

Parental Knowledge of the Treatment of Fever in Children

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Abstract

Background: Although the onset of fever in children often prompts parents to seek immediate treatment, the general level of parental knowledge on pediatric fever and administration of antipyretic medications is unknown. Parents without a basic understanding of treatment principles may give their children incorrect doses of medication. Overdosing may cause drug toxicity, while underdosing may lead to unnecessary, repeated clinic and/or emergency room visits.

Objectives: To assess parental decision-making with regard to treating fever in children, and its effectiveness, and to suggest methods for improving the level of treatment.

Methods: In this cross-sectional self-reported survey, questionnaires were completed by 650 parents who sought medical assistance for a child under the age of 10 years. Parents represented various socioeconomic levels, educational backgrounds and religious affiliations.

Results: Ninety-six percent of parents treated fevers that reached 38.5°C, and 77.6% treated fevers of only 38°C. Acetaminophen was the treatment of choice for 96% and dipyrrone for 4%. Parental sources of information for managing and administering antipyretic drugs were medical personnel (40.7%), mother's or grandmother's experience (30%), and the enclosed leaflet or instructions on the bottle (29.3%). Forty-three percent of the parents administered the recommended dosage (10–20 mg/kg), whereas 24.3% used less and 32.7% used more; 11% exceeded a daily dosage of 120 mg/kg.

Conclusions: A total of 57% of parents treated children with incorrect doses of antipyretic drugs. In 11% of the children treated, the daily dose was at a level that could cause severe toxicity. Parental knowledge of the treatment of fever must be improved.

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Fever is one of the most common pediatric symptoms [1]. Lack of knowledge may lead parents to either overtreat a febrile child or to give subtherapeutic doses of antipyretic medications. Consequently, some children are at risk of suffering the toxic effects of these medications, while oth-

ers are brought frequently to the emergency room or doctor's office because of fever that does not seem to respond to conventional medication.

The general level of parental knowledge about pediatric fever and its treatment is unknown. The purpose of this study was to assess the level of parental knowledge on antipyretic medication, the source of that knowledge, how and when parents decide to treat their children, and the reported effects of that treatment. Variations in the levels of knowledge or patterns of behavior among various socioeconomic groups are considered, and suggestions to improve antipyretic treatment are discussed.

Methods

A cross-sectional, retrospective survey was carried out by distributing questionnaires to 650 parents who sought medical assistance for a child under the age of 10 years. We requested that the parents' answers refer to their youngest child. The study population included five subgroups:

- Secular parents from a clinic in a kibbutz (n = 160)
- Ultra-orthodox parents from a community clinic (n = 150)
- Secular parents in an affluent area, from a community clinic (n = 120)
- Parents who brought their children to the pediatric emergency room at Sheba Medical Center because of fever (n = 110)
- Middle-class parents of healthy infants at a well baby clinic (n = 110)

The questionnaire included three main topics: i) methods of measuring fever and decisions of when and how to treat; ii) antipyretic medication: child's body weight, dosage, modes of administration and effects; and iii) parental knowledge of side effects and toxicity of antipyretic medications.

Results

The demographic data on the respondents are presented in Table 1. Eighty percent of the questionnaires were answered by mothers, and 4% by both parents (the latter

Table 1. Parents' characteristics

	Maternal age (yr)	Maternal education (yr)	Paternal age (yr)	Paternal education (yr)	No. of children	Age of youngest child (months)
Kibbutz (n=160)	36.3	14.0	38.6	13.6	2.8	48.7
Orthodox (n=150)	28.1*	12.9	30.2*	**	4.2*	21.3*
Upper socio-economic class (n=120)	34.6*	15.1	37.2	15.3	2.1	46.2
Emergency room (n=110)	32.4	13.1	35.9	13.2	2.6	41.0
Middle class (n=110)	31.6	14.6	34.9	14.3	2.3	25.8
Total (n=650)	32.7	13.9	35.4	14.1	2.9	37.1

* $P < 0.01$

** The ultra-orthodox Yeshiva system is based on Talmudic study and does not correspond with the public educational system. Almost all male members continue to attend Yeshiva through adulthood.

mostly in the emergency room). In the ultra-orthodox population studied, the parents were significantly younger and there were significantly more children per family than in other groups. Consequently, the mean age of the reference child for the survey was also lower.

Methods of measuring fever and the decision to treat

Body temperature was measured rectally by 50.8% of the parents, orally by 15.9% and in the axilla by 14.1%; 19.2% of the parents did not measure temperature at all. With regard to parental reaction, 20.2% of parents would treat a fever of 37.5 °C, 77.6% would treat at 38°C, and 96.4% of the parents would treat a fever of 38.5 °C. Medication was the treatment of choice for 97.9% of parents (n=636) and a bath for 2.1% (n=14).

Antipyretic medication: modes of administration, dosage, and effects

The source of information on the use of antipyretic drugs was medical personnel for 40.7% of parents, and mother's or grandmother's experience for 30%; only 29.3% of parents read the instructions on the bottle. There were no differences among the groups for this factor. Acetaminophen was the drug of choice among 96%, while 4% chose dipyrone.

As a second choice, 89.6% still used acetaminophen and 10.4% used dipyrone. All parents who used dipyrone were from the ultra-orthodox population. Acetaminophen was administered in syrup form by 57.1% of parents, as a suppository by 36%, and in tablet form by 6.9%. In the ultra-orthodox group, where the reference children were younger than in other groups, significantly more suppositories were used (44%). The recommended dose of 10–20

mg/kg acetaminophen was given by 43.3% of parents; 24% gave less and 32.7% gave more. Of the parents who had underdosed their children, 82% administered syrup and mistakenly assumed that a common 3 ml teaspoon had a 5 ml volume. A maximum dosage of less than 60 mg/kg/day was administered by 47.7% of the parents, and 11.1% exceeded 120 mg/kg/day. In all groups, 6.1% of the parents claimed that the daily permissible intake of acetaminophen was unlimited. It is noteworthy that lower doses of acetaminophen were used when the drug was administered in liquid form ($P < 0.001$). Parents also failed to revise the dosage with the child's increase in weight. Treatment doses were correlated with maternal age: the younger the mother, the more likely she was to read the instructions packaged with the bottle and comply with the recommended dosage ($P < 0.001$).

There was no difference between the groups in terms of observed response to acetaminophen: 56.1% of the parents noted a response within 30 minutes and an additional 36.5% within one hour. Regarding anticipated effect, 44.8% of the parents expected the treatment to reduce body temperature to normal, 29.5% expected a reduction of 1°C, and 25.7% expected a reduction of 2°C.

Parents' knowledge of side effects and toxicity of antipyretic medications

No side effects of the medication were reported by 55.8% and at least one side effect was reported by 15.3%. The reported side effects included vomiting, maculopapular rash, giant urticaria, and diarrhea. No statistically significant relationship was found between the reported dosage and reported side effects.

In response to our question of whether there was a danger of overdosing, 60.2% declared that there was, and 5.6% believed there was not; 34.2% did not profess to have adequate knowledge and abstained from answering. Only 25.7% of the parents knew that the toxic effects of acetaminophen involved the liver.

Discussion

Parental anxiety about the potentially harmful effects of fever is very high [2]. They tend to treat fever vigorously with antipyretic medications and expect a rapid response. Although a fever below 39°C does not require special treatment [2], 96% of the parents questioned were unaware of this and treated children with a fever $\geq 38.5^\circ\text{C}$. The results of this survey showed that 24.1% of the parents gave their febrile children less than the recommended daily dose of acetaminophen. Parents in the study population, like parents in other studies [3], erred in assuming a household teaspoon holds 5 ml although the correct volume is 3 ml. A second cause of underdosing was parental failure to revise the dosage with the child's increasing age and weight. Inappropriately low doses may lead to unnecessary office or emergency room visits for children brought by concerned parents who think the fever is resistant to treatment [2].

Acetaminophen is a relatively safe drug when used in correct doses. However, accidental and therapeutic poisoning remain important causes of morbidity and mortality among pediatric patients [4]. The yearly incidence of acetaminophen overdose in Israel increased from 4.5/100,000 in 1985 [5] to 14.8/100,000 in 1989 [6]. In this study, we found an alarming gap in parental knowledge about the dangers of acetaminophen overdose: 32.3% gave their children more than the maximum recommended 120 mg/kg/day dose. Furthermore, 6.1% claimed that the amount of acetaminophen allowed is unlimited, and 5.6% believed the drug had no toxic effect. Our results are in agreement with those of Schmitt [7] and Kramer et al. [8] who showed that parents frequently overtreated a febrile child. According to May and Bauchner [9], pediatricians may inadvertently contribute to fever phobia if their practices and educational messages are incongruent.

The antipyretics used in Israel are different from those used in the United States. Ibuprofen syrup is not available in Israel, and dipyron has been taken off the market in the United States. Furthermore, in contrast to other developed countries, where the product label has been shown to be the most common source of information on dosages and toxic effects [9], most parents in our study did not read the labels and relied on other sources of information, such as physicians, nurses, and mothers or grandmothers.

In conclusion, this study shows that a majority of parents are unaware of when or how they should treat a

child's fever. It is important that parents be made aware of the appropriate time for medication, the recommended therapeutic dose, and the proper method of administration. Educating parents, using a short and simple verbal explanation reinforced by easily understandable and large-type printed material, could prevent many unnecessary medical interventions. In addition, we recommend that all pharmaceutical manufacturers provide a measuring vial with the antipyretic syrup.

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Capsule



A new way to combat therapy side effects

For decades physicians have been treating cancer with chemotherapy and radiation, and for decades the side effects have been brutal. Because the treatments damage healthy tissues even as they kill tumor cells, patients develop anemia, infections, vomiting, diarrhea, and other problems. These side effects can be so severe that they prevent patients from receiving effective treatment. Now, by capitalizing on their knowledge of a powerful tumor-suppressor gene, researchers may have found a better way to ease side effects in some patients. A team led by Andrei Gudkov of the University of Illinois, Chicago, reports that it has identified a novel compound that protects mice against side effects induced by radiation and allows them to withstand what would otherwise be lethal radiation doses. Other known compounds that help protect healthy tissue from cancer therapies have only limited

effects, for example, helping restore the bone marrow's ability to produce red blood cells. But because of its unusual mechanism of action, the new compound, a small organic chemical called pifithrin- α (PFT- α), may protect all vulnerable tissues.

PFT- α works by blocking p53. When cells are poisoned by chemotherapeutic drugs or barraged by radiation, p53 spurs them either to commit suicide or to go into growth arrest. People whose tumors contain an active p53 gene won't be eligible for the drug because it could help their tumors fight the therapy, too. But in about 50% of all human cancers, the p53 gene is inactivated, and PFT- α could help people with such tumors endure higher possibly life-saving doses of radiation or chemotherapeutic drugs.

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