

Pre-Hospital use of Paracetamol in the Rivers State University Teaching Hospital Paediatric Outpatient Clinic

ABSTRACT

Background: Paracetamol is a medication that is often procured over the counter in many nations including Nigeria. It is therefore prone to abuse/misuse with consequences.

Objective of the Study: To determine the prevalence of pre-hospital use of paracetamol, preferred formulation, appropriateness of dosing and factors associated with its use.

Methodology: An observational study involving 401 caregiver/child pair seen at the Paediatric clinic of the RSUTH over 6 months. Data on demography, clinical symptoms, weight of the children as well as pre-hospital paracetamol use were obtained using a semi-structured questionnaire. Informed consent was obtained from the caregivers.

Results: A total of 401 caregivers/child pairs participated in the research with male predominance. The average age of the children was 28.26 ± 3.80 months. Most of the parents were aged 30-40 years, traders/businessmen with tertiary level of education.

About 40% of children received paracetamol before presentation at the hospital with fever being the most common reason. Syrup was the preferred formulation while 0.6% received injection paracetamol. The most common reason for formulation type was the age of the child followed by available paracetamol formulation at home. Most parents gave paracetamol twice daily, for less than seven days and based on past experiences.

The most common diagnosis among parents that gave paracetamol was malaria. A quarter of children received underdose and 5.4% overdose medication.

Conclusion: Pre-hospital paracetamol self-medication is common with syrup paracetamol being the most common formulation used. There was a high abuse of paracetamol thus education of the populace on appropriate pre-hospital paracetamol use would help reduce this menace.

Keywords: Abuse; paracetamol; pre-hospital; self-medication; pharmaceutical drug; anti-inflammatory.

1. INTRODUCTION

Paracetamol, also known as acetaminophen, is a pharmaceutical drug, an analgesic and an antipyretic used commonly by adults and children. It is one of the over-the-counter (OTC) drugs sold in pharmacies, supermarkets and other stores, thus may not require a doctor's prescription before its purchase and use. Little wonder, it is commonly administered to children by parents and caregivers at home before presentation at the hospital. It has been in use

for more than 70 years and eases mild to moderate pain as well as lowers high temperatures about 30 minutes after a dose has been taken. [1] It is worthy of note that its effect usually last for about 4-6 hours. [1]

The analgesic and antipyretic effects of paracetamol occur through the inhibition of prostaglandin production centrally [2]. Paracetamol however, has very little anti-inflammatory effect as seen in non-steroidal anti-inflammatory drugs [2] An observational

prospective study carried out in Enugu, [3] South east Nigeria documented the most common reason for paracetamol administration to children among mothers/caregivers being fever (68.4%) while other reasons were cough and/or catarrrh (7.4%), abdominal pain (3.9%) and earache (3.5%). Similarly, Ajayi & Falade [4] reported 81.1% respondents gave paracetamol to their febrile children before attending the general outpatient clinic in Ibadan, South West Nigeria whereas Daifallah et al [5] in Palestine reported majority of respondents (50.9%) administered paracetamol to reduce their children's fever while 15.3% administered it as an analgesic.

Paracetamol has been observed as the most widely used analgesic and antipyretic. [6] Obu et al [3] in their study in Enugu, South East Nigeria documented that 75.6% children were given paracetamol before presenting at the Paediatric outpatient clinic (POPC). A similar study by Fadare et al [7] in South West Nigeria also showed that majority (51.8%) children received paracetamol before presentation to the hospital. Mason et al [8] in Sheffield, UK documented that paracetamol was the first line antipyretic drug administered to children as also reported by Gehri et al. [9].

There are various formulations of paracetamol; this includes tablets, capsules, suppositories, soluble powders and liquids (syrups, drops & injections). It is pertinent to note that the suppository formulation is particularly important in children who are vomiting or have challenges with the oral formulation. The type of formulation used depends on the age of the child, severity of symptom(s) as well as the type of formulation available hence may vary with geographic locations. In Nnewi [3] South East Nigeria, oral formulation was the preferred route of pre-hospital paracetamol administration accounting for 98.9% while injection accounted for only 1.1%. In this study, of the oral formulation, tablets accounted for majority (49.2%) while syrups was 38.7% and both 12.1%. Syrups were majorly used in children < 5 years while tablets were used mostly in older children > 5 years. In contrast, a cross-sectional study in Palestine documented suppository (33.8%) paracetamol as the preferred formulation followed by syrups (25.4%) and drops (1.7%). [5] Similarly, suppository or the rectal administration of paracetamol was documented as the preferred route by Gehri et al [9] in under five children.

The recommended dose of paracetamol is 15mg/kg/dose and can be given 4-6 hourly. [1] It is very safe in children when given in the right

dosage and timing however side effects can arise just like any other drugs especially in cases of overuse. The most common side effects of paracetamol are drowsiness, fatigue, rashes and itching. [10] Occasionally, children may also experience low blood sugar and tremors. [10] Serious side effects such as renal injury could arise when usage is prolonged and hepatic toxicity/liver failure and even death when over dose or high dose is given. [1,6,10] It is noteworthy that paracetamol is one of the commonest drugs given in over dose to children especially children below 6 years of age. [11-12] Over dose of paracetamol is also common as paracetamol may be part of the components of other drugs such as medicines for cough, cold and flu, teething and migraine etc. [13] This is not surprising as these children in addition to paracetamol being given as an antipyretic/analgesics may also receive these medicines containing additional paracetamol thereby predisposing them to overdose. Paracetamol is said to be in high dose if dose administered is > 75mg/kg/day for at least 2 days. [14] Obu et al [3] in their study in Nnewi documented paracetamol misuse on children aged 6 weeks to 5 years in 1.7% of cases. Bilenko et al [15] in Isreal reported 34.8% respondents administered paracetamol to their children at doses higher than the recommended dose while 21.4% repeated the dose at intervals less than or equals 3 hours thus predisposing these children to adverse effects. Similarly, Daifallah et al [5] in Palestine reported the time interval of paracetamol administration in 6.3% of children being less than the recommended at least 4 hours. Also, it has been observed that additional doses of paracetamol are frequently prescribed by health workers in the Paediatric emergency departments even when pre-hospital paracetamol was administered. [9] This therefore suggest that the dose given at home may have been inadequate or underdose. When paracetamol is abused, the risk of side effects will increase even when admistered prior to presentation in the hospital hence one rational to know the prevalence of prehospital paracetamol use.

Previous studies have shown that there is a gap in knowledge among mothers/caregivers concerning the rational use of paracetamol ie proper dose, its' administration, adverse effects and toxicity despite the fact that it is one of the commonest OTC drug being used. [3,5,15-19] This has led to either under dosing or over dosing with its' attendant consequences. There is however paucity of information on this subject

matter in Nigeria and no study of this kind has been carried out in Port Harcourt, the south south region of Nigeria. Thus, the present study was done to ascertain the pattern of pre-hospital use of paracetamol. Findings from this study will thus add to the body of knowledge. It will also help to strengthen policies that will educate mothers/caregivers and the public at large on the rational use of paracetamol including its' proper dosing, timing & routes of administration thereby reducing errors and the risk of adverse effects and toxicity in the present and the future.

2. MATERIALS AND METHODS

It was a descriptive cross-sectional study among mothers/caregivers attending the Paediatric outpatient clinic of the Rivers State University Teaching Hospital (RSUTH) in Port Harcourt, south-south Nigeria carried out over six months from January 1st to June 30th 2023. This State-owned tertiary hospital located in the Government reserved area of the State is a 375-bed hospital and receives referral from all the Primary Healthcare centres and general hospitals in the 23 local government areas of the State as well as from private hospitals and neighbouring States. The hospital consists of both non-clinical and clinical departments of which the Department of Paediatrics is part.

The Paediatric outpatient clinic, one of the units in the Department of Paediatrics is open 5 days of the week, Mondays to Fridays from 8am to 4pm. It consists of the specialist clinics and the general paediatric clinics. Each clinic day is run by 2-3 consultants, resident doctors, house officers, nurses of various cadres, other non-medical support staff and sees 42 patients on average. Before the commencement of each clinic day, a health talk is usually given by the nurses and vital signs and anthropometric measurements taken.

A research assistant was recruited before commencement of the study. She was trained on the aim and objectives of the study, inclusion and exclusion criteria as well as the proper administration of the questionnaire to participants. A convenient sampling method was deployed for the study.

Mothers/caregivers were duly educated about the research in clear language they understood and a verbal consent whether or not to participate in the study was obtained.

All mothers/caregivers whose children were within the age group 1 month - 17 years were consecutively recruited for the study.

A pre-tested semi-structured questionnaire which was developed by the researchers was administered by the researchers and/or research assistant to the mothers/caregivers. Data collected included biodata of the patients and parents/caregivers as well as questions on the pattern of paracetamol administration to their children. Socio-economic class of the participants were determined using Oyediji's classification [20]. Paracetamol was considered overdose if dose given was > 75mg/kg/day and underdose if dose given was < 10mg/kg/day.

Data was entered into an Excel sheet and analysed using SPSS software version 23. Data was presented as percentages, tables and figures.

3. RESULTS

A total of 401 parent/child pairs were recruited into the study. There were more males than females in a ratio of 1.4:1

4.1 Socio-Demographic Characteristics

The mean age of the children was 28.26 ± 3.80 months while the mean weight was 14.94 ± 2.06 Kg. The average age of the mothers was less than that of the fathers (35.48 ± 1.26 years versus 42.11 ± 7.43 years). Most of the parents had tertiary level of education, were business men/women and belonged to the upper socioeconomic class.

4.2 Pre-Hospital Administration of Paracetamol

About 40% of the children had received paracetamol before presentation at the hospital, the most common reasons being for fever and cough and the least reasons being for body rash and convulsion. Syrup paracetamol was the most commonly administered formulation. No child received paracetamol suppository. The choice of formulation was based on the age of the child and available formulation at home. Medication was administered mainly twice or three times daily and 20% of the patients received paracetamol for seven days and above.

5. DISCUSSION

This study discovered a high prevalence of pre-hospital administration of paracetamol among the respondents 162(40.4%). This is similar to the 51.8% reported in Ekiti, South West Nigeria[7] and 50.9% in Palestine,[5] 56.9% in Mexico[21], 58% in India[22] but lower than the 67% reported earlier by Eberechi et al in Port Harcourt[23], the 75.6% reported by Obu et al in Enugu[3] and the 81.1% in Ibadan by Ajayi et al[4]. This high rate is not surprising because paracetamol is an OTC medication easily accessible and cheap enough for parents with ill children to give to their children before coming to the hospital. The much higher prevalence in Ibadan [4] could also be explained by the fact that his study was among febrile children who are more likely to have received paracetamol before presentation to relieve fever. Parents also give paracetamol when they think the illness is not serious enough to warrant taking the child to the hospital or when they think the hospital is too far.

Fever was the most common reason for administration of paracetamol at home in this study as well as in previous reports[3,4,5,24-26]. Fever is a symptom of quite a number of diseases and parents are eager to ameliorate any discomfort as much as they can hence the likely reason for administering paracetamol before bringing the child to the hospital. Other symptoms the children in this study had that

necessitated paracetamol administration were cough and body pains. Obu et al in Enugu[3], Danfallah et al in Palestine reported similar findings[5]. Parents' attempts at relieving symptoms with the easily accessible available and cheap paracetamol would most likely account for this.

The oral formulation was the more preferred route of administration as reported also in other studies.[3,4,7] Children younger than five years were likely to receive syrups while older children received tablets[3]. Oral formulations are more easily available, accessible and cheap. In this study, rectal suppositories were not given although it was administered in 33.8% in Palestine.[5] Paracetamol suppository is as effective as other formulations and can be used when patients are too sick or are vomiting and in Switzerland[9] health care providers would choose it as their preferred route of administration. Ignorance about its availability and use may be the reason why it was not administered by parents/caregivers in this study as well as in the report from Sri Lanka [24]. The reason for this was not part of the objective of this study and so was not explored. Injectable formulation was the least used in this study as also reported in Enugu[3]. This is not a surprise as it would require a trained healthcare personnel to administer it. Moreover parents would not want to add the pain of an injection to an already sick child if it is possible.

Table 1. Socio-demographic characteristics of child

Variable	Frequency (n = 401)	Percent
Sex		
Male	235	58.6
Female	166	41.4
Child Age Group (months)		
	42.11 ± 7.43 years	
1 – 10	89	22.2
11 – 20	51	12.7
21 – 30	43	10.7
31 – 40	41	10.2
41 – 50	24	6.0
>50	153	38.2
Mean age: 28.26 ± 3.80 months		
Childs Weight Group (Kg)		
<4	12	3.0
4.1 – 14.0	176	43.9
14.1 – 24.0	121	30.2
24.1 – 34.0	32	8.0
>34.0	60	15.0
Mean weight: 14.94 ± 2.06 Kg		

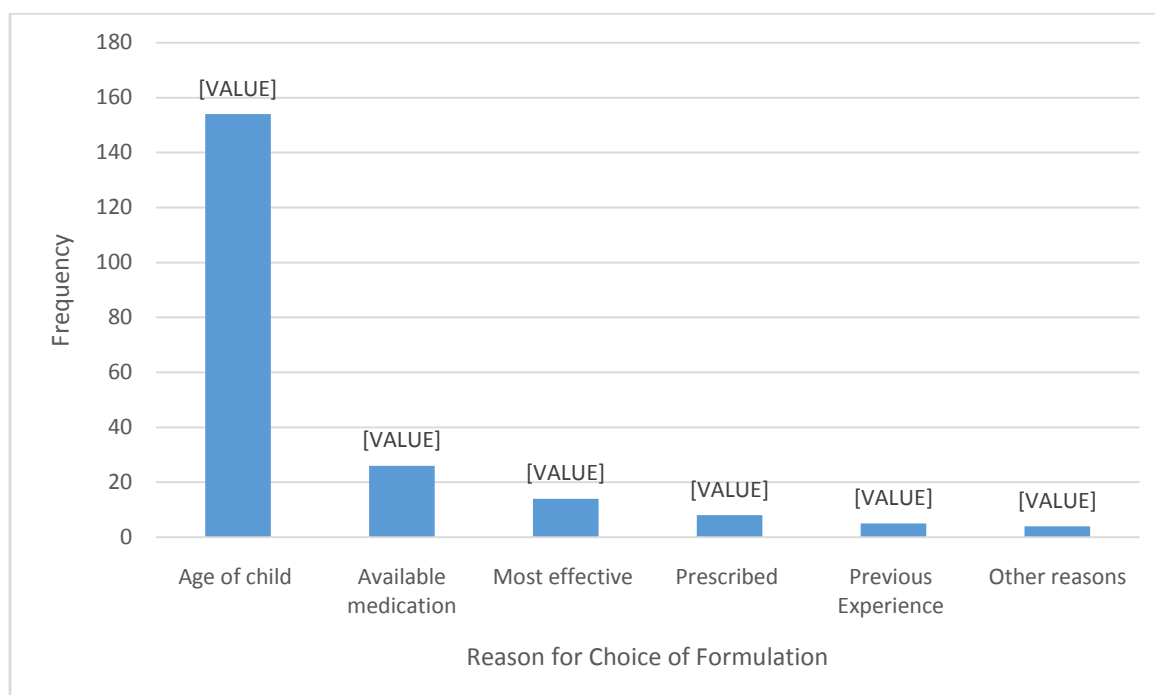


Fig.1. Reason for choice of formulation used
Table 2. Parents' socio-demographic characteristics

Variable	Frequency (n = 401)	Percent
Mother's Age Group (years)		
<30	80	20.0
30 – 40	225	56.1
>40	96	23.9
Mean Age: 35.48 ± 1.26 years		
Mothers' Occupation		
Business/trader	166	41.4
Civil servant	59	14.7
Public Servant	58	14.5
Student	19	4.7
Hose wife/Unemployed	30	7.5
Artisan	33	8.2
Professional	36	9.0
Mothers' Level of Education		
Primary	5	1.2
Secondary	123	30.7
Tertiary	273	68.1
Father's Age Group (years)		
28 – 37	125	31.2
38 – 47	186	46.4
>47	90	22.4
Mean age: 42.11 ± 7.43 years		
Father's Occupation		
Business/ Trader	146	36.4
Civil servant	88	21.9
Public servant	34	8.5
Professional	52	13.0
Artisan	40	10.0
Unemployed	6	1.5
Private company employee	35	8.7

Level of Education		
Primary	4	1.0
Secondary	111	27.7
Tertiary	286	71.3
Socioeconomic Class (OYEDEJI)		
Class 1	102	25.5
Class 2	195	48.6
Class 3	86	21.5
Class 4	17	4.2
Class 5	1	0.2
Socioeconomic status(SES) #		
Upper	297	74.1
Middle	103	25.7
Lower	1	0.2

upper SES = class 1+2, middle SES = class 3+4, lower SES = class 5

More than 70% of caregivers in this study gave paracetamol dose based on parents' experiences in this study similar to the report from Enugu[3] and Syri Lanka [25].The source of paracetamol was mainly from patent medicine stores and pharmacies similar to earlier reports[3,7].

Most parents and caregivers (about 70%) in this

study administered correct dose just like in reports elsewhere[3,7,8] Being a commonly prescribed medication within and outside healthcare facilities as well as the fact that dosing of the drug is on leaflets and body of the drug containers as well as many adverts on the use of

Table 3. History of paracetamol usage

Variable	Frequency (n = 401)	Percent
Administered Paracetamol		
Yes	162	40.4
No	239	59.6
Reason for Paracetamol (Multiple responses, n = 247)		
Body rash	3	1.9
Convulsion	4	2.5
Excessive crying	6	3.8
Fever	133	83.6
Cough	48	30.2
Body/Abdominal pain	17	10.7
Catarrh	17	10.7
Headache	9	5.7
Other reasons	10	6.3
Type of Paracetamol formulation (n = 162)		
Tablet	75	46.3
Syrup	86	53.1
Injection	1	0.6

Table 4. Administration of paracetamol

Variable	Frequency (n = 162)	Percent
Frequency of daily dosage for Paracetamol (n = 162)		
Once	42	26.8
Twice	62	37.8
Thrice	58	35.4
Duration of Paracetamol Medication (n = 160)		
< 7 days	128	80.0
≥ 7 days	32	20.0

paracetamol can explain this. Paracetamol misuse (underdose, overdose) was in 1.7% of children in Enugu[3]62% in America in children 10 years and below[24] and 53% by Goldman et al[25].In the study by Li et al in America [24] among children aged 10 years and below, over 62% of children received an inappropriate dose of paracetamol before presentation at the emergency department. Goldman et al[25] also reported that 26 parents (12%) gave an overdose, and 87 (41%) gave an underdose of acetaminophen. Bilenko et al¹⁵ reported that 34.8% of parents gave an overdose to the children while 21.4% of the children in that study received the medication too frequently that is less than 4 hourly.In Syri Lanka, 11% of the children received an underdose while 43% received an overdose and 16% of the children were given more frequent than recommended.[24] Inappropriate dosing of

paracetamol was also noted in this study with 25.3% (overdose) and 8% (underdose) as well as 32 children (20%) receiving paracetamol for more than seven days. Underdosing a medication will cause it to be ineffective for the ailment being treated while overdose in terms of quantity, frequency of administration and duration will predispose children to the side effects of paracetamol. The assessment of such complications/side effects was beyond the scope of this study.

Another finding in this study was the co-administration of other medications at home with antimalarials (36.2%) haematenics(51.5%) and antibiotics (6.9%) being the most commonly administered medications. Fadare et al [7] in Ado-Ekiti reported similar co-administration(antimalarials 24.7%, antibiotics 14.8% and vitamins 8.7%) while in Enugu South

Table 5. Person responsible for prescription

Variable	Frequency (n = 199)	Percent
Person Responsible for Prescription		
Doctor	50	25.1
Pharmacist	42	21.1
Chemist	14	7.0
Self-Experience	72	36.2
Nurse	17	8.5
others	4	2.0

Table 6. Additional drugs administered

Variable	Frequency (n = 204)	Percent
Drugs (multiple response)		
Antimalarial	47	36.2
Antibiotics	9	6.9
Vitamin C	59	45.4
Cough syrup	35	26.9
Blood Tonic	28	21.5
Multivitamins	6	4.6
Other drugs	21	16.2

Table 7. Drug dose perception

Variable	Frequency (n = 162)	Percent
Child Improvement After Drug Administration (n = 162)		
Yes	95	58.6
No	55	40.0
I Don't Know	12	7.4
Administered the Correct Dose (n = 162)		
Yes	97	59.8
No	9	5.6
I Don't Know	56	34.6
Appropriateness Paracetamol Dose(n =150)		
Yes	104	69.3
Under-dose	38	25.3
Overdose	8	5.4

East Nigeria, half of children who received paracetamol at home also received other medications mainly antimalarials and antibiotics[3]. Parents/caregivers usually try to ameliorate symptoms at home and when they have a favourable response may not bring the child to the hospital [25]. They would however, take to the hospital with persistence or worsening of symptoms. Nigeria is in a malaria-endemic region with high disease burden for infections hence the reason for administration of antimalarials as well as antibiotics at home. This may lead to drug resistance if inappropriate doses are administered. Parents also feel that most drugs should be

administered with haematenics to ensure proper absorption.

6. CONCLUSION

Administration of paracetamol to children at home before presentation at the hospital is a common practice among caregivers in this study. There is a need to educate caregivers on the proper dosing to avoid misuse which can lead to complications or side effects.

CONSENT

All mothers/caregivers of children 1 month – 17 years irrespective of their symptoms who gave consent to participate in the study whereas mothers/caregivers who did not give consent to participate in the study were excluded from the study.

ETHICAL APPROVAL

Ethical clearance was obtained from the RSUTH Ethics research committee.

ACKNOWLEDGEMENT

The authors acknowledge all the parents/caregivers and children who participated in this study. We also appreciate our research assistant Mrs. Glory Isephemugh Ellah for her diligence and hard work. We also acknowledge the nurses in the paediatric outpatient clinic for contributing to the success of this research.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Health Direct. Paracetamol. www.healthdirect.gov.au/paracetamol
2. Sharma CV, Mehta V. Paracetamol: Mechanisms and updates. Continuing education in Anaesthesia. Critical care & pain 2014;153-8. DOI: 10.1093/bjaceaccp/mkt049
3. Obu HA, Chinawa JM, Ubesie AC, Eke CB, Ndu IK. Paracetamol use (and/or misuse) in children in Enugu, south-east Nigeria. BMC Pediatrics 2012;12:103. Available: <https://www.biomedcentral.com/1471-2431/12/103>
4. Ajayi O, Falade CO. Pre-hospital treatment of febrile illness in children attending the General outpatient clinic, University College Hospital, Ibadan, Nigeria. Afr J Med Med Sci. 2006;35(1):85-91
5. Daifallah A, Jabr R, Al-Tawil F, Elkourdi M, Salman Z, Koni A, Samara A, Al-Jabi SW, Zyoud SH. An assessment of parents' knowledge and awareness regarding paracetamol use in children: A cross-sectional study from Palestine. BMC Public Health. 2021;21:380-90
6. Barry HR. Chemical and drug poisoning. In Nelson textbook of Pediatrics. 21st edition. Edited by Nelson WE, Behrman RE, Kliegman RM, Arvin AM. Philadelphia: WB Saunders Company;
7. Fadare JO, Olatunya OS, Babatola AO, Omoniyi E, Taiwo AB. Pre-hospital treatment of children with fever: beliefs and practices of caregivers in Ado-Ekiti, south-west Nigeria. Rwanda Med J. 2021;78(1): 30-7.
8. Mason S, Thorp S, Burke O. Pre-hospital use of paracetamol among children attending the accident and emergency department. Emerg Med J. 2003;20(1):88 DOI: 10.1136/emj.20.1.2-a
9. Gehri M, Guignard E, Djahnine SR, Cotting JQ, Yersin C, Paolo ERD, Krahenbuehler JD, Pannatier A. When fever, paracetamol? Theory and practice in a Paediatric outpatient clinic. Pharm World Sci. 2005; 27(3):254-7 DOI: 10.1007/s11096-004-4771-x
10. Upfal J. The Australian drug guide, 7th ed. Melbourne Black Inc; 2006.
11. Suzan SM. Toxicology. In Pediatrics: Just the facts. 1st edition. Edited by Thomas G, Wayne F, Robert RT. Boston: McGraw-Hill. 2005;71.
12. Utpal KS, Ramesh KP. Acetaminophen poisoning. In Principles of Pediatric and neonatal emergencies. 2nd edition. Edited by Sachdev HPS, Panna C, Arvind B, Krishan C, Siddarth R, Ramesh KP. New Delhi: Jaypee Brothers. 2004;436.
13. Park A. The FDA's painkiller warning: how to avoid taking too much. Time. Available: <http://www.time.com/time/health/article/0,8599,1572012,00.html>. December 20, 2006. Accessed On: 27, 2024.
14. FDA may restrict acetaminophen. Webmd.com.2009-07-01. Available: <http://www.webmd.com/pain-management/news/20090701/fda-may-restrict-acetaminophen>
15. Bilenko N, Tessler H, Okbe R, Press J, Gorodischer R. Determinants of antipyretic misuse in children up to 5 years of age: a cross-sectional study. Clin Ther 2006; 28(5): 783-93 DOI: 10.1016/j.clinthera.2006.05.010
16. Kapasi AA, Lorin MI, Nirken MH, Yudovich M. Parents' knowledge and sources of knowledge about antipyretic drugs. J Pediatr 1980;97(6):1035-7
17. Chang MC, Chen YC, Chang SC, Smith GD. Knowledge of using acetaminophen

- syrup and comprehension of written medication instruction among caregivers with febrile children. *J Clin Nurs*. 2012; 21(1-2):42-51
18. Barrett TW, Norton VC. Parental knowledge of different acetaminophen concentrations for infants and children. *Acad Emerg Med*. 2000;7(6):18-21
 19. Walsh A, Edwards H, Fraser J. Influences on parents' fever management: Beliefs, experiences and information sources. *J Clin Nurs* 2007;16(12):2331-40
 20. Oyediji GA. Socioeconomic and cultural background of hospitalized children in Ilesa. *Niger J Paediatr* 1985; 12: 111-7
 21. Alonso-Castro AJ, Ruiz-Noa Y, Martínez-de la Cruz GC, Ramírez-Morales MA, Deveze-Álvarez MA, Escutia-Gutiérrez R, Carranza-Álvarez C, Domínguez F, Maldonado-Miranda JJ, Ruiz-Padilla AJ. Factors and Practices Associated with Self-Medicating Children among Mexican Parents. *Pharmaceuticals (Basel)*. 2022;15(9):1078.
DOI: 10.3390/ph15091078
 22. Nithisha T, Sharma SK. Extent and pattern of paracetamol usage for children and knowledge and attitude towards its usage among parents attending an outpatient clinic in Warangal district of Telangana. *International Journal Of Community Medicine and Public Health*. 2018;5(6):2394–2399.
 23. Eberechukwu, YIL, Aderonke, SO. Perception and management of fever in children, by mothers in port harcourt Nigeria. *International Journal of Tropical Disease & Health*. 2019;36(4):1–8. Available:https://doi.org/10.9734/ijtdh/2019/v36i430150
 24. Li SF, Lacher B, Crain EF. Acetaminophen and ibuprofen dosing by parents. *Pediatric Emergency Care*. 2000;16(6):394-397.
 25. Goldman, RD, Scolnik D. Underdosing of acetaminophen by parents and emergency department utilization. *Ped Emerg Care*. 2004;20(2):89-93.
PMID: 36145300;
PMCID: PMC9502490.

© Copyright (2024): Author(s). The licensee is the journal publisher. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.