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Research Article

Assessment of Parental Knowledge and Awareness Regarding Paracetamol Usage and Toxicity at Lady Ridgeway Hospital for Children, Sri Lanka

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Abstract

Introduction: Paracetamol is widely used in paediatric care as an antipyretic and analgesic, yet misuse and incorrect dosing can lead to toxicity. This study assessed parental knowledge and awareness of paracetamol use and toxicity at Lady Ridgeway Hospital for Children, Sri Lanka.

Methods: A descriptive cross-sectional study among 402 parents utilised a structured questionnaire to evaluate demographics, paracetamol dosing knowledge, indications, toxicity, and sources of information. Statistical analysis examined associations between knowledge levels and demographic factors.

Results: Most participants (75.9%) were female, with a mean age of 34.01 ± 7.54 years. A majority (75.9%) had an education level between O/L and A/L, while 12.2% had higher education. Employment status varied, with 54.7% unemployed and 45.3% employed. Nearly all (98.5%) administered paracetamol without prior medical consultation, mostly for fever (98.0%). Only 42.8% correctly identified 100.4°F (38°C) as the threshold for antipyretic use, and 43.3% were unaware of the shelf life of opened syrup. While 90.3% recognised overdose risks, awareness of specific toxicity effects was limited. Gender (p=0.005), education (p=0.030), and income (p=0.003) were significantly associated with knowledge levels.

Conclusions: The study highlights significant gaps in parental knowledge regarding the proper use and potential toxicity of paracetamol, particularly among male participants and those with lower educational levels and incomes. Despite an awareness of overdose risks, misconceptions persist, especially concerning fever thresholds and appropriate dosing frequency. To promote safer paediatric paracetamol use, targeted educational initiatives and enhanced guidance from healthcare professionals are essential.

Keywords: Paracetamol, parental knowledge, toxicity, paediatric medication safety, Sri Lanka

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Introduction

Paracetamol is one of the most commonly used antipyretics and analgesics globally and is widely available over the counter in Sri Lanka. It is used alone or combined with other analgesics for mild to moderate pain [1,2]. The British National Formulary for Children (2023) recommends a dose of 10-15 mg/kg per dose for paediatric pain and pyrexia. In Sri Lanka, 85% of parents self-medicate their children, with paracetamol

being the most frequently used over-the-counter (OTC) drug [3]. Various dosage forms, including tablets, syrups and suppositories, are available [4].

Despite its well-documented safety profile, paracetamol overdose remains a significant risk. Fatal liver necrosis was first linked to paracetamol toxicity in 1966, and hepatotoxicity is now recognised as a consequence of acute or prolonged supratherapeutic dosing [5]. A Polish study (2004–2012) identified an increasing trend in paediatric paracetamol poisoning, with 22.7% of cases being accidental and potentially preventable through better carer education [6,7].

Several studies highlight factors contributing to paracetamol misuse, including OTC availability, diverse formulations, and misconceptions about the safety of non-prescription drugs [2,8,9]. High-concentration paracetamol formulations were formerly available in Sri Lanka but have subsequently been removed from the market. Nevertheless, these formulations continue to be available in other nations. A principal issue prompting their removal was the heightened risk of toxicity, especially in instances of accidental intake. Evidence repeatedly points to caregivers' poor knowledge regarding correct use and toxicity risks. In Sri Lanka, overdose cases are reported across urban and rural areas, including paediatric cases of accidental ingestion [10]. In 2012, the Medical Supplies Division estimated that Rs. 167 million was spent on antidotes (methionine and N-acetylcysteine (NAC)) for paracetamol poisoning, underscoring its economic impact [8].

A 2012 cross-sectional study in Ragama assessed parental knowledge and practices related to paracetamol use. Conducted among clients attending family practice sessions, the study predominantly included housewives with satisfactory education levels (98%), but findings suggested a need for broader research, including employed parents and caregivers [4].

Another Sri Lankan study reported 95% of parents self-medicate their children, with 92% using paracetamol [11]. Interestingly, self-medication was more frequent among parents with higher education levels. While previous studies found no link between education and dosing accuracy, these findings raise concerns that misconceptions about OTC drug safety persist, even among well-educated individuals [4].

This study aims to address gaps in parental knowledge, enhance public awareness, and promote safe paracetamol use while informing evidence-based strategies for toxicity prevention among the children of Sri Lanka.

Methodology

Study Setting

This descriptive cross-sectional study was conducted at the Outpatient Department (OPD) of Lady Ridgeway Hospital for Children, Colombo, Sri Lanka, a leading paediatric care centre serving children nationwide. Data collection spanned one month, from March 25, 2025, to April 24, 2025, focusing on parents of children under 14 years.

Study Type

A descriptive cross-sectional study design was employed to assess parental knowledge and awareness regarding paracetamol use in children. This approach provided a snapshot of relevant variables, allowing for efficient data collection and analysis.

Study Tool

Data was collected using an interviewer-administered questionnaire available in English, Tamil, and Sinhala to ensure accessibility. The questionnaire was adapted from a pre-validated tool used in a 2021[12] study conducted in Palestine, with socio-demographic details modified to align with the Sri Lankan community.

The questionnaire included multiple-choice questions, with correct responses assigned one mark (total score range: 0–16). A score of ≥8 indicated adequate knowledge.

Data Analysis

Data was analysed using SPSS (Version 21), employing frequency and descriptive analysis. Continuous variables were presented as mean ± standard deviation, while categorical variables were expressed as percentages. The chi-square test was applied to assess associations between categorical variables, while logistic regression analysis was for continuous variables. Statistical significance was set at $p < 0.05$.

Ethics

Ethical approval for the study was obtained from the Ethical Review Committee of Lady Ridgeway Hospital for Children on March 19, 2025. Informed consent was obtained from all participants, ensuring voluntary participation, confidentiality, and strict adherence to ethical guidelines.

Results

Table 1 outlines the demographic composition of the study population, providing crucial insights into participant characteristics. The average parental age is 34.0 ± 7.5 years. The sample is predominantly female (75.90%), with males representing 24.10%. Education levels reveal that a significant proportion (75.9%)

possess qualifications between the government ordinary level examination and the government advanced level examination, while smaller segments have either higher education (12.2%) or up to the government ordinary level examination (11.7%), with only a negligible percentage (0.2%) having no formal schooling.

Marital status trends indicate an overwhelmingly married population (99.30%), with single and widowed individuals making up only 0.20% and 0.50%, respectively. Geographical distribution highlights that most participants are from Colombo (66.40%), while 33.60% reside elsewhere. Ethnicity data shows a majority Sinhalese representation (70.60%), followed by Muslim (17.20%) and Tamil (12.20%) groups.

Employment status reveals that 54.70% are unemployed, with 45.30% engaged in employment. Income distribution indicates that 59.50% earn between 50,000 and 100,000 LKR, while 31.80% fall below 50,000 LKR, and a smaller fraction (8.70%) exceed 100,000 LKR. These statistics illustrate key socio-economic patterns within the study cohort, influencing healthcare access and knowledge dissemination regarding paracetamol usage.

Table 1: Demographic factors of the 402 participants

Factor	Frequency (%)
Parent age (Year) (Mean ± SD)	34.0 ± 7.5
Gender	
Male	97 (24.1)
Female	305 (75.9)
Level of education	
No schooling	1 (0.2)
Up to O/L	47 (11.7)
O/L to A/L	305 (75.9)
Higher Education	49 (12.2)
Marital status	
Single	1 (0.2)
Married	399 (99.3)
Widowed	2 (0.5)
District	
Colombo	267 (66.4)
Out of Colombo	135 (33.6)
Ethnicity	
Sinhalese	284 (70.6)
Muslim	69 (17.2)
Tamil	49 (12.2)
Occupation	
Employed	182 (45.3)
Unemployed	220 (54.7)
Income (LKR)	
<50000	128 (31.8)
50000-100000	239 (59.5)
>100000	35 (8.7)

Table 2 highlights key parental practices regarding paracetamol use in children. A vast majority (98.5%) administer it without consulting a doctor, mainly for fever (98.0%) and pain (48.0%). Those who refrain cite a preference for prescribed medication (16.6%) or deem it unnecessary (83.3%). Paracetamol is most commonly given at 100.4°F (38°C) (42.8%), though nearly a third (29.4%) are uncertain about the appropriate threshold. Most parents (89.6%) believe four doses per day is the safe limit, while a small fraction (1.0%) think six doses are acceptable. Uncertainty surrounds the shelf life of opened syrup, with 43.3% unsure, though 30.8% believe it remains usable until expiry.

Table 3 indicates that a majority of parents (90.3%) acknowledge the detrimental consequences of paracetamol overdose, predominantly linking it to renal and hepatic impairment (31.6% each). Dose determination primarily relies on the child's weight (92.5%), although prior experience (10.7%) and allergies (10.7%) also play a role in decision-making. Parents primarily depend on physicians (66.4%) for dose recommendations, but a significant segment (29.4%) relies on personal experience. There are misconceptions and uncertainties concerning the consequences of overdose and the sources of optimal dosage.

Table 4 presents the associations between demographic factors and knowledge levels, highlighting significant relationships identified through statistical analysis.

The Odds Ratio (OR) method was used to assess district ($p=0.330$; OR = 0.813, 95% CI: 0.536–1.233), prior hospital admission ($p=0.794$; OR = 0.948, 95% CI: 0.637–1.413), and parity ($p=0.571$; OR = 0.892, 95% CI: 0.601–1.325). These factors did not demonstrate statistically significant associations with knowledge distribution.

The Chi-Square test was applied to gender ($p=0.005$), education level ($p=0.030$), income ($p=0.003$), marital status, ethnicity ($p=0.933$), and occupation ($p=0.719$). Significant findings were observed for gender, where males exhibited a higher prevalence of poor knowledge compared to females; education level, where individuals with higher education displayed better knowledge; and income, suggesting financial stability positively influences knowledge acquisition. Marital status, ethnicity, and occupation, however, did not show statistically significant relationships.

Finally, the Mann-Whitney U test was used to analyse parent age ($p=0.627$), a continuous variable, revealing no meaningful association with knowledge distribution. These findings emphasize the importance of targeted interventions focusing on education and financial stability to enhance knowledge dissemination within the population.

Table 2: The key insights into parental practices regarding paracetamol use of 402 participants

Question/reason	Frequency
Did you ever administer paracetamol for your child without consulting a doctor?	
Yes	396 (98.5)
No	6 (1.5)
If answered yes to the above, what was the reason for using it? (n=396)	
Fever	394 (98.0)
Pain	194 (48.0)
Any other symptoms of illness?	64 (15.9)
When child is unsettled	7 (1.7)
If you answered No for the previous question, what is the reason for NOT using it? (n=6)	
Do not prefer taking drugs without a prescription	1 (16.60)
Not required	5 (83.3)
Beyond what temperature is paracetamol given as an antipyretic without consulting a doctor	
97 °F (36.1°C)	16 (4.0)
98 °F (37°C)	46 (11.4)
99 °F (37.2°C)	50 (12.4)
100.4 °F (38°C)	172 (42.8)
Do not know	118 (29.4)
What is the maximum daily number of doses of paracetamol allowed to be given to children?	
2	34 (8.5)
4	360 (89.6)
6	4 (1.0)
Do not know	4 (1.0)
How long can we use paracetamol syrup after opening the bottle?	
Up to 1 month after opening the bottle	59 (14.7)
Up to 3 months after opening the bottle	45 (11.2)
Until the expiry date of the product	124 (30.8)
Do not know	174 (43.3)

Table 3: Parental awareness of paracetamol toxicity and the perceived harmful effects of overdose of 402 participants.

Statements	Frequency (%)
Does paracetamol overdose cause any harm?	
Yes	363 (90.3)
No	3 (0.7)
Do not know	36 (9.0)
If you answer yes to the previous question, what would a paracetamol overdose cause? (n=363)	
Renal failure	115 (31.6)
Liver damage	115 (31.6)
Damages the heart	2 (0.5)
Stomach problems	11 (2.7)
Brain damage	3 (0.7)
Drowsy	2 (0.5)
Lung problems	2 (0.5)
Bone damage	1 (0.2)
What factors determine the dose quantity? (n=402)	
Weight of the child	372 (92.5)
Experience from previous use	43 (10.7)
Allergy	43 (10.7)
Severity of illness	8 (2.0)
Sex of the child	1 (0.2)
The volume (ml) of the dose may differ in different liquid forms	6 (1.5)
Information provided in the bottle label/leaflet provided with medication	208 (51.7)
What sources of information do you depend on for the paracetamol dose?	
Doctor	267 (66.4)
Pharmacist	6 (1.5)
Personal experience from previous use	118 (29.4)
Internet	5 (1.2)
Relatives and friends	4 (1.0)

Table 4: Associations between knowledge and demographic factors of the participants

Factor	Knowledge		P Value	OR (95% CI)
	Good (n=174)	Poor (n=228)		
Parent age (Year) (Mean ± SD) (n=402)	33.85 ± 7.019	34.14 ± 7.943	0.627*	
Gender				
Male	30 (17.2)	67 (29.4)	P=**0.005****	0.501 (0.308-0.814)***
Female	144 (82.8)	161 (70.6)		
Level of education				
Up to O/L	12 (6.9)	35(15.4)	P=**0.030****	
O/L to A/L	137 (79.2)	168 (73.7)		
Higher Education	24(13.9)	25(11.0)		
Marital status				
Single	1(0.6)	0(0.0)	-	
Married	171 (98.3)	228 (100.0)		
Widowed	2(1.1)	0(0.0)		
District				
Colombo	111 (63.8)	156 (68.4)	P=**0.330****	0.813 (0.536-1.233)***
Out of Colombo	63 (36.2)	72 (31.6)		
Ethnicity				
Sinhalese	124 (71.3)	160 (70.2)	P=**0.933****	
Muslim	30 (17.2)	39(17.1)		
Tamil	20 (11.5)	29 (12.7)		
Occupation				
Employed	77 (44.3)	105(46.1)	P=**0.719****	0.930 (0.625-1.383)***
Unemployed	97 (55.7)	123 (53.9)		
Income (LKR)				
<50000	42(24.1)	86(37.7)	P=**0.003****	
50000-100000	120 (69.0)	119 (52.2)		
>100000	12 (6.9)	23(10.1)		
Prior hospital admission				
Yes	93 (54.4)	127 (55.7)	P=0.794**	0.948 (0.637-1.413)***
No	78 (45.6)	101(44.3)		
Parity				
1 child	79 (45.4)	110 (48.2)	P=0.571**	0.892 (0.601-1.325)
>1 child	95 (54.6)	118 (51.8)		

*Mann Whitney U test, ** Chi Square test , ***Odds ratio

Table 5 shows the logistic regression analysis that demonstrates a substantial influence of gender and education on knowledge levels. Males demonstrate reduced likelihood (Exp(B) = 0.498, p = 0.005) of having proficient knowledge in comparison to females. Likewise, individuals with lesser educational achievement are less inclined to exhibit robust knowledge (Exp(B) = 0.611, p = 0.021). Both factors exhibit statistically significant impacts, with confidence intervals affirming dependability. The constant value (2.995) signifies the baseline probability of possessing strong knowledge in the absence of these predictors, highlighting the influence of demographic factors on knowledge distribution.

Table 5: Logistic regression for knowledge (Good and poor)

Variable	B	Significant	Exp(B)	CI (95%)	
				Lower	Upper
Gender	-0.696	**0.005**	0.498	0.306	0.813
Level of education	-0.493	**0.021**	0.611	0.402	0.928
Constant	2.995				

Discussion

This study analyses parental practices concerning paracetamol use in Sri Lanka, highlighting its common application for fever and pain relief without prior medical advice. Self-medication is a common and generally safe practice; however, the findings highlight particular areas for improvement in knowledge, particularly regarding fever thresholds, weight-based dosing, and the risks of overdose. Despite increased awareness of paracetamol toxicity, understanding of its specific effects, such as hepatic and renal impairment, remains insufficient. Socioeconomic characteristics, including female gender, higher educational attainment, and increased income, are associated with improved knowledge, highlighting their positive impact on parental awareness. Improving parental education through targeted programmes can enhance safe and effective medication practices.

A considerable proportion of participants administered paracetamol to their children without prior medical consultation (98.50%), primarily for fever (98.00%) and pain (48.30%). This aligns with studies conducted in both developed and developing countries, which have consistently reported high rates of parental self-medication with paracetamol [2, 3]. While self-administration is not inherently harmful, poor knowledge regarding fever management contributes to improper dosing [12].

One of the most concerning findings (Table 1) was the lack of consensus regarding the appropriate temperature threshold for administering paracetamol. Only 42.80% of parents correctly identified 100.4°F (38°C) as the recommended threshold [13], while others initiated treatment at lower temperatures. This pattern reflects findings from studies in other settings, where parents demonstrated a tendency to treat mild fever aggressively due to 'fever phobia' [5, 8]. The excessive use of antipyretics for low-grade fever is problematic, as fever is a protective physiological response, and unnecessary medication increases the risk of overdose. While knowledge regarding dosing frequency was relatively high (89.60% correctly identified four doses per day as the maximum limit, Table 1), misconceptions about dosage determination persisted. A significant proportion of parents were unaware that the correct dosage should be based on the child's weight, relying instead on past experiences (10.70%) or allergies (10.70%). These findings align with research indicating that parents frequently determine dosages based on prior use rather than medical guidelines [7,9], increasing the risk of both underdosing and overdosing.

Another major concern was the lack of awareness regarding the shelf life of opened paracetamol syrup (Table 1). A large proportion of parents (43.3%) did not know how long an opened bottle should be used, while 30.8% believed it remained safe until the labelled expiry date. This misconception is problematic, as degraded medication may lead to ineffective treatment. Similar knowledge gaps regarding medication storage and expiry awareness have been reported in other studies [14].

Despite high overall awareness of paracetamol toxicity (90.3%, Table 2), specific knowledge of its consequences was lacking, with only 28.6% recognising liver or kidney damage as risks. Similar studies in Sri Lanka and Pakistan confirm this pattern, highlighting a critical gap in understanding severe overdose outcomes. Given the risk of acute liver failure, this poses a significant public health concern [15].

Additionally, misconceptions about overdose effects were evident. A small percentage incorrectly associated paracetamol toxicity with stomach problems (2.7%) and brain damage (0.7%) (Table 2). While gastrointestinal side effects can occur, they are not the primary concern in overdose situations. The low recognition of liver failure as the primary risk highlights the need for greater emphasis on paracetamol safety during paediatric healthcare visits [7,16].

Table 3 shows gender, education, and income significantly affect parental knowledge. Females exhibited greater awareness, likely due to their childcare role. Higher education and income ($p=0.003$) correlated with better knowledge, suggesting improved access to healthcare resources. However, age, occupation, and residence had no significant impact, indicating knowledge gaps across all socioeconomic groups.

Table 5's logistic regression analysis identifies gender and education as key predictors of knowledge levels. Female parents demonstrated significantly better knowledge than males ($p=0.005$), aligning with studies showing mothers' greater involvement in childcare and medication administration. Higher education ($p=0.030$) and income ($p=0.003$) were associated with better knowledge, underscoring the role of socioeconomic status in health literacy. However, parental age, occupation, and district of residence showed no significant impact, indicating persistent knowledge gaps across demographics.

Table 4 examines the link between prior hospital admission, parity, and knowledge levels. Findings show no significant association between hospitalisations ($p=0.794$) or number of children ($p=0.571$) and parental knowledge, suggesting that caregiving experience alone does not enhance understanding of proper paracetamol use.

This study underscores critical public health and paediatric care concerns in Sri Lanka, highlighting the

prevalence of self-medication and gaps in parental knowledge (Table 1, Table 2). Targeted educational initiatives are essential, focusing on fever thresholds, weight-based dosing, storage guidelines, and overdose risks to enhance paracetamol safety.

Pharmacists and paediatricians should actively counsel parents on correct dosing practices, ensuring safer medication use. While most parents showed basic knowledge of paracetamol use, critical gaps remain, emphasising the need for structured educational interventions. Future research should assess their effectiveness and identify optimal strategies to enhance parental awareness of medication safety.

Conclusion

This study evaluated parental knowledge of paracetamol use and toxicity at Lady Ridgeway Hospital for Children, Sri Lanka, revealing significant gaps in understanding, including fever thresholds, syrup shelf life, and toxicity risks. Female gender, higher education, and income correlated with better knowledge, yet many parents relied on inaccurate sources for dosing decisions. Targeted education and further research are crucial to improve safe paediatric paracetamol use.

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