

# A COMPARATIVE STUDY OF PAIN MEASUREMENT SCALES IN ACUTE BURN PATIENTS

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## INTRODUCTION

A serious Burn Injury is a catastrophic event. It is painful & life threatening.

Great progress has been made in increasing effectiveness of treatment related to the development of better understanding of patho physiologic effect of burns. All health professionals have competence in the treatment of acutely burned patient so that appropriate therapy as well as comfort, reassurance & confidence can be provided promptly.<sup>(1)</sup>

Burn patient suffers from various degree of pain dependent on the period post burn & depth of burns. Usually patient with large area of full thickness burn suffers more than patient with equivalent amount of full thickness burns. Experience of bodily pain contributes to feeling of dread, danger, & apprehensiveness. Pain has long lasting effect on ego development; This also affects functional independence level of the patient. The subjective experience of pain largely related to patient development age, prior experience with parental figures, prior experience with pain & whether or not injury was self inflicted, personal & cultural characteristics of patient<sup>(2)</sup> Expression of pain such as loud yelling & screaming is not necessarily a function of how it is being experienced. They are the way of expressions.

On typical burns unit, there is considerable priority by staff placed on the endurance of pain. The only way to insure that patients receive equally high quality pain relief is to rely on the proven reliable indicator of pain, the patient's, self report whenever the patient can provide it. Thus assessment of pain is important in treatment planning programs & in establishing effectiveness of treatments.

Pain scales are used to monitor pain and to foster communication between patient and their health care providers by using the 0-10 point scale, people have a means to communicate their pain intensity and clinicians have means to track it, just as they would keep track of other vital signs, like temperature, blood pressure, respiration and pulse

Many scales for assessing pain are designed, such as

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- \* Visual analogue scale
- \* Descriptive pain scale
- \* Numerical pain scale
- \* Pain faces scale
- \* Analogue chromatic scale
- \* Palpation
- \* Questioning etc.

These are widely used methods. Some other methods like Mc Gill pain questionnaire & paediatric Pain questionnaire, are used for detailed assessment of pain<sup>(10,11,12,13)</sup>

VAS . Numerical-Pain scale are well known scale for assessment of pain. In various studies it has been shown that Vas is sensitive to change, repeatable & easy to use. Thus can be used for experimental & clinical study.<sup>(11,14,3)</sup>

The Pain Faces Scale & is another popular method, which shown various faces has confirmed its validity & reliability. In various conditions, this can be effective use with Numerical Pain Scale.<sup>(18)</sup>

These pain also effect affect functional activities of the patients. The Brief Pain Inventory (BPI) may be utilized for an overall assessment necessary for patients with acute pain, including general activity, relation with other people and sleep, to determine functional difficulties which may be related to pain.<sup>(5)</sup>

Although there are several studies comparing pain levels in different conditions. **Aim of this study is**

- 1) To find sensitivity correlation in pain measuring scales such as Visual Analogue Scale, Numerical Pain Scale & Pain Faces Scale in acute burn patients.
- 2) To study correlation of pain tolerance & functional interference in acute burn patients

## REVIEW OF LITERATURE

The absence of behavioural and physiologic experience of pain does not necessarily mean the absence of pain. Pain is a subjective experience that cannot be verified by traditional diagnostic methods. This nature of pain & psyche involvement makes exact measurement difficult.; yet pain cannot be effectively treated or relived unless it is measured<sup>(15)</sup> Therefore, the only way to ensure that patients receive equally high quality pain relief is to rely on the proven reliable indicator of pain, the patient's self-report whenever the patient can provide it.

Progress has been slow as pain is complex perceptual experience that can be quantified only indirectly<sup>(10)</sup>.

## Behavioural Observations

In western medicine pain measurement has been useful to determine effective use of analgesic, surgery & other therapies. It also assists in making accurate diagnosis & understanding the meaning of pain for an Individual. Behaviour observation has been used in animal & human experimental studies. Non verbal human pain behaviour has additional dimensions to be assessed such as facial expressions, contortions & moanings, impaired functioning including mobility, ROM, avoidance of occupation & impaired personal relationships etc. <sup>(12)</sup> In 80s, video technology was explored to give more accurate recording of facial expression & body position to be later analysed & coded. <sup>(10)</sup>

Another method for gathering information on meaningful human behaviour is to keep diary of his up time vs. down time including sleep patterns & specific task performance

## Subjective description/personal rating

Verbal Rating Scale (VRS) includes series of words descriptors in ascending order <sup>(6)</sup> The most fundamental simple descriptive pain scale (SDS) was formulated by Keele in 1948 using 4-5 descriptive levels <sup>(15)</sup> The Numeric rating scale improved sensitivity by spacing equal numeric increments <sup>(11)</sup>. Visual Analogue Scale (VAS) was found to be most sensitive which has endless number of choices. It was borrowed from psychology's usage in early 1900's

Hukkison tried combining the VAS & SDS into graphic rating scale showed less failure rate, but found to be time consuming. <sup>(16)</sup>

Advantages of VAS, NMS & PFS are their quickness & ease in administration scoring. <sup>(6)</sup> In Numeric Scale verbal administration is simple when visual contact between patient and clinicians can not be made. It is easily administered orally or in writing It is necessary to choose several scale rather than just one to meet the needs of various client groups <sup>(4)</sup>.

Generally, clinicians can employ the same initial assessment tools to evaluate both acute and chronic pain <sup>(5,9)</sup>. Both type of pain required initial assessment of the following parameters: onset, duration, location, intensity, quality, patterns, relieving and exacerbating factors, impact on daily living and psychosocial variables, and the effect of prior and current therapy on pain. <sup>(17)</sup>

**The Initial Pain Assessment Tool and the Brief Pain Inventory** are two useful questionnaires that provide option for initial assessment of acute or chronic pain. Both of these questionnaires ask a comprehensive set of questions on the nature and effects of pain <sup>(5,9)</sup>.

## METHODOLOGY, SELECTION OF PATIENTS & ASSESSMENTS

50 Burn patients in acute stage i.e. within 2nd week to 6th week of injury were selected from 25-bedded burns care unit under Surgery Department of LTMGH, Sion Mumbai

This analysis included information on burn patients who were

treated and/or evaluated. Patients and/or relative's interview and direct observation documented site of pain, intensity of pain & functional restriction due to pain.

Inclusion criteria for patients were as follows :-

1. Patients with superficial to partial thickness burns, within 2nd to 6 weeks post injury
2. Patients with more than age of 5 years, who can express pain in terms of numbers
3. Patients with no cognitive impairment & no delirium or confusion.

Initial assessment of patient considering age, sex, education, occupation, type of burns, site of burns, depth of burns with details of surgeries if any, week of evaluation was taken...

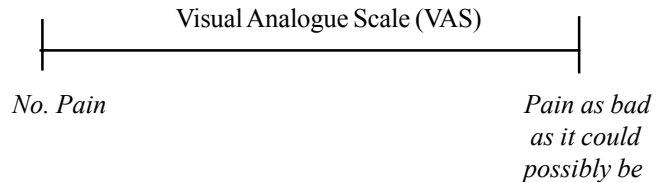
This was followed by initial assessment of pain using initial pain assessment form, which asks a comprehensive set of questions on the nature and effects of pain.

Pain Rating Scales were used for assessing pain level:

### VISUAL ANALOGUE SCALE (VAS)

This is a horizontal (sometimes vertical) 10 (cm) line with word anchors at the extremes, such as "no pain" on one end and "pain as bad as it could be" on the other end.

The patient is asked to make a mark along the line to represent pain intensity <sup>(3)</sup>



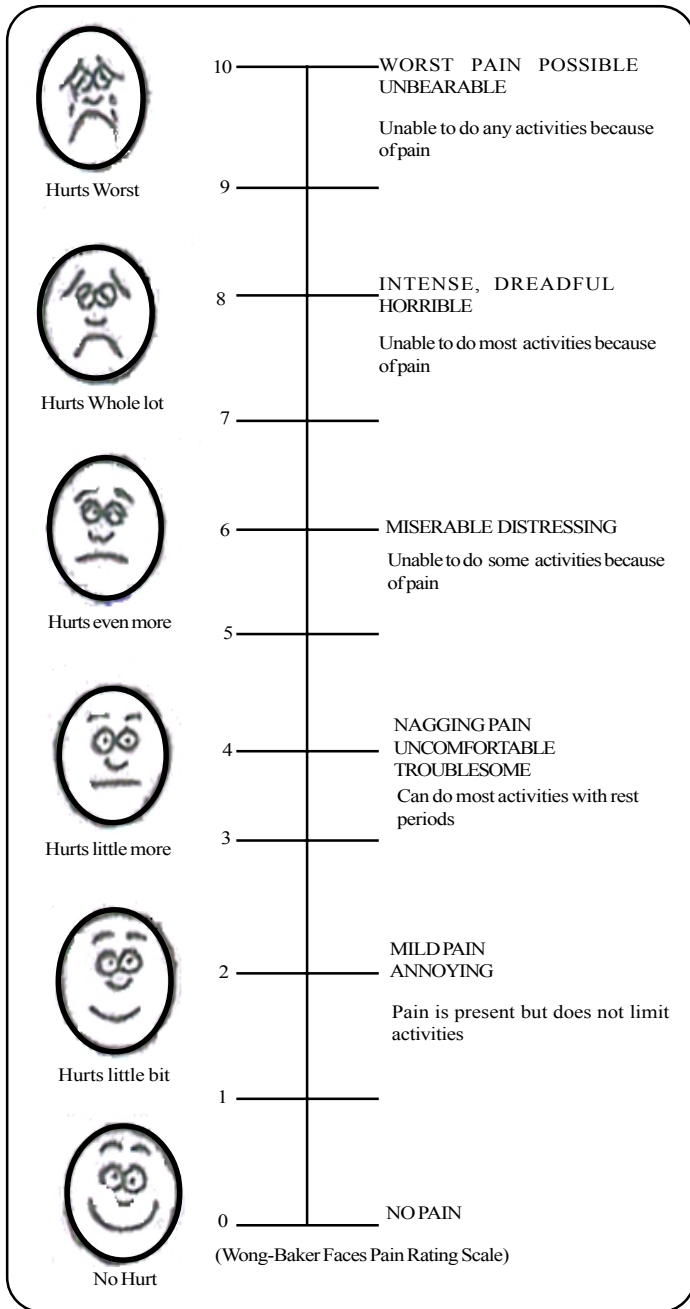
**NUMERICAL PAIN SCALE (NMS)**, that allow client to rate pain intensity on a numbered scale, such as the 0 to 10 Numeric Pain Intensity Scale: there are also related scale that assess pain distress- the degree of subjective suffering caused by the pain. <sup>(3)</sup>

**PAIN FACES SCALE (PFS)**: Several faces rating scales exist and were developed primarily for use with young children. However, faces pain rating scales are also used with adult who have difficulty using the numbers on the visual/verbal analog scale with six facial expressions suggesting various pain intensities. Each face is accompanied by a descriptor, such as "No Hurt" for the first facial expression (0)

The Wong-Baker Faces Pain Rating Scale and Numerical Rating Scale can be combined for easy access to two pain rating scales. Translations of both scales are available in a wide variety of language, as shown in **Fig. 1** <sup>(19)</sup>

**BRIEF PAIN INVENTORY (BPI)** was modified considering patient's present level of activity & Indian culture.

**FIGURE-I**  
**PAIN ASSESSMENT SCALE**



The question in the BPI focus on pain for the last 24 hours.

Question 3 through 6 ask the patient to use a pain rating scale of 0 to 10 to rate pain at its worst and least (tolerable to patient) in the past 24 hours and its intensity on average and right now.

Question 7 has five parts that attempt to identify how much pain has interfered with the patient's life, including general activity; relations with other people and sleep<sup>(17)</sup>

Order in which the VAS, NPS & PFS scale were presented to the patients for completion was determined randomly for each person.

Patient and family members were taught to use pain scales. Then they were asked to mark VAS at a point of pain, use NPS & mark on PFS.

After they completed scale marking, on VAS scale a number is obtained by measuring in millimeters up to the point the patient has indicated. Number of NPS & PFS was recorded on the data sheet. Patient was also asked to report their preferred pain scale

Then patient was presented with modified Brief Pain Inventory & asked to mark on scale marked from 0-10, for each of the items, to determine functional ability of the patient. This information was entered in data sheet.

The differences between minimum tolerated pain & present pain were found out to get pain levels causing agitation.

**RESULTS**

Table 1 shows total number of patients, their mean age, and mean week of evaluation & mean educational level

**TABLE : 1**

**AVERAGE VALUE OF AGE<WEEK OF EVALUATION & EDUCATION**

<b>Total No. Of Patients</b>	50
<b>Mean Age</b>	26.6
<b>Mean week of evaluation</b>	2.26
<b>Mean Educational Level In Std</b>	6.02

Out of these 50 patients 48 were females & 2 were males. All were Thermal Burns except Three

**TABLE : 2**

**AVERAGE LEVELS OF ALL SCALES**

VAS	NMS	PFS	Minimum Tolerable pain on NMS	Present Pain on NMS	Pain Level Causing Agitation	Interference in Activities				
						General Activity	Mood	Walking ability	Relation with people	Sleep
6.05	6.20	6.5	2.24	6.28	4.04	5.64	3.58	5.8	3.2	6.5

It shows that interference in mood levels & relation with people is comparatively low.

Correlation among Three pain Scales viz. Visual Analogue Scale (VAS), Numerical Pain Scale (NMS) & Pain Faces Scale (PFS) was analyzed using Pearson Correlation (One Tailed & Two tailed) All pain scales correlated positively with higher significance as shown in **Table 3**

## CONCLUSION

VAS, NMS & PFS showed significantly positive correlation. Previous studies have shown reliability, validity & clinical sensitivity of VAS & NMS as a measure of the intensity of subjective pain VAS

**TABLE : 3**  
**CORRELATION AMONG THE PAIN SCALES**

Pain Scales	One Tailed Correlation	Two Tailed (Sig)
VAS/NMS	0.892**	0.00
VAS/PFS	0.820**	0.00
NMS/PFS	0.784**	0.00

Key: \*\*  $p < 0.01$  correlation is significant

When asked which pain scale subject was found comfortable 64% stated that it was NMS with PFS.

Further we analyzed relation between Pain levels Causing Agitation (PCA) with interference in the Activities & Patients Communication, using Pearson Correlation, as shown in **Table 4**.

has been used for assessment of pain in children & adults in various studies<sup>(18)</sup>. A numeric scale is especially easy to use and its results are simple to record. Vertical NRS is more sensitive and easier for patients to use. The Vertical Visual NRS with PFS has been used for patient populations especially for patients who have difficulty with the horizontal scale. PFS has also been used for patients with various diagnoses & it has been recommended for use in children

**TABLE : 4**  
**CORRELATION BETWEEN PAIN & ACTIVITIES, COMMUNICATION**

	PCA/General Activities	PCA/Mood	PCA/Walking Ability	PCA/Relation with other people	PCA/Sleep
Single Tailed Correlation	0.578**	0.317*	0.597**	0.361*	0.349*
2 Tailed (Sig)	0.00	0.025	0.00	0.010	0.013

\*\*Correlation is significant at 0.01 level (2 tailed)

Interference in activities correlated positively with pain levels. Interference in General Activities such as Self care & Walking shows higher significance where as Mood, Sleep & Relationship with people shows emerging significance.

The educational level of patients was compared with reported pain levels, Minimum Tolerable Pain & Pain Levels causing Agitation (PCA), as shown in **Table 5**

& patients with language difficulties. The BPI has acceptable validity and reliability and takes about 15 minutes to administer on BPI interference in activities & pain levels also showed significant positive correlation, specifically in Self care & Mobility. Emerging Significance in interference in mood and relationship with other people can be explained on the fact that Social Learning & Communication Skills further influence reporting pain perception Sample size of children was small, which showed less difficulty in functional activities.

**TABLE : 5**  
**CORRELATION EDUCATION WITH PAIN LEVELS**

	Education/Minimum Tolerable Pain Level	Education/Present Pain Level	Education/PCA
One Tailed correlation	0.154	-0.215	-0.310*
2 Tailed correlation	0.284	0.134	0.028

\* Correlation is significant at the 0.05 levels.

Thus pain level causing agitation shows significantly negative correlation with education. Thus more the education lesser the reported agitation.

This may be explained in several ways. Children perceive pain differently. They have difficulty in localizing pain.

Education background showed difference in reported pain levels, which may explain that perception of pain is influenced by

development of cognitive skills & psychological mechanism such as denial, shame etc.

## CONCLUSION

Fifty cases with Acute Burns were evaluated on various Pain Scales & Activity Scales. All three-pain scales can be used for Burn patients considering their reliability. Patients preferred & reported to be comfortable with combination of NMS & PFS scale, especially illiterates. Consistency increases Effectiveness, the chosen pain scale should be used consistently with the patient. Thus different pain scales may be used for different group of patients. The preferred scale should be used consistently to get more valid results. Interpretation of pain levels differs with age & education.

However it can be commented that with this small sample size it is difficult to standardize pain-functional evaluation scale in acute burn patients. Hence furthering depth study is required for implementation of these scales together. Using more comprehensive pain & functional assessment methods will increase our understanding about significance of pain in this condition in terms of functional limitations.

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