers</p> <p>11. What should be taken into account when calculating the appropriate dose of an antipyretic for the child?</p> <p>a) weight b) height</p> <p>12. What do you think about the maximum dose of an antipyretic administered during a high fever?</p> <p>a) it is more effective b) it is more hazardous</p> <p>13. What do you use to administer the appropriate dose of an antipyretic?</p> <p>a) tablespoon or teaspoon b) special dosimeter attached to the antipyretic c) dosimeter from another drug</p>
Multiple choice questions	
<p>14. What kind of thermometer do you use to measure the temperature of your child?</p> <p>a) mercury/alcohol b) electronic c) ear d) Infrared e) pacifier thermometer f) I do not have a thermometer</p> <p>15. What are the side effects fever may cause?</p> <p>a) seizures b) brain damage c) death d) dehydration e) serious illness f) coma g) delirium h) blindness i) other side effects</p> <p>16. What antipyretics do you administer to your child?</p> <p>a) acetaminophen (eg. Pedicetamol, APAP Panadol) b) ibuprofen (eg. Nurofen, Ibum, Ibufen) c) aspirin (e.g. Aspirin C Polopiryna S) d) other (eg. pyralgina)</p> <p>17. What other methods of decreasing body temperature do you use except from antipyretics to reduce fever in a child?</p> <p>a) washing child's forehead with cold (15°C) water b) cold compresses to the neck c) washing child's forehead with lukewarm (25°C) water d) other – oral irrigation, undressing the child or ventilation e) I use only antipyretic drug</p>	

Fig. 1. Questionnaire.

RESULTS

35% (70/200) of the respondents correctly defined the threshold of fever (38°C) in accordance with the current guidelines of the American Academy of Pediatrics (3). 58% (116/200) of the parents recognized fever with the body temperature of less than 38°C, whereas 7% (14/200) considered/identified a temperature above

the threshold as fever. Most parents (74.5%) considered a temperature of approximately 39-40°C as high fever. 86% (172/200) of children were given antipyretics with fever above 38°C, and 14% (28/200) at a temperature below 38°C. 52% (104/200) of respondents believe that if fever is not decreasing after the administration of one antipyretic, the child should be given

more than one drug. On the other hand, 48% (96/200) of parents continue monotherapy (tab. 1). In the multiple-choice question concerning the selection of antipyretic drugs the most frequently selected ones were ibuprofen (65%, 130/200) and acetaminophen (61.5%; 123/200), as well as other drugs (9%). 12% (24/200) of parents declared the use of acetylsalicylic acid (aspirin) for their children. The rectal route of administering antipyretics was declared by 20.5% (41/200) of parents who believe that this method is more effective. 79.5% (159/200) of respondents administered antipyretics orally. Knowledge about the appropriate dose of antipyretics was obtained by 54% (108/200) of parents from their pediatrician. 43% (86/200) used the leaflet in the package. In calculating the appropriate dose of an antipyretic 92% (184/200) of parents took into consideration the body weight, while 8% (16/200) calculated the dose based on the child's height. 56% (113/200) of parents believe the maximum dose of an antipyretic to be more effective, while 43.5% (87/200) consider it as hazardous. 89.5% of parents applied physical methods of reducing the temperature of the child's body as well; most of them, 66.5% (133/200) use cold compresses. 12% (25/200) of parents admitted using one of the three physical methods recommended by the American Academy of Pediatrics, i.e. oral irrigation, undressing the child, airing or lowering the temperature of the room (3). 7% (14/200) of parents used teaspoons and tablespoons instead of special dosimeters attached to the drug, which in turn was used by 91% (182/200) of parents. 2% (4/200) of parents applied antipyretics using dosimeters from other drugs (fig. 2). All of the interviewed parents believed that fever may cause at least one side effect. Since it was a multiple choice question, most of them chose more than one answer. 57.5% of the parents were afraid of more than 4 potential side effects. Most alarming for parents seemed seizures (76.5%; 153/200), delirium (49%; 98/200) and dehydration (40.5%; 81/200) (tab. 2).

DISCUSSION

Previous publications on similar subjects have appeared in many other countries, including the United States, Canada, South Korea, Italy and Germany (4-10). The results of our study illustrate the level of parental knowledge about the rules in case of fever appearance in their child. The obtained results, compared to the guidelines of the American Academy of Pediatrics (3), prove a too low level of knowledge of the caregivers of children on both the role of fever as well as its management.

Every tenth respondent declared the use of acetylsalicylic acid (aspirin) as an antipyretic for their child. The use of aspirin in children under 12 years of age has been contraindicated since 1986, as it may be conducive to the Reye syndrome (acute liver failure and severe encephalopathy) (11). Currently, each package of aspirin is accompanied by a leaflet with a clear contraindication for the use in children. Despite the fact that 43% of parents stated that they use the drug leaf-

Table 1. Fever management in children by their parents on the basis of data obtained from the questionnaires.

Fever management	American Academy of Pediatrics (2)	Amount of parents	% of parents
Fever threshold		200	100
< 38°C		116	58
38°C	✓	70	35
> 38°C		14	7
Antipyretic treatment initiation threshold			
< 38°C		28	14
≥ 38°C		172	86
Pharmacological treatment			
Monotherapy		96	48
Polytherapy		104	52
Physical methods			
Do not use		21	10,5
Cold compresses		133	66,5
Pharmacological treatment only		21	10,5
Oral irrigation	✓	25	12,5
Undressing the child	✓		
Airing the room	✓		

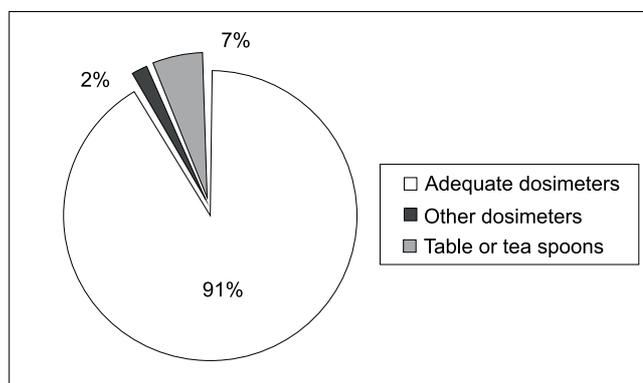


Fig. 2. Methods of antipyretics dosing.

lets, only few apply to the recommendations contained therein. The use of aspirin was declared by 12% of parents; this percentage is higher than in other countries. For example, in a study conducted in Italy (4), aspirin in children was administered only by 0.5% of respondents, and in France (5) – by 1%. It is difficult to explain the cause of the too frequent administration of aspirin on the basis of the survey. It may primarily be due to poor health education and certain environmental habits of “home” treatment. The impact of advertising on the decisions of parents taking medicines available over the counter (OTC) should also not be overlooked.

A further problem is the administration of liquid forms of drugs with an inadequate dosimeter. For 7% of parents a “tablespoon” or “teaspoon” is a dosimeter. This percentage of respondents was comparable to the

Table 2. Possible side effects that may occur in case of fever in a child.

Possible side effects reported by parents (multiple choice question)	Amount of answers	% of answers
Seizures	153	76.5
Delirium	98	49
Dehydration	81	40.5
Brain damage	62	31
Death	45	22.5
Severe illness	36	18
Coma	31	15.5
Other side effects	18	9
Blindness	6	3

results of the Italian study (4). Such dosage is unreliable because of the large span of volume of table-spoons (8 to 15 ml) and teaspoons (3 to 5 ml). This difference in volume that seems small to parents and some doctors is essential, especially with the increasing popularity of "forte" drugs containing more active substances in the same volume, for example 200 mg in 5 ml of ibuprofen instead of 100 mg in 5 ml. It may, on the one hand, expose children to an unconscious overdose, and on the other hand – to drug overdose.

Approximately two-thirds of the surveyed parents recognized the threshold fever incorrectly (too early). 14% of parents administer drugs with the temperature below 38°C, while 52% claim the use of politherapy, although this is not indicated in the guidelines. Even educated parents had a problem with it, which should be an important indication for pediatricians. In South Korea, in turn, the correct

threshold of fever is recognized by more than two-thirds of parents, while politherapy is chosen by just one third (10).

More than half of the parents were worried by more than four side effects that fever may cause in their child. The most unjustified fears – in the context of the present availability of antipyretics – concerned the possibility of brain damage, serious illness, blindness, coma, and even death. These concerns suggest fever phobia and show that this phenomenon is widespread in Poland, as well as in other countries (11). The intensity of the occurrence of fever phobia among parents in Canada was inversely proportional to the number of children possessed (6, 9). In our study, the number of the children the respondents had showed no correlation with the incorrect (premature) recognition of fever. German researchers – Langer et al. (7) believe that the cause of phobia may be a caregivers' feeling of helplessness about fever. It is necessary to improve the communication between the pediatricians and the parents. Appropriate educational programs for parents may also be effective.

Further research on this issue is needed on a larger group of parents.

CONCLUSIONS

1. The level of parents' knowledge on the function of fever and its management is low, which is reflected, among other things, by the administration of aspirin to children under 12 years of age.
2. The parents' methods of applying antipyretics are in many cases incorrect, which may lead to an overdose or limit the effectiveness of the drugs.
3. Fever phobia remains a widespread phenomenon among parents.

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