

# **PRE-HOSPITAL IBUPROFEN ADMINISTRATION AMONG CHILDREN IN PORT HARCOURT, NIGERIA**

## **ABSTRACT**

### **BACKGROUND**

Ibuprofen is a non-steroidal anti-inflammatory drug that is used to relieve pain, fever, and inflammation and is often procured over the counter and given to children before presentation at the hospital.

### **Objective of the study**

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

### **Methodology**

An observational cross sectional study involving 401 caregiver/child pair seen at the Paediatric clinic of the Rivers State University Teaching Hospital over six months. Data on demography, clinical symptoms and weights of the children were obtained using semi-structured questionnaires. Informed consent was obtained from caregivers.

### **Results**

A total of 401 caregivers/child pairs participated in the research with a male predominance. The average age of the children was  $28.26 \pm 3.80$  months. Most of the parents were aged 30-40 years, traders/business people with tertiary level of education. Thirty-nine children (9.7%) received ibuprofen before coming to the hospital. The most common reasons for administering ibuprofen were fever, cough and body pain. Syrup formulation was preferred, mostly given twice daily and for less than seven days. The most common reason for choice of formulation was the age of the child. Majority of the parents gave the medication based on past

experiences. About 83% of parents gave an appropriate dose while 13% gave an overdose to their children.

## **Conclusion**

Pre-hospital ibuprofen self-medication is common with syrup formulation being the most common form given. There was a high abuse of ibuprofen use thus education of the populace is advocated.

**Keywords: Abuse, Ibuprofen, Pre-hospital, Self-medication**

## **Introduction**

Ibuprofen, a non-steroidal anti-inflammatory drug (NSAIDS) is a popular overthecounter (OTC) drug used by both adults and children. It is the most common analgesic used in Paediatrics in addition to paracetamol. It has antipyretic, anti-inflammatory and analgesic properties [1],[2]. It is the most frequently prescribed and widely used non-steroidal anti-inflammatory drug (NSAID). Ibuprofen is the only NSAID approved in children older than 3 months. [3], [4] This is because of its' good tolerability profile and it has been proven to have good efficacy and safety margin thus used in the paediatric age group even without a doctors' prescription. [5], [6] Ibuprofen is however, preferred to paracetamol by physicians in the management of pain related to inflammation. It also has a faster onset of action (being 15 minutes) and a longer duration of antipyretic action being 8-12 hours in comparison to paracetamol. [7]

The recommended dose of Ibuprofen is 10mg/kg body weight given every 6-8 hours or even 12 hourly with the total daily dose not exceeding 30mg/kg body weight. [8] It is administered orally either in liquid/syrup or tablet formulations depending on the age of the child.

Ibuprofen has been rated in the United Kingdom as the safest conventional NSAIDs. [9] Regardless, Ibuprofen is not without side effects; major adverse effects involve the

gastrointestinal system (mainly bleeding) and renal complications. [10], [11], [12]. It could also cause diarrhoea and vomiting. [10] It is noteworthy that in 2010, the Paediatric working group of the Italian drug agency observed an increase in the adverse effects of Ibuprofen (gastrointestinal bleeding and renal damage) which was attributed to an increase in its' use from 28% in 2008 to 70% in 2015. [13] The renal damage was however, attributed to the administration of ibuprofen in the presence of dehydration due to fever or other conditions that could cause dehydration such as vomiting or diarrhoea. Hence, OTC purchase of Ibuprofen by caregivers with its' unsupervised use could be of concern as misuse could lead to untoward effect of the drug leading to increased morbidity and even mortality in severe cases. It is however, pertinent to note that children with normal renal function and circulatory volume are very unlikely to experience renal damage as a result of Ibuprofen administration. Thus, Ibuprofen should be used with caution in the presence of dehydration and in very small babies such as preterm babies because of their immature organs. [8] Ibuprofen is also contraindicated in dengue fever where its platelet-inhibiting effect can worsen the bleeding tendency and lead to prolonged bleeding, internal bleeding, or haemorrhage in critical organs with possible fatal outcomes.

To the best of our knowledge, no study has been carried out on the pre-hospital use of Ibuprofen in children by mothers/caregivers in Rivers State University Teaching Hospital (RSUTH). This study was therefore, carried out to assess the prevalence of pre-hospital Ibuprofen administration as well as its' indications, formulations used and appropriateness of dosage administered. Findings from this study will add to the body of knowledge on ibuprofen use by mothers/caregivers which would also form basis for further education of the populace on the appropriate use of Ibuprofen as well as its' potential side effects.

## **Materials & Methods**

It was a prospective cross-sectional study carried out in the Paediatric outpatient clinic (POPC) of the Rivers State University Teaching Hospital (RSUTH) over six months from January 1<sup>st</sup> to June 30<sup>th</sup> 2023. The RSUTH, a State-owned tertiary hospital is a 375-bedded hospital. It is located in the southern region of Nigeria and serves as a referral centre to all the Primary Health centres in the 23 local government areas as well as secondary health centres, private hospitals and neighbouring States. The POPC is one of the units in the department of Paediatrics, a clinical department of the hospital. Others being the Children emergency room (CHER), Special care baby unit (SCBU) and the paediatric wards. The other clinical departments are Obstetrics & Gynaecology, Surgery, Internal medicine, Pathology, Family Medicine and Community Medicine. The POPC is open for consultation five days of the week, Mondays to Fridays from 8am to 4pm and it is run by consultants, resident doctors, house officers, nurses and other support staff such as the cleaners and clerks. It renders care to children 0 -17 years and sees an average of 35-40 children daily.

The study population was made up of parents/caregivers whose children were attending the POPC. The inclusion criteria were all parents/caregivers whose children were attending the POPC and who gave consent to participate in the study whereas the exclusion criteria were all parents/caregivers who did not give consent to participate in the study. A convenient sampling method was used and a total of 401 parents/caregivers were recruited who were eligible for the study.

Before commencement of the study, a research assistant was recruited and trained on the proper administration of the pre-tested and validated questionnaire. The questionnaire was administered directly on a one-on-one interview by the researcher and/or research assistant. The questionnaire consisted of three parts; the first section was on the biodata of the participants and their parents, the second part contained information on the use of ibuprofen, the dosage, formulation used, duration of ibuprofen administration, indications for giving

ibuprofen and the frequency of administration. The final part contained information on the weight of the child which was used in calculating the appropriateness of the dosing.

Data obtained were entered into an Excel sheet and analysis done using the Statistical Package for Social Sciences (SPSS) version 23. Results are presented as frequency tables and charts.

Statistical significance was set at  $P$ -values  $< 0.05$ .

## RESULTS

### SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE STUDY POPULATION

A total of 401 caregiver/child pairs who gave consent were consecutively recruited into the study. Males predominated in the study with a ratio of 1.4:1. Most of the children were above 50 months of age with mean age:  $28.26 \pm 3.80$  months. The mean weight of the children was  $14.94 \pm 2.06$  Kg.

Most of the mothers were aged 30-40 years with a mean age of  $35.48 \pm 1.26$  years while most of the fathers were aged 38-47 years with a mean age of  $42.11 \pm 7.43$  years. Most of the parents had tertiary level of education and were business men/women. They belonged mostly to the upper socioeconomic class.

Table 1: Socio-demographic Characteristics of the children

Variable	Frequency (n = 401)	Percent
<b>Sex</b>		
Male	235	58.6
Female	166	41.4
<b>Child Age Group (months)</b>		
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: $28.26 \pm 3.80$ months		
<b>Childs Weight Group (Kg)</b>		
<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		

Table 2: Parents' Socio-demographic Characteristics

Variable	Frequency (n = 401)	Percent
<b>Mother's Age Group (years)</b>		
<30	80	20.0
30 – 40	225	56.1
>40	96	23.9
Mean Age: 35.48 ± 1.26 years		
<b>Mothers' Occupation</b>		
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
<b>Mothers' Level of Education</b>		
Primary	5	1.2
Secondary	123	30.7
Tertiary	273	68.1
<b>Father's Age Group (years)</b>		
28 – 37	125	31.2
38 – 47	186	46.4
>47	90	22.4
Mean age: 42.11 ± 7.43 years		
<b>Father's Occupation</b>		
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
<b>Level of Education</b>		
Primary	4	1.0
Secondary	111	27.7
Tertiary	286	71.3
<b>Socioeconomic status</b>		
High	297	74.1
Middle	103	25.7
Low	1	0.2

Table 3: History of Ibuprofen Usage

Variable	Frequency (n = 401)	Percent
<b>Administered Ibuprofen</b>		

Yes	39	9.7
No	362	90.3
<b>Reason for Ibuprofen (Multiple response, n = 56)</b>		
Catarrh	3	8.3
Cough	10	27.8
Body pain	7	19.4
Fever	28	77.8
Other reasons	8	22.2
<b>Type of Ibuprofen formulation (n = 39)</b>		
Tablet	5	12.8
Syrup	34	87.2

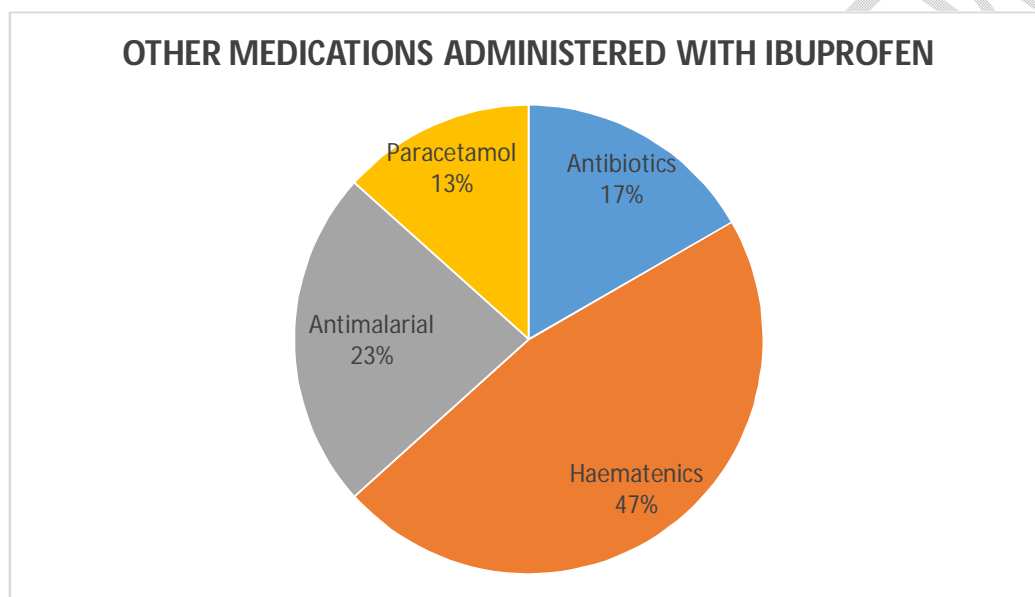


Figure 1: Other medications administered together with ibuprofen

Table 4: Reason for Choice of Formulation

<b>Variable</b>	<b>Frequency (n = 39)</b>	<b>Percent</b>
Reason for Choice of Formulation		
Age of child	29	74.4
Available medication at home	2	5.1
Most easily tolerated	2	5.1
Previous Experience	3	7.7
Weight of child	1	2.6
No reason	2	5.1

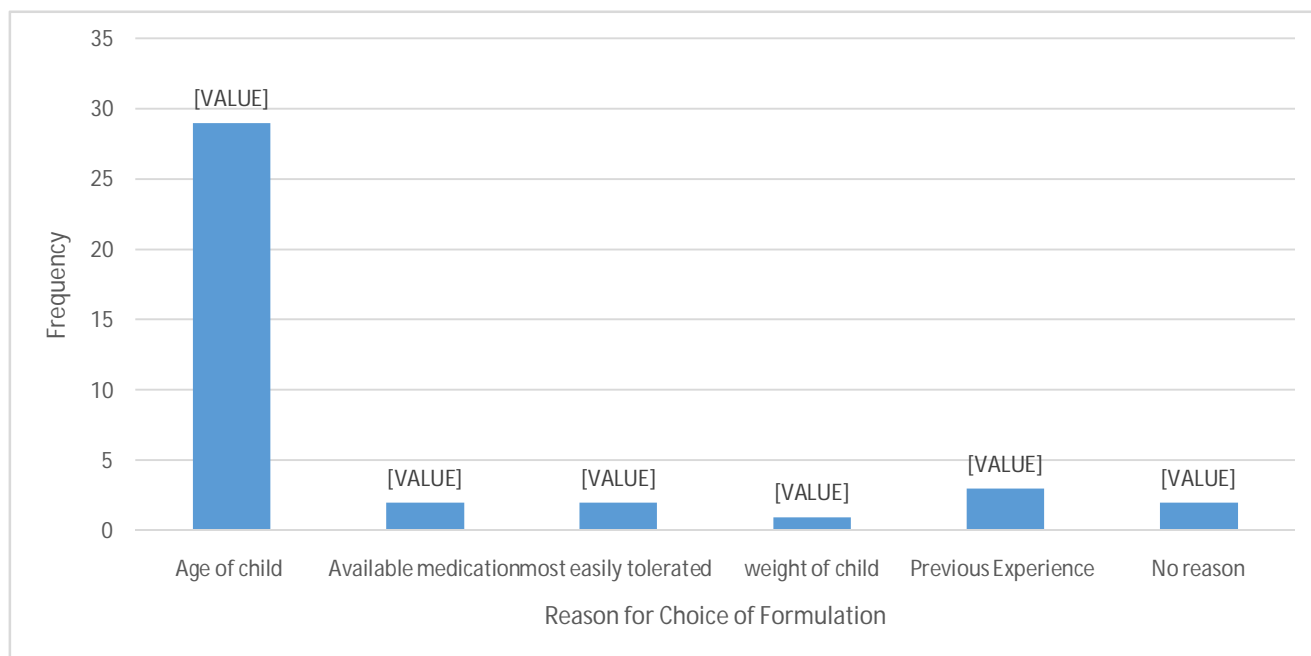


Figure 2: Reason for Choice of Formulation Used

Table 5: Frequency of Giving Medication

Variable	Frequency (n = 38)	Percent
<b>Frequency of Dosage for Ibuprofen (n = 38)</b>		
Once	10	26.3
Twice	18	47.4
Thrice	10	26.3

Table 6: Duration of Medication

Variable	Frequency (n = 36)	Percent
<b>Duration of Ibuprofen Medication (n = 36)</b>		
< 7 days	31	86.1
≥ 7 days	5	13.9

Table 7: Appropriate dosing

Variable	Frequency	Percent
<b>Appropriate Ibuprofen Dose (n = 36)</b>		
Yes	30	83.3
Under-dose	1	2.8
Overdose	5	13.9

Table 8: Diagnoses

Diagnosis (n = 39)	Frequency	Percentage
Acute tonsillitis	11	28.2
Malaria	12	30.8
Asthma	2	5.1

Sciatica	1	2.6
Mumps	1	2.6
Domestic accident	1	2.6
Dermatitis	3	7.7
Epilepsy	2	5.1
Cerebral palsy	1	2.6
Sickle cell disease	4	10.2
Inguinal hernia	1	2.6

## DISCUSSION

Pre-hospital administration of ibuprofen in this study of 9.7% was higher than the 1.9% reported earlier in Port Harcourt in 2019 by Eberechukwu and Aderonke[14] among 324 mother-child pair with fever but lower than the 44.9% reported by Ogunyika et al in Sokoto,[15] among 2,400 parents/ caregivers interviewed. The community-based report by Emilia James et al was 15.6% (15) among 122 mother child pair which is higher than the 9.7% in our study. The lesser percentage reported by Eberechukwu and Aderonke[14] among children with fever could be accounted for by the fact that more of them gave paracetamol before presentation at the hospital hence the need to give ibuprofen was reduced.

Cough and fever were among the commonest symptoms leading to self-medication similar to our findings.[14][15] In another study by Okunola [16] ibuprofen was among the drugs parents gave children on their own at home.

Preferred formulation in this study was syrup depending on the age of the child and the available medication at home. Other studies did not document the preferred formulation but it is a common practice to give syrups to younger children especially those less than five years while the older children who can swallow tablets receive tablet preparations.

Reasons for choice of formulation was the available formulation at home and the age of the child with the much younger children likely to receive syrup formulations.

In the study by Li et al,[17] 26% of children received an inaccurate dose of ibuprofen which was higher than our finding of more than 83% of parents giving adequate dose. It is possible that aggressive marketing by the producers of ibuprofen in our setting has enlightened most parents on the proper dosing of the medication.

In addition to Ibuprofen, other medications given by these caregivers were haematenics, antibiotics, antimalarials and paracetamol. There were no known studies to compare those who administered other medications with ibuprofen. Administering other medications with ibuprofen may be to alleviate the other symptoms or more likely the believe that haematenics should be given to any child who is taking a medication to ensure there is no blood shortage. It is not surprising in this environment since there is generally poor regulation of drugs one can purchase over the counter.

#### Ethical Approval and Consent

Ethical clearance for this study was obtained from the ethical committee of the Rivers State Hospitals Management Board. Parents/caregivers were informed of the objectives of the research being carried out; they were thoroughly educated and thereafter, informed consent was obtained written consent from each participant. Parents/caregivers were reassured of the confidentiality of all the data obtained.

#### **CONCLUSION.**

Although the prevalence of pre-hospital ibuprofen use is less than 10% of the respondents, there was high level of ibuprofen abuse thus the importance of health education on the proper use of ibuprofen cannot be overemphasized in order to forestal the morbidities and mortalities that can result from its use.

#### **Disclaimer (Artificial intelligence)**

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

#### **Conflict of interest.**

The authors declare no conflict of interests

Financing of the study was by the authors.

### **Acknowledgement**

The authors acknowledge the parents/caregivers and children who participated in the study.

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