ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 5.2
IJAR 2020; 6(1): 39-41
www.allresearchjournal.com
Received: 26-11-2019
Accepted: 29-12-2019

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Determining the reliability and validity of peripheralization rating scale in cervical radiculopathy subjects

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Abstract
Aim and objective: The aim of the present study was to assess the reliability and validity of peripheralization rating scale.
Methodology: Sample of convenience of fifty cervical radiculopathy subjects of age 30-50 were taken from Himalayan hospital SRHU. After taking information consent, the reliability and validity of PRS was tested.
Result: PRS was found to be significantly reliable and valid.
Discussion: The result obtained revealed significant Reliability and validity of PRS to quantify the pain peripheralization in cervical radiculopathy subjects. PRS can be used as a prognostic tool in pre and post therapeutic assessment and used to determining the better prognosis and result of treatment.
Conclusion: PRS was established to quantify the pain peripheralization in cervical radiculopathy subjects.

Keywords: Cervical radiculopathy, peripheralization rating scale, reliability, validity

Introduction
Cervical Radiculopathy is a neurologic condition characterized by dysfunction of a cervical spinal nerve, the roots of the nerve, or both.
The reported annual incidence rate of cervical radiculopathy is 107.3 per 100,000 for men and 63.5 per 100,000 for women, with a peak at 50 to 54 years of age [1].
The most frequently involved nerve roots are the cervical 6 (C6) and cervical 7 (C7) cervical roots which are typically caused by C5-C6 or C6-C7 disc herniation or Spondylosis [3].
Along with the cervical radiculopathy cervical pain is becoming a large medical problem [2].
Overall, the prevalence is reported to be somewhat higher for women than for men and is highest around the age of 50 [3].
However the primary symptoms of cervical radiculopathy reported in this population are often upper extremity pain, numbness, and weakness, which often result in significant functional limitations and disability.
Despite the dermatomal mapping of the upper limb, considerable overlap often exists in the sensory innervations and symptom patterns of patients with CR affecting the same spinal nerve root. Sensory symptoms may not exist in the entire dermatome and sometimes do not follow a classical dermatomal distribution at all [4].
The fact that symptoms do not follow a particular dermatomal distribution and does not exclude the existence of a symptomatic nerve root [5].
Impingement may be brought about by acute pathologic changes or by degenerative changes consistent with cervical spondylosis. Retropulsed disk material, zygapophyseal joint hypertrophy, neurocentral joint hypertrophy, and other soft tissue abnormalities all may cause compression of an existing nerve root.
Other causes, including tumors of the spine and spinal infections, are infrequent. The mechanisms underlying radicular pain are poorly understood. Nerve root compression by itself does not always lead to pain unless the dorsal-root ganglion is also compressed. Hypoxia of the nerve root and dorsal ganglion can aggravate the effects of compression 10 [6].

Cervical disc herniation and Cervical spondylosis are considered as the most common causes of cervical radiculopathy (in 70 to 75 percent of cases) [1].

Prognostic factors refer to intrinsic characteristics of an individual such as age, gender, and BMI. Risk factors relate to external variables contributing to the development of the disease (lifestyle, work style, smoking, and co-morbidities) [7].

When treating patients with radiculopathy, the primary goal is to centralize the pain toward the spine, i.e., to have the pain move more proximal from distal in the extremity, and to eventually obtain complete relief of symptoms. This process is called the centralization phenomenon and was first described by McKenzie [4].

Peripheralization is the phenomenon by which proximal symptoms originating from the spine are progressively produced in a proximal to distal direction. This is in response to a specific repeated movement and/or sustained position and this change in location of symptoms is maintained over time. This may also be associated with a worsening of neurological status [8].

In the clinical practice there are various tools used for evaluating neck pain and neck disability in cervical radiculopathy. But there is no scale which measures the peripheralization in cervical radiculopathy or which can grade the peripheralization according to patient's symptoms, so we have documented a "peripheralization rating scale" to determine the better prognosis and rehabilitation programme.

Procedure

50 Subjects were selected on the basis of inclusion and exclusion criteria in which 13 subjects were males and 37 subjects were females, 17 subjects practiced driving and 33 were non drive. Grading of peripheralization rating scale was done by the main researcher at the time of patient entered in the physiotherapy department.

Other researcher had complete knowledge about the peripheralization rating scale.

One minute later, patients were asked to rate the peripheralization again by the second researcher without reference to the first measurement. A minute was chosen as the time interval between different ratings under the assumption that most peripheralization would not change within a 1-minute period.

Informed consent and ethical approval was taken by the patient. Patient's general assessment, assessment of VAS, assessment of NDI and Grading of peripheralization rating scale was repeated again after 1 minute by the main researcher to assess the better reliability before the treatment started.

Grades of peripheralization assessed by both the researcher were unknown to each other.

Reliability was assessed by the use of correlation coefficient and blend altman plot with the help of mean and standard deviation and validity was assessed by the use of Delphi technique.

Subjects were instructed, educated and treated about cervical radiculopathy rehabilitation programme by any physiotherapist.

Data analysis: Statistics were performed by using MS Excel as required.

Reliability was assessed by the use of correlation coefficient and blend altman plot with the help of mean and standard deviation and validity was assessed by the use of Delphi technique.

Result

Equal grades of peripheralization and the value of correlation coefficient in cervical radiculopathy subjects indicates perfect reliability of PRS.

Value of correlation coefficient r=1 with the p value = 0.001

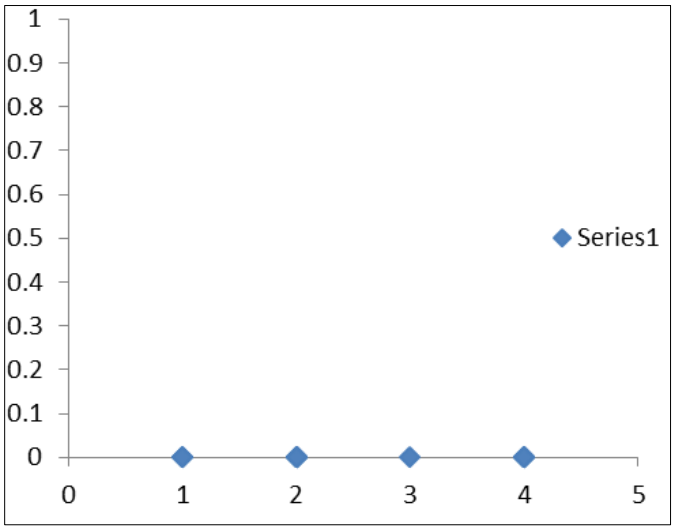

Fig 1: Reliability of peripheralization rating scale between two raters in cervical radiculopathy subjects

Discussion

The goal of this study was to develop a scale to quantify the pain peripheralization in subjects with cervical radiculopathy and to establish its reliability and validity.

The PRS scale was found to be statistically reliable based on the Bland-Altman plot examination. The validity was proved by the Delphi technique, so the PRS was regarded as a valid and reliable tool for measurement of peripheralization in cervical radiculopathy subjects.

Pain is often associated with the peripheralization in cervical radiculopathy subjects. There are many scales being used to document the pain and disability in cervical radiculopathy but till date there is not a single scale that could objectively assessed pain peripheralization.

Meckenzie in 1990 has emphasized the importance of assessing, diagnosing and treating the patient based on peripheralization of pain, so the peripheralization will give the clinician and physiotherapist an assessment tool that can reliably document the peripheralization.

Pre and post therapeutic assessment of pain peripheralization in cervical radiculopathy subjects can be done on the basis of PRS. It can also be used for determining the better prognosis and result of treatment.

Physical Therapist can also modify the rehabilitation program after assessing the grade of peripheralization.

Statistically there was no significant correlation found when PRS was compared with the NDI and VAS.

In most of the cases patient came for physical rehabilitation with the chief complaints of pain and disability while doing household activities or while doing work, not because of Peripheralization of symptoms. Patient can neglect the peripheralization of symptoms and peripheralization indicates compression of nerve fibers, if not treated well it can worsen the patient's condition. So physical therapist

should plan the rehabilitation protocol to overcome the Peripheralization.

Clinical relevance

PRS can be used as a pre and post therapeutic assessment tool to quantify the pain peripheralization in cervical radiculopathy subjects. PRS is easy to assess and it is a better prognostic tool as compared to VAS.

PRS is used to evaluate the degree and extent of root compression by assessing peripheralization of pain and can also be used for determining the better prognosis and result of treatment.

Limitations

Small sample size was the main limitation of this study.

PRS was only valid for lower cervical radiculopathy i.e. c6, c7 and c8.

Future study

Study can be done on large sample size with longer duration and follow-up study can be done.

We can modify the peripheralization rating scale by subdividing the grades between the cervical spine and scapulae, between the cervical spine and shoulder joint line, between the shoulder girdle and elbow, between elbow and wrist and between the wrist and fingers.

Peripheralization rating scale can also be used for Lumbar spine radiculopathy and for bilateral cervical or lumbar Radiculopathy.

Conclusion

The study concluded significant reliability and validity of Peripheralization Rating Scale for the assessment of pain peripheralization in cervical radiculopathy subjects.

PRS is easy to assess and it is a better prognostic tool as compared to VAS. The PRS can be used as prognostic tool in pre and post therapeutic assessment in CR subjects and also used to evaluate the degree and extent of root compression by assessing peripheralization of pain. It can help to establish the better rehabilitation programme for CR subjects.

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