International Journal of Advanced Pharmaceutical Sciences and Research (IJAPSR)
ISSN: 2582-7618 (Online), Volume-3 Issue-6, October 2023

Assessment of Awareness Regarding Paracetamol-Containing Medicine Toxicity Among Syrians

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Abstract: ***This study aimed to assess Syrians' awareness of paracetamol toxicity. An online survey was shared on social media, and in-person interviews were conducted in June 2025. A total of 114 valid responses were collected. The questionnaire had three sections: demographic information, participants' knowledge of the paracetamol treatment plan, and their perceptions of its risks and toxicity. The results showed that most participants (70.3%) knew that daily paracetamol intake is unnecessary. Additionally, 60.7% believed that paracetamol should only be used when needed, especially for pain. The findings also indicated that 73% of participants do not take paracetamol for long periods without understanding the cause of their pain. However, 13.5% admitted to taking it despite being unaware of the pain's origin, assuming it might be psychological rather than physical. In such cases, using paracetamol is unnecessary and could cause adverse effects. Although paracetamol is an over-the-counter (OTC) medication, 76.6% of participants reported using it without medical consultation. It can lead to serious side effects, such as liver toxicity, especially if misused. However, 33% of respondents were unaware that paracetamol could cause such complications due to uncontrolled use.***

Keywords: ***Paracetamol, Toxicity, Survey, Awareness, Syrians.***

Abbreviations:
OTC: Over-The-Counter

I. INTRODUCTION

Acetaminophen, also known as paracetamol [1], is one of the most commonly used analgesics [2] and antipyretic medications [3], recognised for its effectiveness [4] and over-the-counter availability in most countries [5]. It is generally safe when taken properly [6]. Exceeding the maximum recommended daily dose of 4 grams for adults [7], even slightly [8], can cause acute liver toxicity. In Syria, where the country faces significant health and economic challenges, it is increasingly important to assess public knowledge about over-the-counter drugs [12]. Previous studies have shown that humanitarian crises often lead to increased self-medication practices [13], which can pose serious health risks [14]. This study is essential for several reasons [15]. First, medications containing paracetamol are readily available in Syrian pharmacies [16]. Second, many pharmaceutical products contain this substance. Third, there is a lack of local information on awareness of the drug's toxicity. Fourth, complex health conditions motivate many individuals to self-medicate [20]. This study aims to evaluate the Syrian public's awareness of paracetamol, focusing on its recommended dosages, potential side effects, and toxicity risks [21]. A specific questionnaire has been distributed to a representative sample of the Syrian population from diverse geographic and demographic backgrounds [22]. This research aims to address a significant gap in public health knowledge in Syria regarding the safe use of paracetamol-based medications, ultimately helping to reduce health issues caused by improper use.

II. METHODS

This questionnaire was distributed through a structured electronic Google Form in June 2025. The main goal of the study was to evaluate the knowledge, attitudes, and practices related to paracetamol among Syrians and to assess their awareness of its dosage, toxicity, and side effects. The questionnaire was shared via popular social media platforms, including Facebook and WhatsApp. Additionally, face-to-face interviews were conducted in streets and public spaces to reach a diverse segment of the population, especially university students and young adults. A total of 114 complete and valid questionnaires were collected for analysis. The study sample included individuals from various age groups, professional backgrounds, and educational levels. While the study mainly focused on university students and graduates, it also involved individuals working in the public sector. The questionnaire was divided into three main sections: demographic details, evaluation of participants' knowledge about the therapeutic use of paracetamol, and their perceptions of its risks and toxicity.

In the demographic section, participants provided information about their gender, age group (ranging from under 18 to over 60 years), and current occupation [23]. The second section examined individuals' behavior

Manuscript received on 12 December 2022 | Revised Manuscript received on 24 January 2023 | Manuscript Accepted on 15 October 2023 | Manuscript published on 30 October 2023.

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regarding paracetamol use and aimed to measure the frequency and intensity of this practice [24]. Participants were asked how many times per day they usually take it, from once to more than five times, and whether they would repeat the dose if there were no improvement [25]. The types of health conditions for which paracetamol is used were also recorded, including headache, joint and bone pain, muscle pain, and stomach or intestinal pain. This section also included questions about the usual timing of intake and whether participants experienced any side effects after the normal dose. In the third part of the study, the sources of information and the motivations behind choosing to use paracetamol were evaluated. Participants were asked to identify the primary source of pharmaceutical knowledge, whether it was a pharmacist, personal experience, family and friends, or medical advice from doctors, and to assess their awareness and beliefs about the safety and risks of using the drug without consulting medical agents. Participants were questioned about their understanding of the risks associated with random paracetamol use, their knowledge of the maximum allowable daily dose (ranging from 2 to more than 10 tablets per day), and their awareness of the dangers of combining another painkiller with paracetamol. Additionally, the questionnaire assessed participants' knowledge of using paracetamol over extended periods without identifying the source of pain, as well as awareness that paracetamol is available in multiple pharmaceutical forms with different dosages. Each response was analyzed using descriptive statistical methods. Percentages and frequencies were calculated for all categorical variables to provide a clear overview of prevailing habits and beliefs. Since many questions offered multiple-choice options, particularly those related to symptoms being treated, the results were also presented visually using charts to highlight common patterns and facilitate an understanding of participants' behaviours and attitudes toward paracetamol use among Syrians.

III. RESULTS

A. Demographic data of participants

A total of 114 participants completed the questionnaire. As shown in Table 1, females constituted the majority of the sample at 71.4%, compared to 28.6% males. The most represented age group was 18 to 25 years, accounting for 49.5%, followed by the 36 to 45 age group at 18.9%, and the 46 to 60 age group at 16.2%. Regarding occupational status, 46.4% of participants identified as students, while pharmacists represented 7.1%, and employees made up 22.3% of the sample. In terms of educational level, 63.9% reported being university students, whereas 6.2% were high school students. These demographic features indicate that the sample was primarily composed of young individuals, making it a suitable group for studying and assessing public awareness and behaviors related to paracetamol use.

Table-I: Demographic Characteristics of Participants

Demographic data	
Characteristics	**Percentages %**
Gender	
Female	71.40%
Male	28.60%
Age (years)	
>18	3.60%
18-25	49.50%
26-35	9%
36-45	18.90%
46-60	16.20%
60<	2.70%
Work	
Student	46.40%
Employee	22.30%
Doctor	1%
Pharmacist	7.10%
Others	23.20%
Educational level	
School student	6.20%
College student	63.90%
Master, PhD	3.10%
Others	26.80%

The questionnaire was distributed to 200 participants to study individuals' opinions and tendencies regarding herbal medications. Results showed that 66.5% of the participants were female, while 33.5% were male. The 18–25 age group represented the most significant portion (63.5%), followed by the 26–35 age group (17.5%). Regarding education level, the majority (82%) held university degrees, 12.5% had completed secondary education or less, and 5.5% had postgraduate studies. Regarding occupational status, most respondents were students (62%), followed by employees (15.5%), then unemployed individuals (12.5%), and freelancers (10%). Additionally, 54.5% of participants lived in city areas. 45.5% lived in country areas. Around 41.5% were working or studying in the medical or health field.

B. Participant's Knowledge of the Therapeutic Use of Paracetamol

Table 2 presents clear indicators of the widespread use of paracetamol among the studied sample. A total of 60.7% of participants reported using paracetamol when experiencing any pain, while 55% admitted to repeating the dose if they did not feel improvement. This reflects a habitual medication pattern that may indicate ongoing dependence, exceeding temporary or occasional use. Additionally, 10.8% of participants reported consuming more than two paracetamol tablets per day, with intake reaching up to five tablets. This suggests usage beyond safe limits, even though most did not report any noticeable side effects [32]. While only a few experienced adverse effects, such behavior poses a potential health risk, especially concerning an increased likelihood of liver toxicity due to overdose [30]. In terms of symptoms treated with paracetamol, headaches topped the list at 92%, followed by joint and bone pain (21.4%), muscle pain (10.7%), and stomach and intestinal pain (6.3%). This pattern highlights the widespread reliance on paracetamol as a quick therapeutic solution for various common complaints. Regarding usage habits, 60.9% Of the participants, 48.2% reported taking paracetamol immediately upon feeling pain, while 51.8% preferred

to take it after meals. Only 4.5% admitted to taking it on an empty stomach, a practice that, although limited, is not considered medically ideal. Overall, these results highlight a notable discrepancy between participants' awareness of proper paracetamol use and their actual behaviour [29]. Despite a certain level of knowledge, daily practices reveal the need for targeted educational initiatives aimed at promoting responsible usage and reducing the risks associated with the misuse of this widely used medication [28].

Table-II: Results of Participants' Perceptions of the Risks and Toxicity Associated with Paracetamol

Questions	Percentages %
Do you take paracetamol when you feel pain?	
Yes	60.70%
No	4.50%
Maybe	34.80%
What type of pain and symptoms did you experience?	
Headache (cephalalgia)	92%
Arthralgia and bone pain	21.40%
Myalgia (muscle pain)	10.70%
Abdominal and intestinal pain	6.30%
Other	5.40%
How do you administer paracetamol?	
On an empty stomach	4.50%
Before meal	2.70%
After meal	48.20%
Immediately upon pain onset	60.90%
What is your daily dosage intake?	
One tablet	17.10%
2-5 tablets	10.80%
More than that	1.80%
I don't necessarily take it daily	70.30%
In case of no improvement, do you repeat the dose?	
Yes	55%
No	24.30%
Maybe	20.70%
After taking your usual dose, did you experience any adverse effects?	
Yes	2.75%
No	94.50%
Maybe	2.75%

C.PParticipants' Perceptions of the Risks and Toxicity Associated with Paracetamol

Table 3 illustrates the participants' awareness of the risks associated with paracetamol use. It was found that 76.6% of them consume it without consulting any medical source, a behavior primarily attributed to its easy accessibility and the prevailing perception of its relative safety. In contrast, 10.8% reported consulting friends or relatives, 9% turned to pharmacists, and only 8.1% consulted a physician before using it. A total of 57.7% of participants demonstrated knowledge of the recommended time interval between doses. However, 12.5% admitted to taking another analgesic alongside paracetamol, and an additional 11.6% indicated that they might do the same. This dual usage reveals a clear gap between theoretical knowledge and actual practice in medication use, increasing the risk of drug interactions and potential side effects or health complications [27].

Table-III: Results of Participants' Perceptions of the Risks and Toxicity Associated with Paracetamol

	Percentages %
Do you take paracetamol after consulting?	
A doctor	8.10%
A pharmacist	9%
Friends or relatives	10.80%
Without consulting anyone	76.60%
Are you aware of the risks associated with indiscriminate paracetamol use?	
Yes	56.30%
No	33%
Maybe	10.70%
Do you take paracetamol chronically without identifying the underlying cause of your pain?	
Yes	13.50%
No	73%
Maybe	13.50%
Based on your knowledge, what is the permitted daily dosage?	
2-4 tablets	72.70%
4-8 tablets	20%
8-10 tablets	6.40%
More than 10 tablets	0.90%
Do you know the required time interval between doses?	
Yes	57.70%
No	34.20%
Maybe	8.10%
Do you combine other analgesics with paracetamol?	
Yes	12.50%
No	75.90%
Maybe	11.60%
Are you aware that paracetamol comes in multiple pharmaceutical formulations with varying dosages?	
Yes	70.60%
No	23.90%
Maybe	5.50%

Regarding awareness of the associated risks, 56.3% of participants reported being aware of the dangers of consuming paracetamol [26]. The results also revealed discrepancies in knowledge of the permissible daily dose: 72.7% stated that the dose should not exceed four tablets per day, whereas 20% admitted to taking eight tablets, and 6.4% reported taking up to ten tablets daily. These levels approach toxic doses that pose a direct threat to health, especially to liver function. Moreover, 13.5% of participants reported continued use of paracetamol over extended periods without knowing the actual cause of the pain, with repeated dosing done automatically and without awareness of the potential consequences of this behavior. Notably, 23.9% of participants were unaware that paracetamol is available in multiple pharmaceutical forms and believed it exists only in tablet form. This indicates a lack of basic information about the diversity of paracetamol administration routes. In general, these results reflect the widespread, over-the-counter use of paracetamol to address daily health complaints [18], coupled with a concerning tendency to use it without consulting a doctor or having sufficient awareness of the risks. These findings proved the importance of reinforcing health education programs to emphasize the safe and responsible use of paracetamol [11]. These

programs may reduce the adverse effects resulting from unregulated paracetamol use [10].

IV. DISCUSSION

This study aimed to assess the level of Syrian knowledge about paracetamol toxicity. The findings reveal that paracetamol is widely used in Syrian society. It has become a common element in health practices, showing a firm reliance on it as a first-line pain relief method without direct medical supervision. The results indicated that 76.6% of participants take paracetamol without consulting medical agents, highlighting a prevalent trend of self-medication and limited dependence on official pharmaceutical sources [9]. This behavior is linked to easy access to the drug without a prescription and the widespread perception of its safety among many individuals [31]. However, such confidence can be misleading if people lack accurate knowledge about safe dosage limits and potential complications [19]. In this context, it is concerning that 12.5% of participants reported using paracetamol with other analgesics, while 11.6% said they might do so occasionally. This pattern of unregulated use could significantly increase the risk of liver toxicity, especially when active compounds with similar mechanisms are unknowingly combined. Although 56.3% of participants understood the dangers of random paracetamol use, 33% reported having no such awareness, highlighting a clear gap in health education regarding the safe use of this medication. Furthermore, the results showed inconsistent knowledge about the maximum daily dose: 72.7% stated it should not exceed four tablets per day, while 20% admitted to taking up to eight tablets, and 6.4% reported consuming as many as ten tablets daily, a level approaching toxicity and risking liver damage. Additionally, 13.5% of participants reported taking paracetamol over extended periods without understanding the cause of their pain, reflecting a concerning trend of habitual or psychological self-medication. This could lead to dose buildup and a higher risk of toxicity. Moreover, 23. 9% were unaware that paracetamol comes in multiple pharmaceutical forms, believing it only exists as tablets. This indicates limited awareness of pharmaceutical variations and their impact on dosage and administration [17]. Overall, these findings reveal excessive and unregulated paracetamol use without sufficient reliance on trusted medical sources. Many participants had basic awareness of the risks, but it was not often translated into safe practices. This emphasizes the need for targeted educational programs that reach all population groups, focusing on closing the gap between awareness and practice, improving understanding of correct dosing, and clarifying the dangers of excessive or combined use of medications containing paracetamol.

V. CONCLUSION

This study highlights the widespread use of paracetamol among Syrians. While many participants demonstrated relatively good knowledge about the safe daily dosage and some aspects of the drug's toxicity, this understanding did not always translate into safe medication practices. The findings revealed that many individuals take paracetamol without consulting a healthcare professional, tend to repeat the dose if they do not see improvement, and sometimes combine it with other pain relievers, risking liver toxicity and other health issues. Additionally, there was a noticeable lack of awareness about the different forms of paracetamol, reflecting a general deficiency in public health education. These results underscore the need for a comprehensive approach, including health awareness campaigns that clearly explain safe usage limits and the dangers of excessive or unregulated intake. Strengthening the role of pharmacists and promoting responsible pharmaceutical counselling are also crucial to reducing such practices, as many individuals rely on their advice instead of consulting a doctor. Furthermore, improving access to healthcare, particularly in densely populated or underserved areas, could help decrease reliance on self-medication. In conclusion, this study emphasises the significance of national health strategies that promote the rational use of paracetamol and raise public awareness about the risks associated with medicine misuse, including the use of over-the-counter drugs, to foster more informed and responsible pharmaceutical habits within Syrian society.

DECLARATION STATEMENT

After aggregating input from all authors, I must verify the accuracy of the following information as the article's author.

- **Conflicts of Interest/ Competing Interests:** Based on my understanding, this article has no conflicts of interest.
- **Funding Support:** This article has not been funded by any organizations or agencies. This independence ensures that the research is conducted with objectivity and without any external influence.
- **Ethical Approval and Consent to Participate:** The content of this article does not necessitate ethical approval or consent to participate with supporting documentation.
- **Data Access Statement and Material Availability:** The adequate resources of this article are publicly accessible.
- **Author's Contributions:** The authorship of this article is contributed equally to all participating individuals.

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