

Prospective Observational Study Evaluating Paediatricians' Treatment Practices in the Symptomatic Management of Fever

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Received: 03-10-2021 / Revised: 18-10-2021 / Accepted: 20-11-2021

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Conflict of interest: Nil

Abstract

Aim: A study of treatment patterns in symptomatic management of fever in children (antipyresis) among Pediatricians.

Methods: This cross-sectional study conducted in the Department of Paediatrics, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India for 13 months. A sample was not selected, but there were attempts to contact the whole population. A questionnaire was administered to convenient samples of pediatricians and family physicians eliciting information about fever definition, methods of temperature measurement, and antipyretic use. Differences in responses between the doctors were evaluated.

Results: Most of the doctors (84%) recommended an axillary measurement of fever to the parents of the febrile child and 40% of them indicated that a body temperature of above 37.5°C, according to an axillary measurement, was treated as fever. The body temperature treated as fever by doctors according to an axillary measurement varied between 36.5°C and 39°C. About two third of doctors (74%) reported that they recommended an antipyretic agent to every child under the age of 5 with fever. Only 26% of doctors took into consideration signs and symptoms other than fever (malaise, irritability, prolonged crying, signs of infection) to prescribe the antipyretic. A few doctors (31%) indicated that febrile convulsions can cause brain damage. About 34% of the doctors said that fever is harmful for the child and 78% of them reported that a body temperature of above 38°C must definitely be treated, whatever the underlying pathology.

Conclusion: There were significant misconceptions about the management and complications of fever. There is a perceived need to improve the recognition, assessment, and management of fever with regards to underlying illnesses in children and a national consensus statement on fever and antipyresis in children.

Keywords: fever, antipyresis, children

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Introduction

Clinical observation has shown that fever is a physiologically controlled elevation of temperature with a strongly regulated upper limit (via protective endogenous

antipyretics and inactivity of thermosensitive neurons at temperatures above 42°C). It rarely reaches 41°C and does not spiral out of control [1] as is feared

by many parents and health professionals [2,4]. Divergent attitudes towards fever have led to a high level of inconsistency in approaches to its management. Many healthcare providers and parents view fever as a dangerous condition or a discomfort to be eliminated[5], despite evidence that fever is an evolutionary resource that aids in overcoming acute infections [6].Antipyretic treatment can be harmful: in 2006, accidental paracetamol overdose caused 100 deaths in the USA alone [7].A number of organizations have responded to this situation by developing clinical practice guidelines (CPGs) for management of fever in children with goals of guiding antipyretic treatment, responding to discrepancies between evidence and clinical practice, and diminishing irrational fear of fever and overzealous attempts at its suppression. Nevertheless, a published review addressing the quality of seven such CPGs [8] concluded that even guidelines judged as “high quality” are neither comprehensive in content nor in agreement with each other in their recommendations. Whether these conclusions apply to the full spectrum of guidelines for management of fever in children remains uncertain.

Material and Methods

This cross-sectional study conducted in the Department of Paediatrics, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India for 13 months

Methodology

All subjects were interviewed by the use of a standardized self-administered questionnaire, designed on the bases of the recent United States and NICE (United Kingdom) guidelines for the management of fever in children [9,10]. Data was collected after the purpose of the study was explained to the participants and they were informed that their participation was voluntary. The study participants were all practicing doctors who worked in office, and a few attached to a medical college during the period of study. A questionnaire was administered to convenient samples of pediatricians and family physicians eliciting information about fever definition, methods of temperature measurement, and antipyretic use. Differences in responses between the doctors were evaluated.

Statistical methods

The data was analyzed using the SPSS 21.0 program and descriptive statistics were used.

Results

The study included 100 doctors with a mean age of 47.5 ± 8.3 and the male–female ratio was 2.3. The socio-demographic characteristics of the participants are presented in Table 1. About 27% of the doctors indicated that they had read an article associated with fever in the last 6 months.

Table 1: Demographical characteristic of doctors.

Characteristics	Descriptive statistics
Total participants	100
Male, N (%)	71 (71%)
Female, N (%)	29 (29%)
Age (Mean±SD)	47.5±8.3
Paediatricians	60
Family physicians	40
Marital status	
Married N (%)	94 (94%)

Single N (%)	6 (6%)
Participant with children	
Yes, N (%)	86 (86%)
No, N (%)	14 (14%)
Duration of working per day (Mean \pm SD)	11.8 \pm 1.8
Number of patients per week (Mean \pm SD)	258.4 \pm 68.1

Most of the doctors (84%) recommended an axillary measurement of fever to the parents of the febrile child and 40% of them indicated that a body temperature of above 37.5°C, according to an axillary measurement, was treated as fever. The body temperature treated as fever by doctors according to an axillary measurement varied between 36.5°C and 39°C. About two third of doctors (74%) reported that they recommended an antipyretic agent to every child under the age of 5 with fever. Only 26% of doctors took into consideration signs and symptoms

other than fever (malaise, irritability, prolonged crying, signs of infection) to prescribe the antipyretic.

Nevertheless only 14% of doctors indicated that they prescribed antipyretics to ensure the child's comfort and remove irritability. The rest of the doctors prescribed antipyretics to control fever and prevent complications of fever, especially febrile seizures. Some of the statements regarding the management and complications of fever, in agreement with these statements of doctors, are shown in Table 2

Table 2: Knowledge of doctors regarding fever management and complications in febrile children under the age of 5 years.

Statements	Yes (%)	No (%)	Not sure (%)
Fever is dangerous	34	66	0
All fevers less than 100 ⁰ F should be treated even when there are no other signs and symptoms	74	26	0
All fevers of more than 100 ⁰ F must definitely be treated whatever is the underlying condition	78	22	0
A febrile fit can be prevented by antipyretics	88	2	10
Antipyretics should always be used in reducing fever	90	8	2
Other methods like tepid sponging and baths should be recommended to reduce fever	86	9	5
Cold water application can be used to reduce fever	55	28	17
A child who is febrile and sleeping should not be disturbed	34	59	7
When the fever increases the risk of febrile convulsion increases	90	6	4
Febrile convulsion can cause brain damage	29	69	2
Paracetamol or ibuprofen usage can be used to prevent fever and local reactions associated with childhood vaccination	73	21	6
Paracetamol and Ibuprofen can be used alternatively	71	23	6
Aspirin should not be used in a febrile child	89	8	3

Oral administration of paracetamol is better than rectal administration in children	72	24	4
Paracetamol and ibuprofen are the only antipyretic drugs which should be used in children.	66	34	0

A few doctors (31%) indicated that febrile convulsions can cause brain damage. About 34% of the doctors said that fever is harmful for the child and 78% of them reported that a body temperature of above 38°C must definitely be treated, whatever the underlying pathology. Many (90%) believed that the main reason for antipyretic usage is to prevent febrile convulsion and 86% indicated that physical methods (warm water bathing) should be recommended to reduce fever. Most of the doctors (88%) believed there is a positive correlation between the height of fever and the incidence of febrile convulsion. Inappropriate beliefs about antipyretics were confirmed by the 73% who agreed that paracetamol and ibuprofen can be used alternatively. About (66%) of the doctors agreed that only paracetamol and ibuprofen should be used as antipyretics in children.

Discussion

The study gave us an insight into the various misconceptions that existed among the health care providers. The first major finding of this research is a variation in the definition of fever. Fever is defined as a body temperature greater than 37.5°C according to an axillary measurement by primary care doctors and endorsed by the WHO and IMNCI [11]. In the present study only 40% of doctors knew that a body temperature of above 37.5°C according to an axillary measurement is defined as fever. Body temperature treated by doctors as fever varied between 36.5°C and 39.0°C.

This range was too wide. Definitions of high fever by doctors also varied significantly in other studies. In the present study most of the doctors (84%) recommended an axillary measurement of fever to the families. There are conflicting

results as regards this subject. Some authors consider tympanic measurement the best method for non-invasive measurement some authors recommend an axillary measurement because it is easy to perform and generally well tolerated. However, it is not very sensitive [11,12].

In the present study about two thirds of doctors recommended an antipyretic agent to every child under the age of 5 with fever, whatever the signs and symptoms. Only 26% of doctors took into consideration signs and symptoms other than fever (malaise, irritability, signs of infection) to prescribe an antipyretic. In fact, according to various guidelines, antipyretics should not be used routinely in management of a febrile child. Use of antipyretics in children is recommended in case of prolonged crying, irritability, reduced activity and sleeplessness. Only 14% of doctors indicated that they prescribed antipyretics to ensure a child's comfort and remove irritability, except for reducing fever. The rest of the doctors prescribed antipyretics to control fever and prevent complications of fever especially febrile seizures. International literature confirms that fever phobia is common among parents and health care workers.

Misconceptions about complications of fever especially febrile convulsions often push health care workers to over treat fever and this reinforces the phobia among parents [13,15]. The result of the present study confirmed these findings. According to the present study, the fever phobia continues. Almost 34% considered fever to be dangerous for a child. It is known that antipyretic treatment has not been effective in the prevention of simple febrile seizures [12]. In the present study, 90% of doctors reported that the main reason for antipyretic

usage was to prevent febrile seizure. The Studies conducted in other countries also endorse this ratio of 70%, i.e. similar to that of the present study [12].

Although there has been no evidence that fever causes brain damage unless it reaches above 41°C, it is still a common misconception among doctors [15,16]. Fortunately, fever seen in children rarely reaches this high temperature. The most common side effects of fever are benign and include minimal dehydration, increased sleepiness, and discomfort. In the present study, 86% of doctors stated that fever was a risk factor for brain damage if it caused febrile seizure when uncontrolled. There are also other articles that surveyed primary care practitioners' opinions and behaviors with regards to fever, which confirm that fever is seen as a risk factor for brain damage. Unfortunately, health care providers and parents believe that brain damage is a consequence of fever [16,18].

Febrile seizure is a rare complication of fever that occurs in 2-4% of febrile children and most are self-limited without any long-term sequelae [16,18]. Despite there being no evidence to suggest that brain damage may occur after febrile convulsion, in the present study 31% of the doctors believed that brain damage might occur after febrile convulsion. This misconception is common not only in the present study population but also among other health providers working in primary health care, hospitals and emergency rooms.

In the present study, 86% of doctors agreed that the higher the temperature, the higher the likelihood of a febrile seizure. There are conflicting results about the association between the risk of febrile convulsion and the height of fever. Many studies have shown that, almost one third of all children who have febrile seizures will have a second episode despite attempts to prevent fever with antipyretics and there was no evidence found that antipyretic treatment reduced the risk of febrile convulsions.

Most of the doctors (76%) in this study reported that height of fever can be used as an indicator for severe bacterial infection. According to evidence obtained from observational studies height of fever should not be taken as an indicator of the severity of the underlying pathology by itself. In children of less than 3 months of age, height of fever may be an indicator of severe bacterial infection [19].

In the present study, only 10% of participants agreed that a sleeping febrile child should not be disturbed. There are studies which show that parents, doctors and nurses awaken sleeping febrile children who have no other symptoms for antipyretic administration. Accordingly, sleeping febrile child need not be awakened for any reason, including medication [17,18].

In various fever management guidelines and studies of the use of these methods to reduce fever, physical methods are not recommended as their usage may be associated with adverse effects and a paradoxical increase in fever and cause more discomfort to the child [19,21].

More than half of participating doctors (66%) agreed that paracetamol and ibuprofen are the only antipyretic drugs which should be used in children. Studies show that both drugs are more effective than placebo, and can be used confidently in children [22,23]. Evidence obtained from randomized controlled clinical trials show that paracetamol and ibuprofen are the only antipyretic drugs recommended for use in children. In spite of this, in the present study, nearly 35% of doctors were using Mefenemic acid, Nimuselide and other combination drugs for antipyresis.

Most of the doctors who participated in the present study (90%) reported that Acetylsalicylic acid should not be used in a febrile child, although this has been known for a long time, nearly 10% of doctors were unsure.

In this study 72% of doctors preferred oral administration to rectal administration. Some investigations show that oral acetaminophen is more effective than the rectal form [24] others found they had similar effects [25]. So the comparison of the antipyretic effects of rectal and oral acetaminophen has conflicting results. Use of rectal paracetamol is not recommended by many guidelines because of the risk of overdose. It is difficult to achieve precise dosage in rectal administration. There are conflicting results about fever management in the literature and this situation could affect the practices of doctors. In many articles alternative treatments of fever with paracetamol and ibuprofen are recommended [26,29] and alternating acetaminophen and ibuprofen in febrile children appears to be a common practice among doctors. But according to guidelines about management of fever in children; combined or alternating the usage of ibuprofen and paracetamol is not recommended. There is no evidence available that alternating therapy results in improvement in other clinical outcomes and there is also no evidence regarding the safety of this practice. In the present study a great majority of doctors (72%) stated that they advised parents to alternate the use of ibuprofen and paracetamol.

Preventive usage of antipyretic before vaccine application is a common implementation in primary health care in India despite the absence of evidence. Most of the doctors (76%) in the present study reported that antipyretic usage should be recommended to prevent fever and local reaction associated with childhood vaccination. According to evidence obtained from well-designed randomized clinical trials, use of paracetamol or ibuprofen is not recommended to reduce fever and local reactions associated with vaccination [30,31].

The present investigation may have potential limitations. Our results may not

generalize to all primary health care providers. The present study does not provide information regarding possible differences in responses according to the geographical distribution and age. It is well known that self-reported behaviors can be misleading since some participants might not complete the survey as carefully as they would act in real settings.

Our data suggests that implementation of educational programs and using guidelines regarding the proper management of the febrile child are needed. There were misconceptions about management and complications of fever. Conflicting results about fever in the literature also reinforces these misconceptions.

Although there are guidelines for many diseases in primary care, there is no national guidance on the symptomatic management of fever in India. The management of fever varies across India and also among doctors. As a result, there is a perceived need to improve the recognition, assessment, and management of fever with underlying illnesses in children.

Conclusion

There were significant misconceptions about the management and complications of fever. There is a perceived need to improve the recognition, assessment, and management of fever with regards to underlying illnesses in children and a national consensus statement on fever and antipyresis in children.

Reference

1. DuBOIS EF. Why are fever temperatures over 106 degrees F. rare? *Am J Med Sci.* 1949; 217: 361– 368.
2. Karwowska A, Nijssen-Jordan C, Johnson D, Davies HD. Parental and health care provider understanding of childhood fever: a Canadian perspective. *CJEM.* 2002; 4: 394–400.

3. Crocetti M, Moghbeli N, Serwint J. Fever phobia revisited: have parental misconceptions about fever changed in 20 years? *Pediatrics*. 2001; 107: 1241–1246.
4. Elkon-Tamir E, Rimon A, Scolnik D, Glatstein M. Fever Phobia as a Reason for Pediatric Emergency Department Visits: Does the Primary Care Physician Make a Difference? *Rambam Maimonides Med J*. 2017;8.
5. Purssell E, Collin J. Fever phobia: The impact of time and mortality—a systematic review and metaanalysis. *Int J Nurs Stud*. 2016; 56: 81–89
6. Duff GW. Is fever beneficial to the host: a clinical perspective. *Yale J Biol Med*. 1986; 59: 125–130.
7. Nourjah P, Ahmad SR, Karwoski C, Willy M. Estimates of acetaminophen (Paracetamol)-associated overdoses in the United States. *Pharmacoepidemiol Drug Saf*. 2006; 15: 398–405.
8. Chiappini E, Bortone B, Galli L, de Martino M. Guidelines for the symptomatic management of fever in children: systematic review of the literature and quality appraisal with AGREE II. *BMJ Open*. 2017; 7: e015404.
9. Bilenko N, Tessler H, Okbe R, Press J, Gorodischer R. Determinants of antipyretic misuse in children up to 5 years of age: a cross-sectional study. *Clin Ther*. 2006; 28(5): 783-793.
10. Richardson M, Lakhampaul M. Guideline Development Group and the Technical Team: Assessment of initial management of feverish illness in children younger than 5 years: summary of NICE guidance. *BMJ*. 2007; 334 (7604) : 1163-1164.
11. Eichenwald HF: Fever and antipyresis. *Bull World Health Organ*. 2003;81(5):372-374.
12. Chiappini E, D'Elisio S, Mazzantini R, Becherucci P, Pierattelli M, Galli L, et al.: Adherence among Italian paediatricians to the Italian guidelines for the management of fever in children: a cross sectional survey. *BMC Pediatr*. 2013;13(1):210.
13. Sullivan JE, Farrar HC: Section on Clinical Pharmacology and Therapeutics Committee on Drugs. Fever and antipyretic use in children. *Pediatr*. 2011; 127(3):580-587. doi: 10.1542/peds.2010-3852. Epub 2011 Feb 28.
14. Bilenko N, Tessler H, Okbe R, Press J, Gorodischer R. Determinants of antipyretic misuse in children up to 5 years of age: a cross-sectional study. *Clin Ther*. 2006; 28 (5): 783-793.
15. Seow VK, Lin AC, Lin IY, Chen CC, Chen KC, Wang TL, et al. Comparing different patterns for managing febrile children in the ED between emergency and paediatric physicians: impact on patient outcome. *Am J Emerg Med*. 2007;25(9):1004-1008.
16. Sillanpa M, Suominen S, Rautava P, Aromaa M: Academic and social success in adolescents with previous febrile seizures. *Seizure*. 2011;20(4):326-330.
17. Walsh, Anne M. Available evidence does not support routine administration of antipyretics to reduce duration of fever or illness. *Evid Based Nurs*. 2011;14(2):58-59.
18. Offringa M, Newton R: Prophylactic drug management for febrile seizures in children. *Cochrane Database Syst Rev*. 2012;(4):CD003031. doi: 10.1002/14651858. CD 003031. pub2.
19. Trautner BW, Caviness AC, Gerlacher GR, Demmler G, Macias CG: Prospective evaluation of the risk of serious bacterial infection in children who present to the emergency department with hyperpyrexia (temperature of 106° F or higher). *Pediatr*. 2006;118(1):34-40.
20. Meremikwu M, Oyo-Ita A: Physical methods for treating fever in children. *Cochrane Database Syst Rev* 2003;2(2):CD004264.

21. Thomas S, Vijaykumar C, Naik R, Moses PD, Antonisamy B. Comparative effectiveness of tepid sponging and antipyretic drug versus only antipyretic drug in the management of fever among children: A Randomized Controlled Trial. *Indian Pediatr.* 2009;46(2): 133-136.
22. Perrott DA, Piira T, Goodenough B, Champion GD: Efficacy and safety of acetaminophen vs ibuprofen for treating children's pain or fever: a meta-analysis. *Arch Pediatr Adolesc Med.* 2004;158(6):521-526.
23. Edward Purssell. Systematic review of studies comparing combined treatment with paracetamol and ibuprofen, with either drug alone. *Arch Dis Child.* 2011;96: 1175-1179.
24. Scolnik D, Kozer E, Jacobson S, Diamond S, Young NL: Comparison of oral versus normal and high-dose rectal acetaminophen in the treatment of febrile children. *Pediatr.* 2002;110(3):553-556.
25. Nabulsi M, Tamim H, Sabra R, Mahfoud Z, Malaeb S, Fakh H, Mikati M: Equal antipyretic effectiveness of oral and rectal acetaminophen: a randomized controlled trial. *BMC Pediatr* ,2005;5(35). doi:10.1186/1471-2431-5-35
26. Lal A, Gomber S, Talukdar B. Antipyretic effects of nimesulide, paracetamol and ibuprofen- paracetamol. *Indian J Pediatr.* 2000;67(12):865-870.
27. Wong T, Stang AS, Ganshorn H, Hartling L, Maconochie IK, Thomsen AM et al. Combined and alternating paracetamol and ibuprofen therapy for febrile children (Review). *Coch Data System Rev.* 2013;10: CD009572.
28. Hay AD, Costelloe C, Redmond NM, Montgomery AA, Fletcher M, Hollinghurst S, et al. Paracetamol plus ibuprofen for the treatment of fever in children (PITCH): randomized controlled trial. *BMJ* 2008;337: a1302.
29. Wright AD, Liebelt EL: Alternating antipyretics for fever reduction in children: an unfounded practice passed down to parents from pediatricians. *Clinic Pediatr (Phila).* 2007; 46 (2):146-150.
30. Prymula R, Siegrist CA, Chlibek R, Zemlickova H, Vackova M, Smetana J, et al. Effect of prophylactic paracetamol administration at time of vaccination on febrile reactions and antibody responses in children: two openlabel, randomised controlled trials. *Lancet* 2009;374 (9698): 1339-1350.
31. Jackson LA, Dunstan M, Starkovich P, Dunn J, Yu O, Nelson JC, et al. Prophylaxis with acetaminophen or ibuprofen for prevention of local reactions to the fifth diphtheria-tetanus toxoids acellular pertussis vaccination: a randomized, controlled trial. *Pediatr.* 2006; 117(3): 620- 625.