ORIGINAL ARTICLE

PAIN MANAGEMENT IN CHILDREN IN A TERTIARY PEDIATRIC EMERGENCY IN ETHIOPIA

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ABSTRACT

Background : *Pain is a stressful experience that is considered to be a global health problem, and children are the most vulnerable and under-served population. Despite the exponential increase in scientific evidence about pediatric pain in the last few decades, there are many barriers to the transfer of knowledge to clinical practice. Consequently, children still experience unnecessary pain during hospitalization. We designed this study to assess the prevalence, evaluation and management of pain in children admitted to St Paul's hospital millennium medical college pediatric emergency.*

Methods : *Institution based cross-sectional study was conducted from April to June, 2018over a period of 3 months using semi-structured questionnaire & age appropriate pain assessment tools. In addition, documentation of existence of pain, evaluation and management was made from the medical charts of each children included in the study. A total of 290 patients 1 month to 18 years of age were included in the study and data was cleaned, coded and entered to SPSS version 23 for analysis. Bivariate and multivariate analysis was done to see association between dependent and independent variables.*

Result : *Out of the 290 children, 206 (71%) aged 1-47 months. Male to female ratio was 1.4:1 with males comprising 57.9% of the total study population. The majority of children, 224 (77.2%) had their mothers as primary care giver. Overall prevalence of pain among children admitted to PE was 76.2%; 70% of the children had mild to moderate pain and 6.2% had severe pain based on the age appropriate assessment tools. Of those children found to be in pain, only 21.3% had documented analgesics in their order sheet, and only 7.2% of the children had analgesics documented in the Nursing sheet. Pain assessment was documented in none of the charts. Children aged >47 months were 5.5 times more likely to have pain (p-value<0.001); and children with Severe acute malnutrition (SAM), 13.5 times (p-value=0.017) and Acute gastroenteritis (AGE), 5.8x (p-value=0.036) were likely to have pain.*

Conclusion: *A high prevalence of pain was identified in children admitted to PE but there is poor recognition, documentation and treatment of pain.*

Key words: *Pain, Children, Ethiopia, Analgesics*

INTRODUCTION

International Association for Study of Pain (IASP) defines Pain as, "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (1). All children encounter pain associated with casual activities, diseases and medical procedures.

to clinical practice (2-7). There is no evidence that shows the experience of pain in children is less than adults, while the reverse is true (4, 8). Though it is over a decade since the declaration of "the relief of pain as a human right" by world health organization (WHO), and IASP (9), studies from different regions of the world continued to report that pain in hospitalized children is still prevalent but undocumented and untreated (4-7, 10-11).

Pain is classified based on duration of pain, underlying mechanism and situation. Based on the duration, pain is classified into acute pain, which is due to acute illness or injury, and chronic pain which is due to chronic pathologic process. Acute pain is one of the most common adverse stimuli experienced by children, occurring as a result of injury, illness, and necessary medical procedures (12-14).

Pain is widely undertreated, causing suffering and financial loss to individuals and to society. There are various reasons for poor pain evaluation and treatment including lack of adequately trained health professionals, difficulty of pain assessment in children, the unavailability of drugs, especially opioids, and a fear of using opioids because there is an erroneous belief that inevitably the use of these drugs will cause addiction. Though, pain is a universal experience especially in hospitalized children and, an important responsibility of physicians who care for children is eliminating or relieving pain and suffering when possible, there still is inadequate pain management especially in children (15-18).

Uncontrolled pain can result in long term complications: impact a child's quality of life by interfering with mood, sleep, appetite, school attendance, academic performance, and participation in sports and other extracurricular activities. Furthermore, childhood pain can enhance a child's vulnerability to pain later in life. Repeated exposure to pain may cause altered pain sensitivity, impaired social skills, and patterns of self-destructive behavior. Numerous myths, insufficient knowledge among caregivers, and inadequate application of knowledge also contribute to the lack of effective management (19-23).

Though lots of studies have been done in the rest of the world including Africa, there are limited studies in Ethiopia investigating pain status of children admitted to hospitals (24-42) and thus, the objective of our study was to determine the prevalence, severity, documentation and management practice of pain in children admitted to SPHMMC pediatrics emergency.

MATERIALS AND METHODS

The study was done in St Paul's Hospital Millennium Medical College, a tertiary center located in Addis Ababa with 392 beds and an annual average of more than 200,000 patients. The pediatrics emergency has 16 beds and 5625 patients visited the PE in 2016with average monthly visit of 469 patients.

Institution based cross sectional study was conducted from April 9 to June 27, 2018. Infants and children 1 month to 18yrs of age admitted to PE were included and evaluated for presence of pain within 24 hours of admission but children who were cognitively impaired were excluded from the study.

SAMPLE SIZE DETERMINATION AND SAMPLING TECHNIQUE

Taking previous pain prevalence of 78 % (36) from Kenya, and a confidence interval of 95% (Z=1.96) and margin of error (w) of 5%, calculated sample size was 290using single population proportion formula and a 10% non-response rate. Convenience sampling was used until the calculated sample size is achieved.

DATA COLLECTION

Data was collected by trained general practitioners not working in the study area during the study period. The questionnaire was developed in English and then translated to Amharic with most items adapted from existing literatures. Written consent from the child's legal guardian and assent from older children was sought initially and semi structured and pre-tested Amharic language questionnaire was administered to the child and caregiver to collect data on socio-demographic characteristics, absence or presence of pain or procedure within 24 hours of admission. An age appropriate pain scale, Face Pain Scale Revised for those children >4yrs and Face, Legs, Activity, Cry, Consolably scale for those children between 1 & 47 months of age, were then administered to determine presence and severity of the pain. Finally, review of the participant's medical and nursing record was carried out to determine the documentation of pain assessment and initial pain management in terms of: type of intervention given, dosage, route and frequency of administration of pain medication. Dependent variable was occurrence of pain and Type and frequency of analgesic used whereas Age and Sex of the child ,Clinical diagnosis, Primary care giver, Age and Sex of the primary care giver, Level of education of the primary care giver, Occupation of the primary care giver, Presence and type of procedure done were the independent variables.

DATA PROCESSING & ANALYSIS

After data collection, each questionnaire was checked for completeness and data was entered in to SPSS version 23. Further, data cleaning was performed to check for outliers, missed values and any inconsistencies before the data was analyzed. Descriptive statistics including frequency tables, graphs and descriptive summaries were used to describe the result. Bivariate and multivariate analysis was done to see the association between dependent and independent variables. A confidence limit of 95% and p- value less than 0.05 was used as cut of point to see presence of statistical significance. To control the effect of confounding variables multiple

logistic regression analysis was done and adjusted odds ratios (AORs) was used to explore real association.

OPERATIONAL DEFINITIONS

Procedure-- any medical interventions that have some degree of pain associated with it. (Include IV cannulation, urethral catheterization, central line insertion, paracentesis, etc.).

Procedural pain- Pain related to clinical procedures/interventions (36).

Pain severity documented- Presence or absence is mentioned, measured and documented on the patient's chart.

Documented Pain management- When assessment of pain severity and management mentioned on the chart.

RESULTS

A total of 290 children were included over a period of 3 months. Seventy one percent (206) of the children were between 1-47 months and 57.9% were male.

In majority of them (77.2%) mothers are the primary care giver; while fathers accounted for 14.8%.Lower respiratory tract infection (LRTI) are the main admission diagnosis, (28.3%); followed by Severe Acute Malnutrition (SAM) (6.6%),renalproblems (6.6%), and acute abdomen (5.9%) respectively.

Pain prevalence

Pain was present in 221 children giving a prevalence of 76.2%within 24 hours of admission. Among younger children using FLACC scale, 148 (72%) were in pain (Table 1).

Table 1.Prevalence of Pain among Hospitalized Children

Age group	In pain (No)	Total	Prevalence(%)
1-47months	148	206	71.8
>47months	73	84	87
Overall	221	290	76.2

Majority of care givers, (99%) has reported pain because of admission diagnosis and/or procedure. Among older children 98.8 % (n=83) reported pain because of admission diagnosis and/or procedure. More than two-third of the primary care givers (70.1 %) had informed the health worker that their child was in pain. Pain was intermittent in 82.2 % of the older children. The majority of children 89 % had reported pain either to care giver or doctor (Table 2).

Severity of Pain

Using the FLACC scale, severity of pain among younger children was found to be mild in 69.6%, moderate in 29.1% and severe in 1.4%. The most common symptom of pain as reported by the caregiver was crying (58.4%). Among older children, 37.0% reported mild pain; 41.1% reported moderate pain and 21.9% reported severe pain associated with diagnosis (Fig. 1).

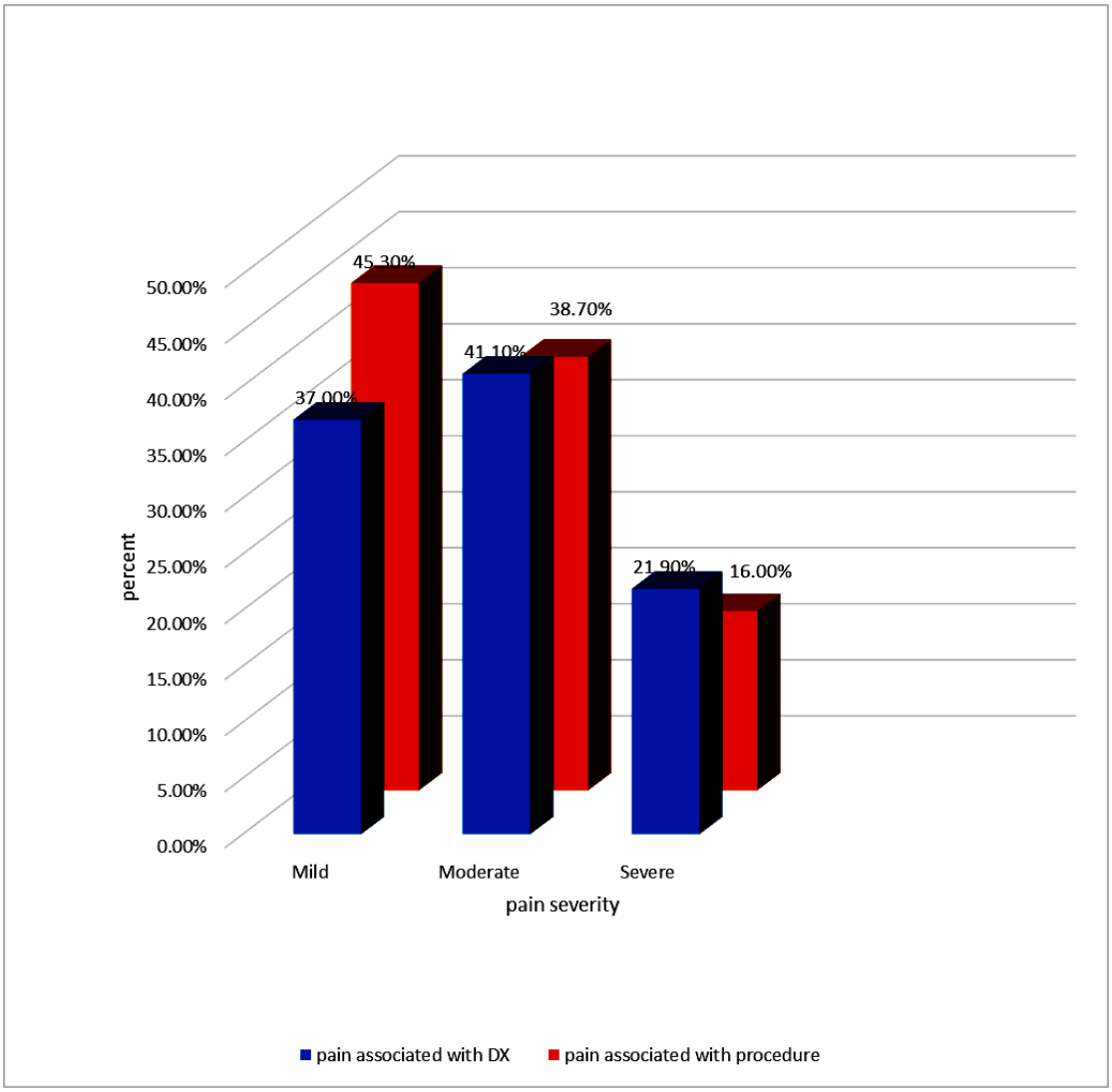

Figure 1: Severity of Pain associated with Admission DX & Clinical Procedures among Patients greater than 47 months (Self- report); Dx-Diagnosis

Table 2: Summary of Caregiver's report of pain

Characteristics		Number	Percent (%)
Care giver's report of pain since admission		286	99
Care giver's report of pain associated with DX		221	77.3
Care giver's Reported to health worker (HW)		155	70.1
Care giver's report of Pain associated with procedure		280	97.9
Explanation given by HW about procedure		138	48.1
Site of procedure	Bed supine	92	32.1
	Care giver's lap	188	65.5
	Procedure room	3	1.0
Care giver present during procedure		274	95.5
Care givers report of site of pain	Head & neck	31	14.0
	Chest	53	24.0
	Abdomen	67	30.3
	Head, neck and abdomen	17	7.7
	Chest & abdomen	8	3.6
	Extremities	11	5.0
	Unknown	23	10.4
	Other	11	5.0
Child's report of pain since admission		83	98.8
Child's report of Pain associated with DX		73	88
Consistency of pain	Continuous	13	17.8
	Intermittent	60	82.2
Child reported pain		65	89.0
To whom child reported	Doctor	2	3.1
	Primary care giver	41	63.1
	Doctor & Nurse	1	1.5
	primary care giver &Doctor	19	29.2
	All	2	3.1

Table 3. Child's report of pain

Characteristics	Number	Percent (%)
Child's report of pain associated with procedure	75	90.4

Admission Diagnoses and pain

Malignancy was the most common admission diagnosis associated with severe pain, with 80% of all children with malignancy reporting moderate to severe pain. Other causes of severe pain included surgical problems (35%), renal problems (10%), and bone and soft tissue infections.

Clinical Procedures and Pain

Majority of the care givers (97.9%) reported pain associated with procedure. According to the primary care giver, explanation regarding how painful the procedure might be was given in only 48.1 %(n=138). Site of procedure was care giver's lap in most of the procedures 65.5 %(n= 188) followed by bed supine 32.1 % (n=92) and procedure room 1 %(n= 3). Most of the Care givers were present during procedure (95.5%).

In both age groups the commonest site of pain is the extremities and the most frequently performed procedure was blood sample collection with IV/IM injection (28.9%, n=83). Pre-procedural analgesia was given for 2 procedure (Paracetamol before abscess drainage and unspecified injectable analgesics for chest tube insertion); and non-pharmacologic therapy was used in 60.3% (173) which were provided by both health worker and care giver in 60.1% and only care giver in 39.3% of cases.

Factors associated with presence and severity of pain

In the multinomial logistic regression, the presence of pain is 5.5 times higher in children >47 months (p-< 0.001; 95%CI= 2.518,12.074). From the admission diagnosis, children with SAM are 13.5 times likely to have pain (p =0.017; 95% CI=1.601,114.519), and children with AGE are 5.8 times likely to have pain (p=0.036;95%CI=1.124, 30.010). Other factors such as sex and chief complaint are not associated significantly with the presence of pain. There was no statistically significant association between severity of pain and children's sex, age, chief complaint and admission diagnosis. There was also no statistically significant association between severity of procedural pain and type of procedure (Table 3).

Table 4: Multinomial logistic regression of factors associated with the presence of pain

pain presence		p-value	AOR	95% Confidence Interval for Exp (B) Lower Bound	Upper Bound
Age	<47months	.487	1.292	.628	2.658
	>47months	.000	5.514	2.518	12.074
Admission DX	LRTI	.113	2.013	.847	4.781
	AGE	.036	5.807	1.124	30.010
	LRTI+AGE	.769	1.205	.348	4.169
	Surgical problems	.083	6.617	.779	56.207
	LONS	.104	6.194	.686	55.935
	SAM	.017	13.541	1.601	114.519
	Meningitis	.737	1.477	.152	14.348
	TB	.495	2.227	.223	22.220
	CHF	.079	6.980	.801	60.792
	Renal problems	.264	.514	.160	1.653
	Seizure disorder	.109	.348	.096	1.266
	Other	.	.	.	.

Pain management and medical chart review

There was no record of objective pain assessment in all medical charts of the patients. Among children who were found in pain, analgesia was documented in the order sheet in only 21.3 %(n=47); and it is only in 7.2 % (n=16) that the administration of analgesia was documented in nursing chart. Analgesia provided was predominantly a single medication; most commonly paracetamol and few patients received ibuprofen and diclofenac. Among patients receiving analgesia, administration was found to be in standing dose in 66 %(n=31) and as needed in 34 %(n=16) (Table 4).

Table 5: Pain assessment and management documentation in medical and nursing

patient in pain	**In pain**	**Total**	**Analgesia Documented /order sheet**		**Analgesia administered/ nursing sheet**		**Therapy for procedural pain**			
			N	%	N	%	pharmacologic N	%	Nonpharmacological N	%
FLACC SCALE	148	206	29	19.5	12	8	1	0.34	139	80.3
FACES SCALE (Self report)	73	84	18	24.6	4	5.4	1	0.34	34	19.6
Total	221	290	47	21.3	16	7.2	2	0.7	173	60.3

DISCUSSION

Pain was found to be very common in children admitted to pediatrics emergency with an overall prevalence of 76.2%. This is similar to previous studies carried out by Taylor et al at Canadian tertiary teaching pediatric hospitals (6) who found a prevalence of 77% and Jane et al (78% prevalence) in Kenyan children (36).

Pain was detected more in those children aged >47 months (87%) as compared to children aged <47 months (71.8%).In the multinomial logistic regression, the presence of pain is 5.5 times higher in children of age >47 months (p-value less than 0.001;95%CI= 2.518,12.074).Kyrie et alinthe US Children's Hospital showed that infants, had significantly lower rates of pain detection (26); and Brudvik et al in comparison of pain assessment by physicians, parents and children in an outpatient setting showed that both parents and physicians underestimated pain in young children (43). The majority of children aged <47 months were admitted because of infectious diseases, and pain in infectious disease may fluctuate and thus make pain assessment difficult and time dependent. Acute abdomen and other diagnosis such as bone and soft tissue infection, which are more likely to result in pain, were more common in those children >47months of age, accounting for the pain burden in this age group.

This study found that the majority of patients (97.9%) experienced pain associated with clinical procedure. In terms of the severity of pain, it was found that 70% of the patients had mild to moderate pain and only 6.2% reported severe pain. This result is consistent with the result from the previous Kenyan study (36).

We interviewed the children whenever possible and tried to obtain the information on the presence and severity of pain from the patient even when the primary care giver responded to the majority of the questioner. It is important to obtain child's self-report regarding pain considering that pain is a subjective phenomenon. Among patients aged greater than 47 months self-reported pain intensity scores are highly correlated with the care givers rating. Of those children >47months old,89% reported their pain symptoms primarily to their care giver. The children described their pain precisely in terms of consistency and location with the majority of patients reporting pain in the extremities associated with clinical procedures such as blood sample collection and peripheral IV line insertion. This was also found from the study by Stanford et al. (42) which showed that children above 18 months of age were cognitively competent to communicate pain symptoms using spontaneous verbal descriptors.

In contrast, if the child is less than 47months, we used behavioral scale to assess the presence and severity of pain. These children are dependent on their care givers to detect their

pain symptoms. The primary care givers identified pain symptoms primarily through crying behavior; and 70.1% of the care givers reported their observation to health worker.

In regard to clinical diagnosis associated with higher severity of pain, Malignancy was a common cause resulting in moderate to severe pain followed by surgical problems and other diseases including bone and soft tissue infections. In this study children with SAM were 13.5 times likely to have pain (p - value=0.017; 95%CI=1.601, 114.519), and children with AGE were 5.8 times likely to have pain (p-0.036; 95%CI=1.124, 30.010). Although we couldn't find similar studies, this might be explained by the associated morbidities in children with SAM as well as the behavioral changes related to malnutrition.

It is observed that not all patients are clearly informed about what to expect when painful procedures are performed further asserting health workers give less attention to pain. Almost all (95.5%) of the primary care givers were allowed to stay during a clinical procedure, which is similar to a survey from Italian hospitals which found All emergency departments allowed parents 'presence and most (89.9%) allowed them to stay when painful procedures were carried out (29).

In our study Non pharmacologic therapy for procedure was used in 60.3 % of the cases, with both the caregiver and health worker providing in 60.1% and only caregiver providing in 39.3% of the cases. The commonly used non-pharmacologic therapy were breast feeding, comforting and reassurance. This can considered to be very important since around 97.9% of our patients had at least two painful procedures with in 24hr. This result varied from the finding in the Kenyatta study which showed that non-pharmacological interventions were not used by health care professionals (36).

Other non-pharmacologic therapies such as distraction, massage& positioning were least used. Relaxation, the use of sucrose, allowing the child to suck his/her thumb or hand, and nonnutritive sucking were not identified as part of the interventions used to manage procedural pain in this study.

In our study objective pain assessment was documented in none of the patient charts. This is probably because of a number of reasons including lack of knowledge about pain measurement tools, absence of practice to assess and document pain previously and inadequate time for documentation. In regard to pain management,21.3% of patients who are found to be in pain had documented analgesics in their order sheet. However, only 7.2% of patients had documented pain medications in the Nursing sheet. This is probably a reflection of poor documentation and communication practice between physicians and nursing team. This result was lower in comparison to the Kenyatta study (36) which

found that more than half of the patients (59%) found to be in pain received some intervention in the last 24 hours.

Analgesia provided was predominantly a single medication; most commonly paracetamol and few patients received ibuprofen and diclofenac. This is similar to previous studies carried out by Taylor et al at Canadian tertiary teaching pediatric hospital (9) and Jane at Kenyatta national hospital general pediatric ward (36). Among patients receiving analgesia, administration was found to be in standing dose in 66 %(n=31), which should be appreciated. The choice of analgesics was not in accordance with the WHO's pain management ladder as there were patients with severe pain who are taking paracetamol only. There was no utilization of opioids and combination of classes of analgesics for better efficacy in the setting of severe pain.

LIMITATION OF THE STUDY

Our study did not assess pain status immediately at presentation and incomplete data from chart review was a problem in obtaining information about the assessment and management of pain.

Conclusion

We assessed children between 1 month- 18 years of age for the presence, severity, and management of pain using age appropriate pain assessment tools and self-report from those children above 4 years of age and identified that pain is a common companion of all children underlying condition. It is however almost not assessed, documented and treated. Measures to evaluate, document and treat pain related with the underlying diagnosis as well as procedures should be taken according to the WHO standard of pain management.

ETHICAL CONSIDERATION

The study was approved by the institutional review board (IRB) of SPHMMC. Parents and legal guardians were approached for the study and gave written consent prior to participation in the study and assent was obtained from older children in addition to the parent or guardian.

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CONFLICT OF INTEREST

No conflict of interest to disclose.

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