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Research Article

Severity of Trauma Pain and Treatment Modalities in Children Attending Emergency Care Facility in a Tertiary Hospital- Preliminary Report

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ABSTRACT

Trauma is increasing amongst the children and is an important cause of pain. Less analgesia, if any at all, is given to children for pain. There is the need for accurate diagnosis of trauma pain, determination of its severity in children and use of the most effective treatment regimen. The study was a prospective observational study carried out at the Accidents and Emergency Department of the University College Hospital, Ibadan. A total sampling of all paediatric patients presenting with trauma pain over a 11-month period was done. An interviewer administered questionnaire was used to obtain information about patients' demographics, pain experiences and interventions at different time intervals. Thirteen patients participated in the research of which most (69.2%) were males. Trauma was more common amongst toddlers and school age children. The most common cause of trauma pain was Motor Vehicular Accidents (46.2%). Most patients (46%) had mild pain as their worst previous pain experience; however, about 62% of the patients experienced severe pain at the time of presentation to the hospital. Non-Steroidal Anti-inflammatory Drugs (NSAIDs) were the most commonly used analgesics. Only about 15% of the participants had an opioid analgesic alone or with an NSAID. Pain from trauma as experienced by children in this environment is usually moderate to severe but suffers oligoanalgesia. A trauma pain treatment protocol should be developed to adequately address the needs of this patient population.

Keywords: *Trauma, pain, severity, children, treatment modality*

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INTRODUCTION

Pain is one of the most common reasons for presentation in the hospital especially at the emergency department (Selbst and Clark, 1990; Dale and Bjornsen, 2015; Krauss et al, 2015; Ahmadi et al, 2016). Pain in children has gained more attention recently as pain can be an evidence of severity of an injury or can result in severe complications leading to a worst outcome (Ahmadi et al, 2016). Trauma is increasing amongst the paediatric age group and is an important cause of pain (Miftah et al, 2017). According to the World Health Organization (WHO), trauma would be the third leading cause of death and disability in all ages by 2020 (Ahmadi et al, 2016). In a study by Selbst and Clark (1990) conducted amongst patients presenting to the emergency department, trauma pain accounted for 80% of the presentation. It was also observed in this study that most of the patients especially children received no analgesics (Selbst and Clark, 1990). Less analgesia, if given at all, is given to children than adults, this

phenomenon is referred to as oligoanalgesia (Karreman, Krause and Smith, 2016).

In a study conducted in the United States (US) in 2000 on paediatric patients presenting with pain in emergency department (Drendel, Brousseau and Gorelick, 2006), only 44.5% of children presenting to emergency department had their pain scores recorded. Documentation of pain score has been associated with a higher likelihood of analgesic use particularly opioid analgesics (Drendel, Brousseau and Gorelick, 2006).

Many paediatricians and emergency doctors are unwilling to use analgesics in treating children in pain. This stems from an inability to adequately assess the pain, lack of resources to address the analgesic needs of patients, misconceptions about pain that adversely affects presentation to the hospital, misconceptions about certain analgesics and lack of adequate knowledge by doctors or other health professionals in pain management. (Size, Soyannwo and

Justins, 2007; Albertyn, 2009; Witte, 2010; Miftah et al, 2017)

Many of the studies encountered were done in the general population with few focussing on paediatric patients; many of which did not cover the aspect of trauma pain. Also, there is paucity of data about assessment and treatment of trauma pain in children in this environment. Hence, this study was aimed at identifying the different causes of trauma pain in children presenting to the emergency department in this environment, assess this pain; using certain pain tools to determine the severity and identify the different treatment modalities applied in this environment, if any, and determine their effectiveness in lowering pain.

MATERIALS AND METHODS

Study design: The study was a prospective observational study.

Study population: The study was conducted among paediatric patients, ages 2 to 15 years, who presented to the Accidents and Emergency Department (University College Hospital, Ibadan) with trauma pain.

Study area and setting: The study was carried out between June, 2016 and May, 2017 at the Accidents and Emergency Department of the University College Hospital, a tertiary institution located in Ibadan, Oyo State, South-West Nigeria. UCH has over ten thousand emergency cases per year. (Rukewe et al, 2015)

Sampling method: A total sampling of all paediatric patients presenting to the Accidents and Emergency Department with trauma pain during the study period was used. Consecutive cases of children aged 2-15years whose parents/ guardians provided informed consent were included in the study. Children who were unconscious and those whose parents/ guardians were unavailable to give an informed consent were excluded from the study. A total of 13 participants were involved in the research.

Ethical consideration: Ethical approval was obtained from the University of Ibadan/ University College Hospital (UI/UCH) Ethics Committee (NHREC/05/01/2008a). Consent to participate in this study was obtained from the parents/

guardians of the children while older children were required to provide assent in addition.

Data collection, instruments and quality controls: An interviewer administered questionnaire was utilised to obtain information from the participants. The questionnaire comprised three sections; the first containing information about the participants’ demographic characteristics, the second section included cause of injury, pain related experiences and pain score while the last section comprised information about interventions ranging from the use of paracetamol (PCM), ibuprofen, diclofenac, pentazocine, morphine or a combination of these drugs, it also included the effects of these intervention on pain scores. The Visual Analogue Score (VAS) and Numerical Rating Scale (NRS) were components of the questionnaire used to assess the pain experiences.

Participants were grouped into four categories based on their age groups: Toddlers (1-3years), Pre-schoolers (4-5years), School age children (6-12years) and Adolescents (12-15years) using the Classification of the American Academy of Paediatrics. The NRS of the patients at presentation were categorised based on severity into mild for a score of 1 to 3, moderate- 4 to 6 and Severe- 7 to 10.

Data analysis

Data were cleaned and analysed using the Statistical Package for Social Sciences (SPSS) version 21.0. The distribution of participants’ characteristics was summarised using frequency tables, proportions (for categorical variables) and descriptive statistics such as mean and standard deviation (for quantitative variables). Difference in average pain scores at thirty and sixty minutes after intervention were compared (separately) with pain scores at baseline and current pain at presentation using one-way analysis of variance (ANOVA). All analysis was performed at a nominal 5% level of significance.

RESULTS

Patients’ Characteristics: Thirteen children participated in the research of which 69.2% were males and 30.8% were females. (Table 1) Trauma was more common amongst toddlers and school age children compared to other children. (Table 1) Most participants experienced trauma pain from Motor Vehicular Accidents (46.2%) while others had injuries from falls (30.8%), mechanical injury (15.4%) and burns (7.7%).

Table 1: Patients’ Characteristics

Parameters	Type of trauma			
	Motor Vehicular Accidents (%)	Falls (%)	Mechanical Injury (%)	Burns (%)
Age				
Toddlers (1-3years)	3 (75.0)	1 (25.0)	0 (0.0)	0 (0.0)
Pre-Schoolers (4-5years)	0 (0.0)	1 (33.3)	1 (33.3)	1 (33.3)
School Age (6-12years)	2 (50.0)	1 (25.0)	1 (25.0)	0 (0.0)
Adolescents (12-15years)	1 (50.0)	1 (50.0)	0 (0.0)	0 (0.0)
	Total	6 (46.2)	4 (30.8)	2 (15.4)
Sex				
Male	6 (66.7)	2 (22.2)	0 (0.0)	1 (11.1)
Female	0 (0.0)	2 (50.0)	2 (50.0)	0 (0.0)
	Total	6 (46.2)	4 (30.8)	2 (15.4)

Key: N= Number of Children

Table 2:

Comparison of pain severity between previous pain experience and pain at presentation using NRS

Classification	Worst previous pain		Current pain at presentation	
	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)
No pain	4	30.8	0	0.0
Mild	6	46.2	4	30.8
Moderate	2	15.4	1	7.7
Severe	1	7.7	8	61.5
Total	13	100.0	13	100.0

Table 3:

Pain scores

Parameters		Age group			
		Toddlers-1-3years	Pre-Schoolers 4-5years	School Age 6-12years	Adolescents-> 12years
Worst previous pain experience	VAS (Mean ± SD)	2.00 ± 3.367	1.67 ± 0.577	2.75 ± 2.724	1.00 ± 1.414
	NRS Median(IQR)	0.50 (5.50)	2.00	2.50 (5.25)	1.00
	NRS ≤ Median %	50	100	100	100
	NRS ≥ Median %	50	0	0	0
Baseline pain score (immediately after injury)	VAS (Mean ± SD)	8.00 ± 1.414	9.00 ± 1.000	5.50 ± 3.697	6.00 ± 5.657
	NRS Median(IQR)	8.50 (3.50)	9.00 (-8.00)	5.00 (7.00)	6.00
	NRS ≤ Median %	50	66.7	75	50
	NRS ≥ Median %	50	33.3	25	50
Current pain score (at presentation)	VAS (Mean ± SD)	9.00 ± 0.816	7.00 ± 3.606	5.50 ± 3.697	4.00 ± 2.828
	NRS Median(IQR)	9.00 (1.50)	8.00	5.00 (7.00)	4.00 (4.00)
	NRS ≤ Median %	75	66.7	75	50
	NRS ≥ Median %	25	33.3	25	50
Pain score immediately after intervention	VAS (Mean ± SD)	6.75 ± 2.986	6.33 ± 3.512	3.50 ± 3.109	2.00 ± 2.828
	NRS Median(IQR)	7.00 (5.75)	6.00	3.50 (6.00)	2.00 (4.00)
	NRS ≤ Median %	50	66.7	100	100
	NRS ≥ Median %	50	33.3	0	0
Pain score 30mins after intervention	VAS (Mean ± SD)	4.00 ± 3.266	3.67 ± 3.215	2.25 ± 2.630	0.00 ± 0.000
	NRS Median(IQR)	4.00 (6.00)	5.00	2.00 (4.75)	0.00 (0.00)
	NRS ≤ Median %	75	100	100	100
	NRS ≥ Median %	25	0	0	0
Pain score 60mins after intervention	VAS (Mean ± SD)	3.25 ± 3.403	2.00 ± 2.000	1.50 ± 1.915	0.00 ± 0.000
	NRS Median(IQR)	2.50 (6.25)	2.00 (0.00)	1.00 (3.50)	0.00 (0.00)
	NRS ≤ Median %	50	100	100	100
	NRS ≥ Median %	50	0	0	0

VAS= Visual Analogue Score NRS= Numerical Rating Scale

IQR= Interquartile range

Table 4: Comparison between the mean baseline VAS with those at 0 mins, 30 mins and 60 mins after intervention for participants across the various age groups

	Study time points				p-value
	Baseline (Mean ± SD)	0mins (Mean ± SD)	30mins (Mean ± SD)	60mins (Mean ± SD)	
Toddlers (1-3years)	8.00 ± 1.414 ^a	6.75 ± 2.986 ^a	4.00 ± 3.266 ^{ab}	3.25 ± 3.403 ^b	0.116
Pre-Schoolers (4-5years)	9.00 ± 1.000 ^a	6.33 ± 3.512 ^{ab}	3.67 ± 3.215 ^b	2.00 ± 2.000 ^b	0.049
School Age (6-12years)	5.50 ± 3.697 ^a	3.50 ± 3.109 ^a	2.25 ± 2.630 ^a	1.50 ± 1.915 ^a	0.279
Adolescents (12-15years)	6.00 ± 5.657	2.00 ± 2.828 ^a	0.00 ± 0.000 ^a	0.00 ± 0.000 ^a	0.322

Note: Means with the same alphabet indicates no significant difference

Comparison of pain severity between previous pain experience and pain at presentation using NRS.

Most children (46%) had mild pain as their worst previous pain experience while about 31% had no previous pain experience (Table 2). However, about 62% of these children experienced severe pain at the time of presentation to the hospital (Table 2).

Pain scores

Baseline pain scores (Table 3) and current pain scores at presentation (Table 2 and 3) across the age groups were indicative of moderate to severe pain with Visual Analogue Score (VAS) and Numerical Rating Scale (NRS) ranging from 4 to 9. Pain scores dropped gradually during the course of

observation of the patients such that after one hour following intervention with analgesics, all patients had mild pain.

Comparison between the mean baseline VAS with those at 0 mins, 30 mins and 60 mins after intervention for participants across the various age groups.

The difference in mean between pain scores at baseline, zero, thirty and sixty minutes after administration of analgesics were obtained across the age groups. It was found that amongst toddlers, there was no significant difference in pain scores between the study time points. There was however a significant difference in mean pain scores at zero and thirty minutes but none between thirty and sixty minutes. Amongst pre-schoolers, there was a significant difference in mean pain scores across the study time points, however, this difference occurred between pain scores at baseline, thirty and sixty minutes, none at zero minutes. School age children showed no significant difference in mean pain scores across the study time points. However, there was a significant reduction between pain scores when those at zero, thirty and sixty minutes were compared. Adolescents had no significant reduction in mean pain scores across the study time points but a significant reduction when mean baseline score was compared to scores at zero, thirty and sixty minutes (Table 4).

Comparison between the mean current VAS with those at 0 mins, 30 mins and 60 mins after intervention for participants across the various age groups

In comparing mean current pain score with those zero, thirty and sixty minutes after administration of analgesia across the age groups, there was no significant reduction in pain scores based on study time point (Table 5).

Table 5:

Comparison between the mean current VAS with those at 0 mins, 30 mins and 60 mins after intervention for participants across the various age groups

	Study time points				p-value
	Baseline (Mean ± SD)	0mins (Mean ± SD)	30mins (Mean ± SD)	60mins (Mean ± SD)	
Toddlers (1-3years)	9.00 ± 0.816 ^a	6.75 ± 2.986 ^{ab}	4.00 ± 3.266 ^b	3.25 ± 3.403 ^b	0.050
Pre-Schoolers (4-5years)	7.00 ± 3.606 ^a	6.33 ± 3.512 ^{ab}	3.67 ± 3.215 ^{abc}	2.00 ± 2.000 ^{abc}	0.255
School Age (6-12years)	5.50 ± 3.697 ^a	3.50 ± 3.109 ^{ab}	2.25 ± 2.63 ^{abc}	1.50 ± 1.915 ^{abc}	0.279
Adolescents (12-15years)	4.00 ± 2.828 ^a	2.00 ± 2.828 ^{ab}	0.00 ± 0.000 ^{abc}	0.00 ± 0.000 ^{abc}	0.281

Note:

Means with the same alphabet indicates no significant difference

Interventions:

Analgesics given to patients across the age groups include paracetamol, diclofenac, ibuprofen and pentazocine (Table 6).

Distribution of analgesics used

The type of analgesics was regrouped into three categories- Non-Steroidal Anti-inflammatory drugs (NSAIDs),

Pentazocine and those who had both. Most children (84.6%) were given NSAIDs.

Table 6:

Interventions	
Age group	Intervention
Toddlers	Ranged from paracetamol, diclofenac, ibuprofen to pentazocine which were administered using the oral or intramuscular routes
Pre-schoolers	Included paracetamol and ibuprofen given via the oral route
School age children	Included paracetamol and diclofenac given orally
Adolescents	Included paracetamol given intravenously

Table 7:

Distribution of analgesics used		
Analgesic	Frequency	Percentage %
NSAIDs	11	84.6
Pentazocine	1	7.7
Both	1	7.7
Total	13	100.0

DISCUSSION

We found that children in this environment are exposed to trauma of various kinds including motor vehicular accidents, falls, mechanical injury and burns. The mean of the baseline pain scores and current pain scores at presentation revealed that these children had moderate to severe trauma pain. Analgesics were administered based on the physician's discretion at the time of presentation of the patients and were not based on any unit protocol as the drugs were administered orally, intramuscularly or intravenously irrespective of pain severity, trauma type or patient characteristics. Non-Steroidal Anti-inflammatory Drugs (NSAIDs) and pentazocine- an opioid analgesic were administered.

From our study, it is obvious that pain can be felt by any age group which is also the assertion of others who have studied pain in children. (Schechter, 1997) Hence, there is need for adequate assessment and treatment of pain notwithstanding the age group. Although mean baseline and current pain scores across the age groups ranged from four to nine, indicative of moderate to severe pain, most participants received only NSAIDs (84.6%) which is contrary to the suggestion by the World Health Organization (WHO) on the treatment of pain in children. The WHO suggests that moderate to severe pain in children should be treated with Opioids with or without NSAIDs and other adjuvant treatment modalities. (WHO guidelines on the pharmacological treatment of persisting pain in children with medical illnesses, 2012) As was evidenced by our results, there was a reluctance to use opioids in children as only about 15% of the children received pentazocine, a weak opioid antagonist alone or in addition to NSAIDs. This was also the situation identified by a study conducted in Hartford in the United States (US) of America, in which, it was noted that the use of potent opioids was associated with myths such as the likelihood of addiction. (Albertyn, 2009) In another study conducted in the US, of the 99 children presenting with fracture to the emergency department, 47% did not receive

any form of analgesic. (Friedland and Kulick, 1994) It was recognized in this study that there was low use of analgesics in mildly to moderately injured children. (Friedland and Kulick, 1994)

Some of the responses in this study were gotten from parents/ guardians because the Visual Analogue Score (VAS) and Numerical Rating Scale (NRS) are not best for use in children less than five years. The use of observer assessment of pain severity in this study is a source of bias because the patient is the person that knows how much it hurts. Although, parents can try to describe their children's pain, their description may not be very accurate. Also, the small sample size is a limitation, therefore, studies recruiting large number of patients who may be randomized to receive analgesics based on unit protocol are required to further explain and improve knowledge on paediatric trauma pain management. The assessment of trauma pain is particularly limited in the emergency department as many doctors focus on the injury forgetting the pain it has produced. Although all over the world, there is a greater awareness and consciousness about assessment and treatment of pain in children, children who present in trauma pain in this environment, even though, they have moderate to severe pain as revealed by this study suffer from oligoanalgesia as there is still no protocol for assessing and treating pain at our emergency department; this is something to look into. Developing a protocol that ensures adequate assessment and treatment of pain would require further research. There is also the need to train doctors to assess pain and ensure appropriate treatment using the developed protocol which ensures uniformity. Modern innovations aimed at minimizing pain and preventing additional pain to patients who present to the emergency department should also be introduced into pain management in children with trauma pain. They include analgesics in the form of sprays, gels and inhalational agents (Maurice, O'Donnell and Beattie, 2002; Wilson-Smith, 2011; Fein, Zempsky and Cravero, 2012).

In conclusion, pain from trauma as experienced by children in this environment is usually moderate to severe but suffers oligoanalgesia. A trauma pain treatment protocol should be developed to adequately address the needs of this patient population.

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REFERENCES

Ahmadi, A., Bazargan-Hejazi, S., Heidari Zadie, Z., Euasobhon, P., Ketumarn, P., Karbasfrushan, A., Amini-Saman, J., & Mohammadi, R. (2016): Pain management in trauma: A review study. *Journal of injury & violence research*, 8(2), 89–98.

Albertyn, R., Rode, H., Millar, A.J. & Thomas, J. (2009): Challenges associated with paediatric pain management in Sub Saharan Africa. *International Journal of Surgery*, 7(2), 91- 93.

Dale, J., & Bjørnsen, L. P. (2015): Assessment of pain in a Norwegian Emergency Department. *Scandinavian journal of trauma, resuscitation and emergency medicine*, 23, 86.

Drendel, A.L., Brousseau, D.C. & Gorelick, M.H. (2006): Pain Assessment for Paediatric Patients in the Emergency Department. *Pediatrics*, 117(5), 1511-1518.

Fein, J.A., Zempsky, W.T. , Cravero, J.P. (2012): Committee on Pediatric Emergency Medicine and Section on Anaesthesiology and Pain Medicine: American Academy of Pediatrics. (2012). Relief of pain and anxiety in pediatric patients in emergency medical systems. *Pediatrics*. 130(5): e1391-405. doi: 10.1542/peds.2012-2536.

Friedland, L.R. & Kulick, R.M. (1994). Emergency department analgesic use in pediatric trauma victims with fractures. *Annals of Emergency Medicine*, 23(2), 203-207.

Karremen, E., Krause, C.S., Smith, S. (2016). Children receive less analgesia in general ERs than adults: A retrospective study. *Journal of Emergency Medicine, Trauma & Acute Care* 2016:1

Krauss, B.S., Calligaris, L., Green, S.M. & Barbi, E. (2016). Current concepts in management of pain children in the emergency department. *Lancet*, 387 (10013), 83.

Maurice, S. C., O'Donnell, J. J., & Beattie, T. F. (2002). Emergency analgesia in the paediatric population. Part II Pharmacological methods of pain relief. *Emergency medicine journal: EMJ*, 19(2), 101–105.

Miftah, R., Tilahun, W., Fantahun, A., Adulkadir, S., & Gebrekirstos, K. (2017). Knowledge and factors associated with pain management for hospitalized children among nurses working in public hospitals in Mekelle City, North Ethiopia: cross sectional study. *BMC research notes*, 10(1), 122. <https://doi.org/10.1186/s13104-017-2446-7>.

Rukewe, A., Fafiregun, A., Okolo, C. A., Ojifinni, K., Akinola, O., & Nweke, M. C. (2015). Emergency Department Deaths in a Nigerian University Hospital: Deaths Too Many. *The West Indian medical journal*, 64(2), 131–134.

Schechter, N.L., Blankson, V., Pachter, L.M., Sullivan, C.M., Costa, L. (1997). The ouchless place: no pain, children's gain. *Pediatrics*, 99(6), 890 – 894.

Size, M., Soyannwo, O.A. & Justins, D.M. (2007). Pain management in developing countries. *Anaesthesia*, 62(Suppl1), 38-43.

Selbst, S.M. & Clark, M. (1990). Analgesic use in the emergency department. *Annals of Emergency Medicine*, 19(9), 1010-1013.

Thomas, S.H. **Management of Pain in the Emergency Department.** (2013): *ISRN Emergency Medicine*, Article ID 583132, 1 -19.

Witte, W. & Stein, C. (2010). History, Definitions, and Contemporary Viewpoints. In: Kopf, A., Patel, N. B., editors. *Guide to pain management in low- resource settings*. Seattle: International Association for the Study of Pain (IASP), pp. 3-8.

Wilson-Smith E. M. (2011). Procedural Pain Management in Neonates, Infants and Children. *Reviews in pain*, 5(3), 4–12.

World Health Organization. (2012). Persisting pain in children package: *WHO guidelines on the pharmacological treatment of persisting pain in children with medical illnesses*. World Health Organization. <https://apps.who.int/iris/handle/10665/44540>