Research Article

COMPARISON OF P4, NUMERICAL PAIN RATING SCALE AND PRESSURE PAIN THRESHOLD IN PATIENTS HAVING CHRONIC LOW BACK PAIN- AN OBSERVATIONAL STUDY

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ABSTRACT

Background: Pain is a multidimensional experience, with low back pain (LBP) being the most common. Numerous pain measures exist to assess pain intensity, though the systemic quantification is a rare clinical practice. P4, numerical pain rating scale (NPRS) and pressure pain threshold (PPT) measure pain intensity, which is necessary for its effective management. Objective of the study was to assess and compare pain measured by P4, numerical pain rating scale and pressure pain threshold in LBP patients. **Methodology**: A prospective observational study was conducted at SBB College of physiotherapy, VS Hospital, Ahmadabad. A convenience sample of (*N*=50) patients, according to inclusion and exclusion criteria were recruited. P4: pain intensity measured at four times over the past 2 days and NPRS: pain intensity over last 24 hours was graded subjectively by the patient & PPT was measured over tender point. Level of significance was kept at 5%. **Results**: Pearson correlation coefficient was used to correlate P4 and PPT, NPRS and PPT. Moderate negative correlation was present between P4 and pressure pain threshold ($r = -0.623$, $p=0.001$) and mild negative correlation was present between numerical pain rating scale and pressure pain threshold ($r=-0.372$, $p<0.05$) which was found to be statistically significant. **Conclusion**: P4 had a moderate inverse correlation with pressure pain threshold & numerical pain rating scale had mild inverse correlation with pressure pain threshold which was found to be statistically significant.

Keywords: Pain measurement, Low back pain, Numerical pain rating scale, P4, Pressure pain threshold.

INTRODUCTION

Pain is a multidimensional experience and that is a prominent feature of many musculoskeletal disorders.[1] It is a major cause of morbidity, with low back pain (LBP) being one of the most common locations of symptoms.[1]The lower back is commonly defined as the area between the bottom of the rib cage and the buttock creases. Some people with non-specific low back pain may also feel pain in their upper legs, but the low back pain usually predominates.[2]Pain has a considerable impact on both the individual suffering and society at large.[3]

Pain can be measured by-verbal, numeric self-rating scale, behavioural observation scale and objective measures.[4] A study done by Maria et al[5] in 2011had tried to find validity of four different pain scales using hand immersed in the cold-pressor apparatus which showed that small variations in water temperature result in significant differences in pain intensity ratings, with numerical rating scale being

the most responsive, followed by visual analogue scale, verbal rating scale and faces pain scale-revised.[5]

Goals for the pain assessment are to measure the individual's pain experience in a standardized way, determine type of pain and possible etiology, state it's effect and impact, form a basis to develop treatment plan to manage pain, and to aid communication between interdisciplinary team members.[6]Pain is not synonymous with function or quality of life, and other tools covering these important outcome dimensions should complement the assessment of pain, especially in patients with chronic symptoms.[1]

Numerical Pain Rating Scale (NPRS) is an ordinal and subjective scale which can be used for older or less literate, or for the one having sustained trauma. NPRS is quicker to score and therefore used in greater range of patients[7].Although having several advantages; capacity to detect the change is less. (i.e. self-report function).

The pain threshold or tenderness resistance is the point at which a stimulus is perceived as pain which can be measured by pressure algometers. When a particular site of the body is pressed with a rubber disk having an area of 1 cm[2], the device displays the pressure.[8] Pressure pain threshold (PPT) is an objective and gold standard method, measured by pressure algometer giving accurate value, but its use is limited, as it is expensive.[9]

A new measure P4, which measures pain intensity at four-different times over the past 2 days in less than 1 minute by patient and scored by clinicians in 5 second by clinicians, was introduced by Spandoni GF et al(2004).[10]

So, there is a need to know which instrument does the accurate assessment of pain, which is a prerequisite for its effective management, as the systematic quantification is a rare clinical practice. The aim of this study was to measure and compare pain by P4, numerical pain rating scale and pressure pain threshold in patients having low back pain.

METHODOLOGY

The study was a prospective observational study, done at SBB College of physiotherapy, Orthopedic OPD, VS hospital, Ahmadabad.200 patients of age 18 years or above were screened using convenience sampling, from which 5o patients with low back pain-radiating and non-radiating, with ability to lie prone or side-lying, presence of tender point, not attending specific centres for patients with chronic pain were included in the study.

The study was reviewed & approved by Institutional Ethics Committee, SBB College of Physiotherapy, V S General Hospital, Ahmadabad, Gujarat. Ethical letter no.:PTC/IEC/21/2013-14.

Subjects having average PPT< 4kg/cm^{2} which indicates fibromyalgia syndrome tendency, undergoing psychological treatment, having pregnancy, suspected tumour, and cauda-equina syndrome, known dependency of drugs, alcohol or smoking were excluded. Written informed consent was taken from all the participants.

After taking demographic data, patients were asked to score P4 which inquires about the pain in the morning, afternoon, evening, and during activity throughout the day for the past 2 days on a scale which consisted of 11 points. The anchors were 'no pain' and 'pain as bad as it can be'. Study was conducted from July 2013 till September 2013.

Item scores were summed to yield a total score from 0 to 40.[10,11] Second measure NPRS inquired about the pain as follows: ''Over the past 24-hours, how bad has your pain been?''. NPRS had 11 points and the anchors were 'no pain' (0) and 'pain as bad as it can be' (10) giving a score from 0 to 10. [11]

Third measure used was the pressure pain threshold by pressure algometer. Patient was taken in prone or side lying position on the examination table with both forearms over the sides.[12]Rate of pressure was kept at constant rate of 1 kg/cm^{2}. [12] When pressure was applied; person being tested was required to say 'yes' at the moment of change from 'pressure' to 'pain' was experienced. [12] It was measured thrice after every 10 seconds, over the tender point and average of the 3 readings was taken into consideration. PPT was measured in kg/cm[2.]

RESULTS

Statistical analysis was done using SPSS version 16.0.There were 11 males (22%) and 39 females (78%) in the age group of 18-79 years (mean: 39.98±6.234). Correlation was done using Pearson's correlation coefficient between P4 and pressure pain threshold and between numerical pain rating scale and pressure pain threshold. Pearson's correlation was used as the data was found to be parametric by normal frequency distribution.

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Moderate negative correlation was present between P4 and pressure pain threshold (r = -0.623, p<0.001) and mild negative correlation was present between numerical pain rating scale and pressure pain threshold (r=-.372, p<0.05)which was statistically significant.
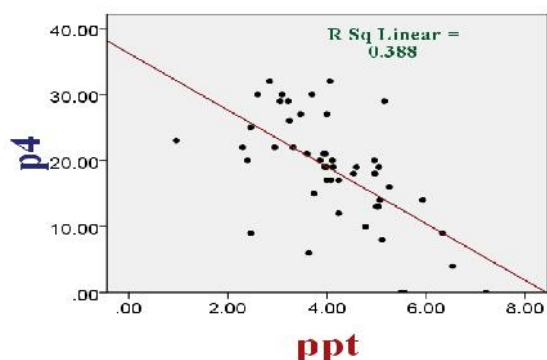
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Fig 1: Correlation of P4 with pressure pain threshold
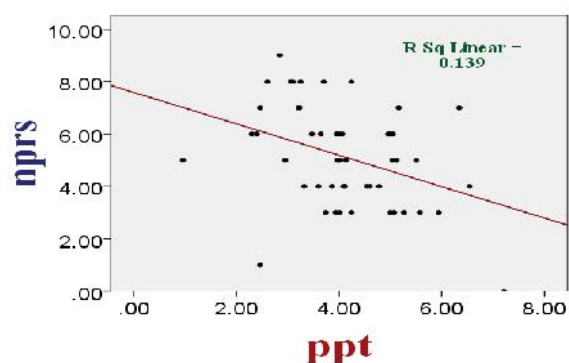
Fig 2: Correlation of numerical pain rating scale with PPT.

DISCUSSION

The current study was conducted to measure the intensity of pain and find an accurate pain intensity measurement tool. P4 was a new subjective measure which measures the pain at four different durations which gives the precise pain measurement in comparison to numerical pain rating scale showed high reliability.[8] PPT measured by pressure algometer was an objective measurement of pain, but it would be costly and time consuming as compared to P4 which can be computed in less than 5 seconds.

As found by Spandoni[10] et al the P4's MDC_{90}, a measure of clinical significance, was substantially less than those associated with the single-item NPRS. MDC_{90} was applied to quantify true change. The subscript ''90'' was used to signify a 90% confidence level. They also found that the smaller measurement error associated with the P4 also resulted in increased efficiency when considering sample size for a clinical trial.

Giburm Park[8] et al showed that the digital pressure algometer showed high reliability. Jensen[13] et al(1999), using a similar scale composition to the P4, examined test-retest reliability and sensitivity to change in patients with chronic pain and found that it was greater for the composite measures, but the observed differences using the scale were not statistically significant.[13]

Krebs EE[14] et al (2009), developed a 3-item PEG [average pain intensity (P), interference with enjoyment of life (E), and interference with general activity (G)] ultra-brief pain measure to assess chronic pain which showed good reliability and construct validity in comparison to brief pain inventory (BPI). It was sensitive to change and differentiated between patients with and without pain improvement at 6 months, and therefore was a practical and useful tool to improve assessment and monitoring of chronic pain in primary care.This tool is comparable to the P4 tool used in the above study.

Downie WW[15] et al (1978), did a study to find the degree of correlation between the pain score registered on four different pain rating scales which showed that 11-point (0-10) numerical rating scale performs better than both a 4-point simple descriptive scale or a continuous (visual analogue) scale.

The present study is in accordance with findings of Goldsmith[16] et al (1993), who have shown that the magnitude of an important change is greater for an individual in the construct validation process, depending on which this study found the correlation in context with the individual. On this basis it was seen that the pain measured by the standard gold method i.e. pressure pain threshold and by numerical pain rating scale and P4 had a mild and moderate correlation respectively which was statistically significant at (p<0.05 and p<0.001).

The limitation of this study was that the comparison between P4 and numerical pain rating scale was not done. Test-retest reliability studies using P4 can be done for the specific conditions using the large sample. P4 can be used as a measure of pain in future studies.

CONCLUSION

P4 has a moderate inverse correlation with pressure pain threshold and numerical pain rating scale has mild inverse correlation with pressure pain threshold which concludes that P4 is a better subjective pain measurement tool and has the capacity to measure individual change in comparison with numerical pain rating scale and pressure pain threshold, which is an expensive tool, in spite of an objective measurement.The current work represents only one step in determining the extent to which the P4 is a valid and useful measure for the myriad of conditions and clinical settings in which the assessment of pain intensity is an outcome of interest. P4 had a high correlation with the gold standard method which implies that it can be used for pain assessment for the clinical purpose.

Conflict of interest: Nil.

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