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COMMENTARY

Paracetamol Overdose in Somali Children Under Five: An Emerging Public Health Concern

Widad Mohamed Hassan

Department of Internal Medicine, Dr Sumait Hospital, SIMAD University, Mogadishu, Somalia

Correspondence: Widad Mohamed Hassan, Email widadmohamedh@simad.edu.so

Abstract: Paracetamol (acetaminophen) is widely used for pain and fever management in children under five; however, accidental overdose is an increasing public health concern in low-resource settings such as Somalia. This narrative review highlights key risk factors, clinical consequences, and prevention strategies relevant to the Somali context based on published literature. Misconceptions about dosing, reliance on age rather than weight, and unrestricted access contribute to inappropriate administration and increased risk of hepatotoxicity and acute liver failure. While metabolic pathways in young children differ from adults, increased vulnerability in this setting is more strongly associated with malnutrition, dosing errors, and delayed access to healthcare. Toxicity results from accumulation of N-acetyl-p-benzoquinone imine (NAPQI), leading to oxidative stress and liver injury. Early treatment with N-acetylcysteine (NAC) is essential, yet delayed presentation and limited availability of antidotes in Somalia worsen outcomes. There is currently limited published data on the incidence of paracetamol overdose and NAC availability in Somalia. Strengthening caregiver education, pharmacy-based counseling, access to essential antidotes, and national poison surveillance systems is critical to reducing preventable pediatric liver injury in Somalia.

Keywords: paracetamol, pediatric overdose, hepatotoxicity, Somalia, public health, N-acetylcysteine

Introduction

Paracetamol (acetaminophen) is among the most commonly used medications to treat pain and fever in young children,[1,2] its effectiveness, safety, and over-the-counter availability have made it a first-line treatment for pediatric febrile illnesses globally. However, despite its widespread use, children under five are particularly vulnerable to accidental overdose, which can result in hepatotoxicity and, in severe cases, acute liver failure.[1,3]

Globally, paracetamol overdose is one of the leading causes of drug-induced liver injury in children, highlighting the need for careful dosing and early recognition of toxicity.[3,4]

Recent reports continue to highlight the ongoing clinical burden of accidental paracetamol overdose in children, including medication-related dosing errors in healthcare settings.[5]

Although Somalia-specific epidemiological data are limited, medication poisoning and paracetamol overdose are increasingly recognized as important causes of pediatric toxicity in low-resource settings and across sub-Saharan Africa.

In low-resource settings like Somalia, unrestricted access to paracetamol, limited caregiver knowledge regarding weight-based dosing, and socioeconomic constraints contribute to a higher risk of pediatric overdose.[2,5] Caregivers may administer paracetamol at shorter-than-recommended intervals or unintentionally use multiple formulations containing paracetamol, increasing the risk of toxicity.[4,5]

Commentary Methods Approach

This manuscript is a narrative review. Relevant literature was identified through searches of PubMed and Google Scholar using keywords including “paracetamol overdose,” “acetaminophen toxicity,” “pediatric poisoning,” and “low-resource settings.” Articles were selected based on relevance to pediatric populations and applicability to resource-limited contexts, including Somalia. Additional references were identified from cited literature.

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Paracetamol Use and Self-Medication in Somali Children

Paracetamol is widely administered at home for fever, colds, and pain in children under five.[5] Caregivers often lack awareness of safe dosing intervals and may give the drug multiple times within a short period, at inappropriate or overly frequent dosing intervals, under the misconception that frequent administration accelerates recovery.[2,4,5] Miscalculation of doses based on age rather than weight, use of multiple formulations, and overlapping administration of combination products further increase the risk of overdose.[5,6] In addition, the absence of standardized pediatric labeling and insufficient pharmacy counseling exacerbate the problem, leaving caregivers without clear guidance on safe administration.[6,7] This combination of factors contributes to repeated exposure to hepatotoxic doses in vulnerable children.

Pharmacology and Clinical Consequences

Paracetamol is metabolized primarily in the liver through glucuronidation and sulfation pathways. A small proportion is converted to the highly reactive metabolite N-acetyl-p-benzoquinone imine (NAPQI), which is detoxified by glutathione under normal circumstances.[2,3] In cases of overdose, these detoxification pathways become overwhelmed, leading to the accumulation of NAPQI, oxidative stress, hepatocellular injury, and potentially fulminant hepatic failure.[2,3,8]

Although paracetamol metabolism differs between young children and adults, increased vulnerability in this setting is more strongly associated with malnutrition, dosing errors, and delayed access to healthcare rather than intrinsic immaturity of liver enzymes alone.[5,7] Early administration of N-acetylcysteine (NAC) is critical to prevent progression to liver failure; however, delayed healthcare presentation, which is common among children in Somalia because of geographical barriers, delayed healthcare access, and transportation challenges, and reliance on traditional remedies, significantly increases the risk of severe outcomes.[4,7,8]

Recent pediatric emergency department studies continue to demonstrate that paracetamol overdose remains a significant cause of poisoning-related hospital presentations in children.[9]

Clinical Algorithm for Suspected Paracetamol Overdose in Children

1. Suspected or Confirmed Ingestion
   - → Obtain history of ingestion (dose, timing, formulation)
2. Assess Time Since Ingestion
   - → Determine whether timing is known or unknown
3. At ≥4 Hours Post-Ingestion
   - → Measure serum paracetamol concentration (if available)
4. Risk Assessment
   - → Plot level on the Rumack–Matthew nomogram (if available)
5. Treatment Decision
   - If above treatment line, unknown timing, or high-risk ingestion:
   - Initiate N-acetylcysteine (NAC) immediately
6. Monitoring
   - Assess liver function tests (ALT, AST, INR)
   - Monitor clinical status
7. Ongoing Management
   - Complete full NAC protocol according to hospital guidelines
   - Refer severe cases to higher-level care if necessary

Recommended weight-based dosing guidelines for paracetamol in children are presented in (Table 1).

Health System Challenges in Somalia

The management of pediatric drug poisoning in Somalia faces substantial healthcare system limitations. There is currently no national poison control center or dedicated pediatric toxicology infrastructure, limiting early recognition,

Table 1 Recommended Paracetamol Dosing in Children (Weight-Based)

Weight (kg)	Single Dose (mg)	Maximum Daily Dose (mg)	Frequency
5–10 kg	75–150 mg	≤600 mg/day	Every 6–8 hours
11–20 kg	150–300 mg	≤1200 mg/day	Every 6 hours
21–40 kg	300–600 mg	≤2400 mg/day	Every 6 hours
>40 kg	500–1000 mg	≤4000 mg/day	Every 6 hours

Note: Dosing is based on 10–15 mg/kg per dose, with a maximum of 60 mg/kg/day in children.

reporting, and coordinated management of paracetamol toxicity.[4,8] In addition, systematic national surveillance data on pediatric drug poisoning remain unavailable, making it difficult to estimate the true burden of disease and develop targeted prevention strategies.[10]

Access to essential antidotes such as N-acetyl cysteine (NAC) is inconsistent, particularly in rural and resource-limited areas.[4,10] Healthcare access may also be delayed by geographical barriers, transportation difficulties, financial constraints, and reliance on traditional remedies before hospital presentation.[5,7]

Pharmacy regulation and caregiver counseling practices are inconsistent, and many caregivers may not receive clear instructions regarding appropriate pediatric dosing intervals or weight-based dosing.[6,7] Limited public awareness and the absence of standardized pediatric dosing tools further increase the risk of unintentional overdose.[5,6]

These gaps highlight the urgent need for improved public education, strengthened pharmacy oversight, better access to essential antidotes, and the development of national poison surveillance systems in Somalia.

The key risk factors and corresponding preventive strategies relevant to the Somali context are summarized in (Table 2).

Opportunities for Prevention and Policy Action

Effective strategies to reduce paracetamol-related harm in children under five require interventions at multiple levels. First, caregiver education is critical, including public campaigns on safe pediatric dosing, correct measurement of syrup, and recognition of overdose signs.[5,10] Second, pharmacy oversight should be strengthened through standardized labeling, enforcement of counseling protocols, and regulation of over-the-counter pediatric paracetamol sales.[5,6]

Third, clinical preparedness can be improved by ensuring the availability of NAC, providing weight-based dosing charts, and establishing pediatric poison management protocols in hospitals.[4] Recent international epidemiological studies have shown that pediatric paracetamol overdose remains an important public health concern in both high- and low-resource healthcare settings.[11] Finally, systematic data collection through surveillance of pediatric drug toxicity is necessary to inform evidence-based policy and preventive measures.[12]

Coordinated action across these domains can reduce preventable liver injury and associated morbidity and mortality in Somali children.

Table 2 Risk Factors and Recommended Interventions for Pediatric Paracetamol Overdose in Somalia

Risk Factors	Recommended Interventions
Caregiver misunderstanding of dosing	Public education campaigns
Use of age-based instead of weight-based dosing	Promote weight-based dosing charts
Lack of pharmacy counseling	Standardize counseling protocols
Unrestricted access to medication	Strengthen pharmacy regulation
Limited access to N-acetylcysteine (NAC)	Ensure availability in hospitals
Absence of surveillance systems	Establish national reporting systems

Limitations

This commentary has several limitations. First, published Somalia-specific epidemiological data on pediatric paracetamol overdose remain extremely limited, restricting accurate estimation of disease burden and clinical outcomes. Second, as a narrative review, this manuscript does not present original clinical or population-based data. Third, some of the evidence discussed was derived from studies conducted in other low-resource and international settings, which may not fully reflect the healthcare context in Somalia. Nevertheless, the available literature highlights important gaps in caregiver awareness, poison surveillance, and pediatric toxicology infrastructure that warrant further research and public health attention in Somalia.

Conclusion

Paracetamol remains an essential medication for managing fever and pain in children; however, in Somalia, its misuse among children under five represents a growing public health concern. Addressing this issue requires prioritizing practical and scalable interventions, particularly strengthening caregiver education and pharmacy-based counseling on safe dosing practices. Improving access to essential treatments such as N-acetylcysteine and establishing basic surveillance systems are also critical steps. Targeted, context-specific strategies are urgently needed to reduce preventable liver injury and improve child health outcomes in Somalia.

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Disclosure

The author declares no conflicts of interest in this work.

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