

## Knowledge of Iranian General Practitioners for Acetaminophen Dosing in Children

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### Abstract

**Objective:** This study aims to explore the knowledge of a randomly selected cohort of Iranian general practitioners (GPs) on the topic of acetaminophen dosing for fever in children.

**Methods:** In this cross-sectional study, which was conducted in March 2011 in Isfahan (Iran) 515 GPs who were practicing general family medicine were sent a self-administered 10-item questionnaire about the usage of acetaminophen for fever in pediatric patients. Questions were designed to evaluate the knowledge of GPs on acetaminophen dosing amount and interval for fever in children and were formatted as multiple choice answers. The questionnaire were face and content validated and checked for reliability before the study (Cronbach's alpha=0.75) in two separate sample sets of the same population.

**Results:** 51.5% of questionnaires were returned and analyzed. 41.9% of the physicians gave doses different from the recommended dose (10-15 mg/kg every 4 hours). Only 23.8% of the physicians suggested true maximal daily dose of acetaminophen. 65.7% of the responders usually or always gave prescriptions for antipyretics and 8.7% did not routinely give parents instructions on the dosing of antipyretics.

**Conclusions:** We found that some GPs do not strictly adhere to the dosing guidelines of acetaminophen, so intense clinical courses of pharmacology and rational usage of drugs and other relevant educational programs for medical students and practitioners seems to be necessary for the sake of safety of pediatric patients in Iran.

**Keywords:** Acetaminophen, Paracetamol, General Practitioners, Fever, Rational use of Drugs (JPMA 62: S-55; 2012).

### Introduction

Acetaminophen, a commonly used over-the-counter drug, is on access of general population which leads to the high incidence of overdose in the pediatric population.<sup>1,2</sup> In 2006, 140000 poisoning cases involving acetaminophen were reported to the American Association of Poison Control Centers.<sup>3</sup> Acetaminophen is a safe and effective drug<sup>4,5</sup> but some problems including giving a wrong dose of medication by health care providers and parents<sup>6</sup> and not to receive dosing instructions from physicians<sup>7</sup> may resulted in incorrect doses of acetaminophen. Although it has a wide margin of safety at therapeutic doses, a single dose of acetaminophen 150 mg / kg in children, has the potential to cause severe hepatocellular damage.<sup>8</sup> Association of repeated over dose prescription and liver toxicity was reported in several studies.<sup>9-17</sup>

In Iran general practitioners (GPs) visit pediatric patients routinely in early stages of many febrile diseases in community health centers and medical clinics. In this study we evaluated current knowledge of community-based general practitioners regarding acetaminophen usage and dosing issues

for fever in pediatric patients.

### Methods

In this cross-sectional study, which was conducted in March 2011 in Isfahan Province (Iran) 515 randomly selected GPs who were practicing general family medicine were sent a questionnaire. These physicians were chosen disregarding to their age and graduation dates and were from both genders. We did a literature review using "Acetaminophen", "Paracetamol", "Drug Utilization Evaluation" and "dosing method" as key words through PubMed, Ovid® and Elsevier® for assessing the questionnaire of similar studies. The results were discussed in 3 meeting sessions of academic experts of the fields who were Pediatrician, Clinical Pharmacist, Pharmacologist and Family Medicine practitioner. In this way, we prepared a pre-questionnaire for data collection written 10-item.

The validity and reliability of this pre-questionnaire were evaluated in December 2010, analyzed separately and involved different subjects. For the sake of face-validity, the pre-questionnaire was distributed between 25 university professors, medical students and pharmacy students and their

comments for the clearness of the sentences and phrases were taken to effect. Content validity of our research tool was performed by 5 medical/ pharmacotherapy experts who were different from the group who primarily constructed the pre-questionnaire.

Reliability of this pre-questionnaire was determined using test-retest method. A sample of GPs (n = 61) was recruited from a monthly continuing education meeting which was held in the same city, at Isfahan University of Medical Sciences (Test-1). They have filled in the pre-questionnaire after a lecture which was not related to drug usage in children and acetaminophen's drug information. They did this for the second time one month later at the same place (Test-2). Physicians who had not done both tests (in two separate times with the time interval of one month) were excluded (n=11). The test-retest reliability coefficient of our questionnaire was calculated by comparing the results of these two tests using SPSS (Cronbach's alpha= 0.75).

The finalized questionnaire was including demographic variables of the participants, years elapsed from graduation (10 years and less or more than 10 years), location of medical graduation and the rank of it (1st class, 2nd class and 3rd class according to the classification criteria of the Iranian Ministry of Health and Medical Education), and questions about acetaminophen prescribing including the recommended dose of acetaminophen, the minimal allowed interval between two administration, the maximum allowed dose in a day for a child, and points about patient counseling for acetaminophen prescription.

The Ethics Committee of the Isfahan University of Medical Sciences approved the study protocol. All medical participants were requested to return the filled questionnaire then data was analyzed using SPSS software v.12. Descriptive analysis was done and independent T test was used to compare means for quantitative variables.

## Results

51 percent of the questionnaires were returned. The mean age of the responders was  $42.04 \pm 10.02$  years and they were mostly (67.5 %) graduated from Isfahan University of Medical Sciences. The demographic features of the study population are presented in Table-1.

The frequency of correct answers to questions regarding acetaminophen prescription by physicians is presented in Table 2. When asked on the recommended dose of acetaminophen for a 3-year-old child with fever, (21.7%) of the medical doctors gave lower doses than the recommended dose and (20.1%) of them gave more doses than the recommended dose. 65.7% of the responders usually or always give prescriptions for antipyretics and (8.7%) do not routinely give parents instructions on the dosing of antipyretics. There was not a Significant correlation between the time of graduation and the pattern of prescription of Acetaminophen ( $p=0.25$ ), but

**Table-1: Demographic characteristics of GPs who participated in the study.**

|                            |              |
|----------------------------|--------------|
| Age (years)                | 42.04± 10.02 |
| <b>Gender</b>              |              |
| Male                       | 63.1%        |
| Female                     | 36.9%        |
| Years after Graduation     |              |
| <10 years                  | 34.5%        |
| >10 years                  | 65.5%        |
| <b>Graduation location</b> |              |
| Isfahan                    | 67.5%        |
| <b>Other</b>               |              |
| Type 1 (1st class)         | 14%          |
| Type 2 (2nd class)         | 11.5%        |
| Type 3 (3rd class)         | 7%           |

**Table-2: Frequency of correct answers to questions regarding acetaminophen prescription.**

| Frequency of correct answers | Questions   |
|------------------------------|---|
| 36.65%                       | Body temperature to recommend acetaminophen (Answer: 38.5 C)  |
| 58.13%                       | Recommended dose of acetaminophen (Answer: 10-15 mg/kg)       |
| 90.2%                        | Minimal interval between two administration (Answer: 4 hours) |
| 23.81%                       | Maximal daily dose (Answer:90mg/kg)                           |

there was a significant correlation between genders ( $p=0.032$ ) and the pattern of prescribing of acetaminophen was more promising in female GPs.

## Discussion

Fever is still a common reason for which parents seek emergency departments, health care centers and clinics.<sup>18-20</sup> In Iran general physicians visit the children in health care centers and many emergency departments. Our study showed that nearly half of the studied physicians prescribed antipyretics incorrectly. Others used subtherapeutic or supratherapeutic doses. About one fourth of the studied GPs were aware of the correct maximal doses of Acetaminophen. In a similar study among US physicians, 76% of them were aware of maximum doses of acetaminophen<sup>21</sup> which may shows that Iranian GPs need to have more effective continuing education programs. Although due to the especial metabolism pathways of acetaminophen, young children may be less susceptible to the toxicity of the acute ingestion of acetaminophen than adults,<sup>22</sup> some studies showed hepatic cell injury due to repeated supratherapeutic doses.<sup>10-15</sup> In addition using low doses decreased acetaminophen efficacy. In this study although we considered 38.5°C as a point to start acetaminophen prescribing, more than 70 percent of physicians answered this item incorrectly. Early administer of acetaminophen may increase the risk of acetaminophen overdose. To prevent health problems related to

acetaminophen, improving the knowledge of health care providers such as physicians, clinical nurses and parents is necessary. Many studies showed that parents misused acetaminophen to lower the child's body temperature. As Physicians are the most frequent source of information for fever, enhanced levels of continuing medical education and studies to evaluate these interventions might help to increase their knowledge. Emphasis on acetaminophen dosage and its indications, other factors which predispose toxicity such as co-ingestion of other OTC containing acetaminophen and other effective drugs on liver metabolism seems to be essentials. In addition, written and verbal instructions have important roles in medication education for parent especially for poor literacy individuals.<sup>7</sup> It seems that the curriculum for medical students needs to be enriched for clinical pharmacology issues. Acetaminophen is only a simple probe drug which is prescribed frequently and is supposed to be well-known for any physician. We are not sure about the knowledge of GPs on less frequently used drugs and this may cause a real concern despite the limitations for our study. More effective and interactive courses on clinical pharmacology for medical students and the same item for continuing education session for graduated are highly recommended.

The limitations for our study were the low response rate of participants which limited the power of generalization for the results and also recall bias.

### Acknowledgments

Authors would like to acknowledge all of general practitioners who participated in this study. The protocol of this study was designed in the Student's Research Committee of the School of Pharmacy and Pharmaceutical Sciences was financially supported by the vice-chancellor of Research and Technology at Isfahan University of Medical Sciences.

### Conflict of Interest:

Authors declare no conflict of interest.

### Authors Contribution:

All authors contributed the idea of research, design of study, data analysis and manuscript preparation. MB did the data collection as well.

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