

# An assessment of parents' knowledge, awareness and practice regarding paracetamol use in children

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## Abstract

**Introduction:** Paracetamol is an effective antipyretic and analgesic medication also known as acetaminophen and it is over-the-counter medication although it is widely prescribed to treat mild to moderate pain and fever but at same time it could have minor side effects like lowering blood pressure or increasing heart rate or allergic reaction (rash and swelling).

Previous studies confirmed that there is a lack of information among the general population about how to take paracetamol and deal with the dosage which includes what is the maximum dose and how many times to take it daily (frequency). Most previous studies were done out of Saudi Arabia and to the best of our knowledge there are a lack of studies on the topic in Saudi Arabia. For that reason, our aim in this study was to assess parents' knowledge, awareness and practice regarding paracetamol use in children and to evaluate whether doctors and pharmacists in hospitals or pharmacies educate the parents about this medication or not.

**Methodology:** A Descriptive Cross-sectional Study was done via a validated questionnaire on the general population in the Western Region of Saudi Arabia. This study was conducted in July-August 2021.

The questionnaire has been used in previous studies and it is validated. The questionnaire is divided into four parts that comprises 32 questions; the first about

socio-demographic data, the second part to assess parents' awareness, the third part to assess parents' knowledge and the fourth part assessing parents' practises.

**Results:** The study consisted of 502 participants, 52.4% females and 47.6% males. More than half of the participants (58.8%) do not use paracetamol without doctors' consultation. Regarding Knowledge score among participants, the mean score was 2.089, out of 6. There is a significant relationship between Knowledge and Mother's educational level ( $P= 0.016$ ). On the other hand 48.6% used syrup as their most commonly used form of treatment.

**Conclusion:** This study emphasises the need for increasing caregivers' education on paracetamol use and its side effects. Overall the knowledge score was unsatisfactory. The study found a significant association between parents who had a university degree and their higher knowledge scores. Although most of the participants would consult their doctors before administering paracetamol, it showed no positive impact on their knowledge and practises towards antipyretics dose and side effects, which indicates a need for campaigns or educational programs on fever management.

**Keywords:** Paracetamol, Acetaminophen, Parents, Children.

## Introduction

Paracetamol is an effective antipyretic and analgesic medication also known as acetaminophen and it is an over-the-counter medication and although it is widely prescribed to treat mild to moderate pain and fever at same time it could have a minor side effect like lowering blood pressure or increasing heart rate or allergic reaction (rash and swelling) [1]. Simultaneously, overdosing may produce serious side effects or toxicity such as liver failure or kidney failure or even hepatotoxicity particularly in individuals who are at risk for injury [1,2].

Fever and pain are the commonest symptoms in childhood and a frequent reason for parents to treat them with paracetamol which is administered to children due to its efficacy, safety, and availability even though appropriate dosages should be used to ensure optimal efficacy and safety of paracetamol by administering the correct dose according to body weight [3].

A study done in 2015 at Wollongong, Australia, aimed to investigate if Australian adult caregivers have adequate knowledge to administer paracetamol for children in a proper way and they found that 21.3% of caregivers were unsure of any expected side effects related with giving too much paracetamol [4]. Another cross-sectional study done in the Paediatrics Ward at Hospital of Seri Manjung, in Malaysia from 2018 to 2019 to assessed the knowledge regarding management and use of Paracetamol in treating fever in children. They showed knowledge about using Paracetamol in childhood fever is unsatisfactory in their environment; about 31.2% did not know or were unsure that taking Paracetamol exceeding the recommended dose could result in toxicity [5].

In 2016, a study was done in primary healthcare centres in the Nablus Palestine, aimed to assess parents' knowledge, attitudes, and practice according to paracetamol dosing and poisoning, as well as their awareness regarding paracetamol-containing products. Less than 80% showed evidence of lack of information in different areas, including paracetamol dosing, administration timing, and toxicity potential [6]. Therefore, another a study was done by Kamel F, et al. from 2018-2019 in Jeddah, Saudi Arabia in two malls, which aimed to assess Knowledge, Attitude, and Practice of Paracetamol and Ibuprofen administration of the Paediatric Age Group, and they found 97% of their sample showed poor information regarding Paracetamol and Ibuprofen leading to inappropriate drug administration [7].

The previous studies confirmed that there is a lack of information among the general population about how to take paracetamol and deal with the dosage which includes what is the maximum dose and how many times to take it (frequency). Most of the previous studies were done out of Saudi and to the best of our knowledge there are a lack of studies in Saudi Arabia. For that reason, our aim in this study is to assess parents' knowledge and awareness and practice regarding paracetamol use in children and to evaluate whether doctors and pharmacists in hospitals

or pharmacies educate the parents about this medication or not.

## Methodology

A Descriptive Cross-sectional Study was done via a validated questionnaire on the general population in the Western Region of Saudi Arabia. This study was conducted in July-August 2021. Participants were randomly recruited by submitting the survey and sending it through social media. Participants included those aged between 19 and 50 years who had parented one or more children aged from 2 months up to 13 years. Regarding the sample size, according to the Saudi General Authority for statistics; those who live in western region of Saudi Arabia is 6,927,477. By using the Raosoft calculator the minimum recommended size required was 385 [8,9]. This study was approved by the Unit of Biomedical Ethics Research Committee at the Faculty of Medicine, King Abdulaziz University (Reference No 374-21).

The questionnaire used in previous studies was reviewed and validated by three experts in pharmacy practice [6]. The questionnaire is divided into four parts, where the first part is about socio-demographic data of the child and parents and it continues with various questions such as child gender, number of doctor visits in the last 6 months, number of children, parent's age (fathers' age, mothers' age), parents' education (father's educational level, mother's educational level), marital status and the relation to the child.

The second part is to assess parents' awareness regarding paracetamol products (those who had used paracetamol for the child without consulting a doctor, used either suppository, syrups, tablet and drops for the child, and which product(s) contain(s) paracetamol and Paracetamol use).

The third part was to assess parents' knowledge of paracetamol use (temperature at which paracetamol is given as an antipyretic, daily maximum frequency of paracetamol use, Time allowed between doses, Time allowed for use after opening a syrup, Paracetamol overdose can cause serious adverse effects, Type of damage paracetamol overdose causes). A knowledge score was calculated as the sum of correct answers to items that covered paracetamol administration, dosing, and toxicity and ranged from 0 to 6, with higher scores representing better knowledge.

The fourth part assessed parents' paracetamol-related practises (pharmaceutical dosage form preferred, Syrup dose used before, Syrup measuring tool used before, Suppository dose used before, Reasons for choosing this dosage form, Fever management if no improvement within 2 hours, Reasons for using paracetamol without prescription, Difficulty with administration, Ways to ensure the child has taken the medication, Reason for repeating the dose, Sources of information on paracetamol dose, what dose quantity is determined by).

The data was collected and entered into Microsoft office Excel 2010 and the analysis was done by SPSS (Statistical Package for Social Sciences) V.21 by using bivariate and univariate tests. With 95% confidence interval (CI), P-value below 0.05 was considered as a significant level.

## Results

The study aimed to assess the parents' knowledge, awareness and practice regarding paracetamol use in children and to evaluate whether doctors and pharmacists in hospitals or pharmacies educate the parents about this medication or not in the western region of Saudi Arabia.

The study consisted of 502 participants; most of the participants were females rather than male (263) 52.4%, (239) 47.6% respectively. (Table 1)

Regarding awareness about paracetamol products, we found that 58.8% (295) of our participants do not use paracetamol without doctors' consultation. The majority preferred syrups to be used for their children 89.8% (451). About 46.8% (235) are aware of paracetamol use. At the same time the highest percentage of participants' choice were 4-6 hours as the allowed time between each dose while the correct answer was more than 6 hours 68.3% (343), 21.9% (110), respectively (Table 2).

Regarding Knowledge score among participants The Mean score was 2.089, SD  $\pm$  1.12. There was a significant relation between Knowledge and Mother's educational level ( $P= 0.016$ ) (Tables 2, 3).

According to paracetamol practice and use, parents' responses showed half of our participants choice of drug is according to doctors' recommendations. Sources of information on paracetamol dose was provided by doctors and pharmacists 39.8% (200), 12.7% (64) respectively (Table 4).

**Table1: Socio-demographic details of participants**

| Socio-demographic details of children          |             |                |               |   |                             |
|--|-------------|----------------|---------------|---|-----------------------------|
| Child gender                                   | Male        | 47.6% (239)    | Female        | 52.4% (263)                             |                             |
| Number of doctor's visits in the last 6 months | None        | once           | twice         | 3 times or more                         |                             |
|  | 38.6% (194) | 26.1% (131)    | 18.7% (94)    | 16.5% (83)                              |                             |
| Socio-demographic details of parents           |             |                |               |   |                             |
| Number of children                             | 1           | 2              | 3 and more    |   |                             |
|  | 22.9% (115) | 20.5% (103)    | 56.6% (284)   |   |                             |
| Married status                                 | Married     | 90.2% (453)    | Widowed       | 7% (35)                                 | Divorced 2.8% (14)          |
| Parents' age                                   | Age         | 19-30          | 31-40         | 41-50                                   | Dead                        |
|  | Mother      | 29.1% (146)    | 44.2% (222)   | 26.7% (134)                             | 0% (0)                      |
|  | Father      | 11.8% (59)     | 36.5% (183)   | 47.8% (240)                             | 4% (20)                     |
| Parents education level                        | Uneducated  | Primary School | Middle school | High school                             | University Higher education |
|  | Mother      | 0.6% (3)       | 1.8% (9)      | 5% (25)                                 | 29.9% (150) 7.4% (37)       |
|  | Father      | 1.8% (9)       | 3.4% (17)     | 3.6% (18)                               | 24.1% (121) 18.1% (91)      |
| Relation with child                            | Mother      | Father         | Grandparents  | Brothers and sisters Aunties and uncles | Others                      |
|  | 58.6% (294) | 15.3% (77)     | 1.6% (8)      | 14.3% (72) 9.6% (48)                    | 0.6% (3)                    |

Table 2: Assess parents' awareness regarding paracetamol products and knowledge of paracetamol use

| Awareness Regarding Paracetamol Products                      |  |            |             |  |
|---|--|------------|-------------|--|
| Q1- Used paracetamol for the child without doctor consulting: | Yes  |            | 28.7% (144) |  |
|   | No   |            | 58.8% (295) |  |
|   | IDK what is paracetamol                        |            | 12.5% (63)  |  |
| Q2- Used one of the following products for the child:         |  | No         | Yes         |  |
|   | Suppository                                    |            | 42% (211)   |  |
|   | Syrups   |            | 10.2% (51)  |  |
|   | Tablets  |            | 56.8% (285) |  |
|   | Drops  |            | 77.1% (387) |  |
| Q3- Which product(s) contain(s) paracetamol:                  | Drug   | No         | Yes         |  |
|   | Paramol  | 5.4% (27)  | 29.3% (147) |  |
|   | Pediamol                                       | 7.6% (38)  | 23.3% (117) |  |
|   | Emidol   | 5.8% (29)  | 22.9% (115) |  |
|   | Omol   | 7.2% (36)  | 21.9% (110) |  |
|   | Defadol  | 5.2% (26)  | 35.3% (177) |  |
|   | Fevadol  | 2% (10)    | 79.7% (400) |  |
|   | Calpo  | 9% (45)    | 14.3% (72)  |  |
|   | Panadol  | 2.2% (11)  | 70.1% (352) |  |
|   | Revanin  | 11.4% (57) | 12.2% (61)  |  |
|   | Panadrex                                       | 7.8% (39)  | 40.2% (202) |  |
|   | Adol   | 2.6% (13)  | 68.5% (344) |  |
|   | Tylenol  | 8.8% (44)  | 35.5% (178) |  |
| Q4- Paracetamol uses:   | Anti-Pyretic                                   |            |             |  |
|   | Analgesic                                      |            |             |  |
|   | Sedative                                       |            |             |  |
|   | Symptoms Of Illness (Cough, Flu, And Vomiting) |            |             |  |
|   | Anti-Pyretic and Analgesic                     |            |             |  |
|   | Anti-Pyretic and Sedative                      |            |             |  |
|   | All The Above                                  |            |             |  |

\*Correct answer, Q = Question number, IDK = I don't know, C = Celsius degree, h = Hour

(Table 2: Assess parents' awareness regarding paracetamol products and knowledge of paracetamol use continued)

**Table 2: Assess parents' awareness regarding paracetamol products and knowledge of paracetamol use**

| Knowledge of paracetamol use                                       |                      |             |
|--|----------------------|-------------|
| <b>Q1-Temperature at which paracetamol is given as antipyretic</b> | 38 ° C *             | 44.6% (224) |
|  | 38.5 ° C             | 24.3% (122) |
|  | 39 ° C               | 14.1% (71)  |
|  | 39.5 ° C             | 5.4% (27)   |
|  | 40 ° C               | 0% (0)      |
|  | I don't know         | 11.6% (58)  |
| <b>Q2-Daily maximum frequency of paracetamol use:</b>              | One dose             | 4.6% (23)   |
|  | Two doses            | 28.7% (144) |
|  | Three doses          | 29.1% (146) |
|  | Four doses *         | 28.3% (142) |
|  | Five doses           | 2% (10)     |
|  | I don't know         | 7.4% (37)   |
| <b>Q3-Time allowed between doses:</b>                              | Less than 4 hours    | 3.8% (19)   |
|  | 4-6 hours            | 68.3% (343) |
|  | More than 6 hours *  | 21.9% (110) |
|  | I don't know         | 6% (30)     |
| <b>Q4-Time allowed for use after opening a syrup:</b>              | Up to 3 months       | 31.5% (158) |
|  | Up to 6 months *     | 13.9% (70)  |
|  | Until expiry date    | 42.0% (211) |
|  | I don't know         | 12.5% (63)  |
| <b>Q5- Overdose can cause serious adverse effects:</b>             | Yes *                | 66.9% (336) |
|  | No                   | 5.2% (26)   |
|  | I don't know         | 27.9% (140) |
| <b>Q6-Type of damage paracetamol overdose causes:</b>              | Renal failure        | 41.6% (209) |
|  | Liver damage *       | 33.3% (167) |
|  | Gastric irritability | 15.3% (77)  |
|  | Immune suppression   | 0% (0)      |
|  | Other                | 9.8% (49)   |

\*Correct answer, Q = Question number, IDK = I don't know, C = Celsius degree, h = Hour

**Table 3: Participants knowledge score (n=502)**

| Knowledge items   |                     | Wrong answer         | Correct answer |                |         |
|---|---------------------|----------------------|----------------|----------------|---------|
| Q1-Temperature at which paracetamol is given as antipyretic       |                     | 55.4% (278)          | 44.6% (224)    |                |         |
| Q2-Daily maximum frequency of paracetamol use                     |                     | 71.7% (360)          | 28.3% (142)    |                |         |
| Q3-Time allowed between doses                                     |                     | 78.1% (392)          | 21.9% (110)    |                |         |
| Q4-Time allowed for use after opening a syrup                     |                     | 86.1% (432)          | 13.9% (70)     |                |         |
| Q5- Overdose can cause serious adverse effects                    |                     | 33.1% (166)          | 66.9% (336)    |                |         |
| Q6-Type of damage paracetamol overdose causes                     |                     | 66.7% (335)          | 33.3% (167)    |                |         |
| Demographic factors affecting caregivers' knowledge score (n=502) |                     |                      |                |                |         |
| Demographic characteristic  |                     | Scoring of Knowledge |                |                |         |
|   |                     | Number               | Mean           | Std. deviation | P value |
| Q1-Number of children:  | 1 Child             | 115                  | 1.94           | 1.082          | 0.23    |
|   | 2 Children          | 103                  | 2.20           | 1.114          |         |
|   | 3 Children or more  | 284                  | 2.10           | 1.14           |         |
| Q2-Fathers' age (year)  | 19-30               | 59                   | 2.25           | 1.18           | 0.42    |
|   | 31-40               | 183                  | 2.06           | 1.03           |         |
|   | 41-50               | 240                  | 2.04           | 1.20           |         |
|   | Dead                | 20                   | 2.35           | 0.67           |         |
| Q3-Mothers' age (year):   | 19-30               | 146                  | 2.14           | 1.05           | 0.72    |
|   | 31-40               | 222                  | 2.04           | 1.14           |         |
|   | 41-50               | 134                  | 2.10           | 1.18           |         |
|   | Dead                | 0                    | 0              | 0              |         |
| Q4-Marriage Status:   | Married             | 453                  | 2.09           | 1.11           | 0.43    |
|   | Widowed             | 35                   | 1.91           | 1.44           |         |
|   | Divorced            | 14                   | 2.35           | 0.63           |         |
| Q5-Father's educational level:                                    | Uneducated          | 9                    | 2.00           | 0.86           | 0.66    |
|   | Elementary School   | 17                   | 1.70           | 1.53           |         |
|   | Middle School       | 18                   | 2.00           | 0.97           |         |
|   | High school         | 121                  | 2.05           | 1.12           |         |
|   | University          | 246                  | 2.09           | 1.12           |         |
|   | Higher education    | 91                   | 2.20           | 1.10           |         |
| Q6-Mother's educational level:                                    | Uneducated          | 3                    | 0.66           | 1.15           | 0.016   |
|   | Elementary School   | 9                    | 1.66           | 1.65           |         |
|   | Middle School       | 25                   | 1.52           | 0.87           |         |
|   | High school         | 150                  | 2.09           | 1.16           |         |
|   | University          | 278                  | 2.14           | 1.06           |         |
|   | Higher education    | 37                   | 2.24           | 1.25           |         |
| Q7- Relationship to the child:                                    | Mother              | 294                  | 2.06           | 1.12           | 0.001   |
|   | Father              | 77                   | 2.54           | 1.23           |         |
|   | Grandparents        | 8                    | 2.50           | 0.92           |         |
|   | Brother and sisters | 72                   | 1.88           | 1.08           |         |
|   | Aunt and uncle      | 48                   | 1.81           | 0.86           |         |

**Table 4: Participating parents' responses to questions on paracetamol-related practices**

| <b>Q1-Pharmaceutical dosage form preferred:</b>              |             | <b>Q7-Reasons for using paracetamol without prescription:</b> |             |
|--|-------------|---|-------------|
| Syrup  | 48.6% (244) | I do not trust the healthcare system                          | 2.6% (13)   |
| Suppositories  | 6.6% (33)   | No need to visit the doctor                                   | 13.1% (66)  |
| Syrup and Suppositories                                      | 39.6% (199) | Doctor fee is too expensive                                   | 11.0% (55)  |
| Drops  | 5.2% (26)   | Prior experience with similar symptoms                        | 69.3% (348) |
| <b>Q2-Syrup dose used before:</b>                            |             | Other   | 4% (20)     |
| 125 mg/5 ml  | 72.1% (362) | <b>Q8-Difficulty with administration:</b>                     |             |
| 250 mg/5 ml  | 19.3% (97)  | Children refuse to swallow the medication                     | 48.4% (243) |
| Didn't use before  | 8.6% (43)   | Child is not cooperative due to illness                       | 11.2% (56)  |
| <b>Q3-Syrup measuring tool used before:</b>                  |             | Child is sleeping at the dose times                           | 6.6% (33)   |
| Teaspoon   | 10.2% (51)  | No difficulty   | 33.9% (170) |
| Table spoon  | 3.6% (18)   | Other   | 0% (0)      |
| Syringe  | 12.4% (62)  | <b>Q9-Ways to ensure the child has taken the medication:</b>  |             |
| Measuring cup  | 69.1% (347) | Using force   | 6.2% (31)   |
| Didn't use before  | 4.8% (24)   | Coaxing and encouraging the child                             | 69.1% (347) |
| <b>Q4-Suppository dose used before:</b>                      |             | Mixing medicine with food or drinks                           | 6.6% (33)   |
| 80 mg  | 17.3% (87)  | Seeking medical advice  | 2.2% (11)   |
| 150 mg   | 21.9% (110) | Using non-pharmacological methods                             | 2.8% (14)   |
| 250 mg   | 16.5% (83)  | Using suppositories instead of syrup                          | 5% (25)     |
| 300 mg   | 1.2% (6)    | Mixing medicine with food or drinks and using suppositories   | 8.2% (41)   |
| 80 mg and 150 mg   | 4% (20)     |   |             |
| Didn't use before  | 39% (196)   | Other   | 0% (0)      |
| <b>Q5-Reasons for choosing this dosage form:</b>             |             | <b>Q10-Reason for repeating the dose:</b>                     |             |
| Price  | 3.2% (16)   | Severity of illness   | 46.8% (235) |
| Efficacy   | 13.1% (66)  | Age   | 2.8% (14)   |
| Doctor's recommendation                                      | 50.2% (252) | Weight  | 2.4% (12)   |
| Pharmacist's recommendation                                  | 11.6% (58)  | Medication leaflet  | 4% (20)     |
| Other's recommendation                                       | 3.2% (16)   | Doctor's consultation   | 37.3% (187) |
| Easily used  | 18.1% (91)  | Pharmacist's consultation                                     | 6.8% (34)   |
| Other  | 0.6% (3)    | <b>Q11-Sources of information on paracetamol dose:</b>        |             |
| <b>Q6-Fever management if no improvement within 2 hours:</b> |             | Doctor's consultation   | 39.8% (200) |
| Give another dose of paracetamol                             | 5.2% (26)   | Pharmacist's consultation                                     | 12.7% (64)  |
| Use other medications  | 3.4% (17)   | Own knowledge   | 5% (25)     |
| Use cold sponges   | 18.7% (94)  | Relatives and friends   | 3% (15)     |
| Consult a doctor   | 17.3% (87)  | Experience from previous use                                  | 22.5% (113) |
| Use cold sponges and consult a doctor                        | 54.4% (273) | Medication leaflet  | 16.9% (85)  |
| Other  | 1% (5)      | <b>Q12-Dose quantity is determined by:</b>                    |             |
|  |             | Age   | 38.4% (193) |
|  |             | Weight  | 19.9% (100) |
|  |             | Severity of illness   | 9.2% (46)   |
|  |             | Experience from previous use                                  | 6.2% (31)   |
|  |             | Medication leaflet and weight                                 | 22.9% (115) |
|  |             | Other   | 3.4% (17)   |

## Discussion

In this study, parent's knowledge on paracetamol use for their children was assessed, as well as their practises and attitudes towards it, especially as most of the Paracetamol medications are considered as over-the-counter (OTC) medication that is easily available in hands. Studies showed that most patients with mild to moderate symptoms are self-medicated, which emphasises the need for awareness of paracetamol misuse and overdose, especially with children [10].

Data on paracetamol practises and awareness are limited in Saudi Arabia. This study involved 502 participants; the majority were married, with 3 or more children, and almost 50% of all parents had college degrees.

Surprisingly, number of children had no direct impact on parent's knowledge and practises towards paracetamol use ( $P= 0.23$ ). Similar results were found by another Saudi study done in Jeddah [7]; unlike another study that involved parents with more than one child and, as a result, were more experienced with greater knowledge when using antipyretics [11]. On the other hand, there were statistically significant associations between the level of mothers' education and their knowledge on paracetamol use ( $P= 0.016$ ). This was also emphasised by other findings from different populations, which may indicate that educated parents better comprehend drug information found on the leaflet [7,11-13].

A temperature of  $38^{\circ}\text{C}$  or higher is considered a fever as stated in different studies [14]. Participants were firstly asked when to define their child temperature as fever for an antipyretic to be given; about 45% used similar cut-offs ( $38^{\circ}\text{C}$ ) for the administration of paracetamol.

Only 13% did not know what paracetamol is and more than 35% did not know its uses, even though it's widely used as an analgesic and antipyretic for feverish children [15]. Almost 70% who would possibly use paracetamol without prescription could be due to prior experience with similar symptoms, which can lead to drug misuse and accidental overdose. However, 60% of our participants did not choose to use paracetamol for their children before consultation and medical advice (Table 1,2). Another study done in Palestine with similar results found that about 47% of parents administered the drug based on medical advice [16]. Conversely, other studies involved more than 50%-70% of parents who used paracetamol immediately without a prescription or consulting a doctor [7,10,17]. Despite that most of our participants would consult a doctor/paediatrician before administering paracetamol. These affirmations were not consistent with the overall knowledge scores reported in some questions. Consequently, our results showed slightly similar findings to those who did not consult their doctors.

Incorrect answers were found in some aspects regarding dosing and long-term adverse effects, or others answered I don't know (IDK), were 78% and 67%, respectively; even

though 67% of all participants were aware that overdose can lead to long-term harm. Taken together, these paradoxical results may indicate limited understanding, and therefore suggests further interventions in order to improve caregivers' knowledge on using paracetamol precisely to avoid hepatotoxicity [18].

Reliable information sources and enhancing access to them is also mandatory after doctors' consultation, for safe and effective use of analgesics and antipyretics. Herein, half of our participants (52%) reported that medical personnel, including doctors and pharmacists, were considered as their primary source of information. This was in concordance with other findings where >50% reported health care providers as their main source of information [10,19].

Paracetamol is the most common drug overdose particularly among children aged less than 6 years [20]. Although only 2% of our participants had chosen 5 doses as the maximum frequency of dose, that could consequently lead to overdose and toxicity, the correct answer of four doses was only chosen by 28%, whereas under-dosing was reported by more than 60%. According to [10], not only overdosing could possess negative consequences, under-dosing can lead to lack of therapeutic response and ineffective fever management that may further lead to unnecessary use of antibiotics.

Our study found that about 40% of parents preferred the dosage form as both syrup and suppositories, and about 49% preferred it as syrup, which most likely indicates that oral dose is common among almost 50% of the participants. Simultaneously, about 62% of those drug forms were chosen as per doctor or pharmacist recommendations. This matches other findings that involved 50% of participants who preferred syrup form for drug administration [7,16].

Comparison between the two forms caused controversy. More recently, the oral form has been officially recommended considering its accuracy in estimating the right dose [10]. Arana et al., 2008 also stated that oral absorption is faster and more effective than rectal; however, it should be known that it is age-dependent, as rectal bioavailability is higher in the very young age than in older children. A randomised controlled trial conducted by Lmbulana and Fernando, 2020 focused on the effectiveness of rectal paracetamol in some instances, and stated that a single dose of 30 mg/kg rectal paracetamol was more effective than a single dose of 15 mg/kg oral paracetamol on reducing body temperature in children aged between 2 to 6 years, with no differences in side effects [21,22].

On the other hand, several earlier studies reported no differences in the effect of either oral route or rectal on reducing body temperature in children, claiming that other studies with conflicting results can be scientifically justified [23]. For instance, the first study by Leary et al. 1997, employed axillary temperature, that was supposed to be unreliable [24]. Another study that documented better effects of oral route was not randomised and administered

a low dose of 10 mg/kg [25,26]. More future research and prospective studies may be needed to elucidate these conflicts.

Since syrup form is commonly prescribed among participants, accuracy of oral liquid measuring device is always necessary to avoid overdosing and underdosing. The majority of the participants (69%) used a measuring cup as the measuring tool when administering paracetamol, similar to a study done by Arachchi et al., 2018 [17]. In addition, only 12.4% used the syringe. These findings are in contrast with another study done in Saudi Arabia by Almazrou et al., 2015, in which 50% of its participants used a syringe and 49% used a measuring cup. It stated that more accurate doses were reached when using syringes than using other devices. Similarly, another study done by Sobhani et al., 2008 comparing the use of different measuring devices mentioned that 24% of participants reached the accurate dose using syringe and only 4.2% measured the accurate dose using the cup. This further addresses the need for pre-explanation on how to use different measurements by health care providers or through pamphlets to avoid the high risk of making dosing errors [27,28].

### **Strengths and Limitations**

This study had a number of notable strengths; one included the large sample size in comparison to our method of online questionnaire that usually receives low response rates. This in turn yielded statistically significant results. Second, the questionnaire design ensured that questions were clearly phrased; in order to assure caregivers understanding and involvement, and to have an indirect role in increasing knowledge and awareness through it. Thirdly, although the questionnaire was sent to a large sample of people, our study ensured avoiding non-response bias and collecting data only from our target, parents and caregivers, to avoid false or inaccurate results. Finally our questions were also all in Arabic, which could have been available in both languages to maximise participation. However, one of the limitations of our survey is the low response, and the time it took to collect data from our target sample to reach this sample size.

### **Future research**

Future study can draw caregivers' responses through both online surveys and face-to-face interviews. This may, however, be time consuming and come at a higher cost. It would allow for both open-ended and closed-ended questions, to further increase certainty of online answers and ensure respondents' understanding of all questions.

### **Conclusion**

This study emphasises the need for increasing caregivers' education on paracetamol use and side effects. Overall knowledge score was unsatisfactory, as most of the questions related to the drug use, dose and adverse side effects were not correctly answered. Educational background can play a significant role in increasing knowledge and awareness, and the study found a significant

association between parents who had a university degree and their higher knowledge scores. Most of our participants preferred syrup and suppositories over the other drug forms. Although most of the participants would consult their doctors before administering paracetamol, it showed no positive impact on their knowledge and practises towards antipyretics dose and side effects, which indicates a need for campaigns or educational programs on fever management.

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