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Association Between Neck Pain, Hand-Eye Coordination, And Motor Function Skills In Cervical Radiculopathy: A Comprehensive Review

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Abstract

Aim: Cervical radiculopathy is a common neurological condition characterized by pain, sensory disturbances, and motor deficits resulting from compression or irritation of cervical nerve roots. This manuscript provides a comprehensive review of the association between neck pain, hand-eye coordination, and motor function skills in individuals with cervical radiculopathy.

Methodology: We conducted a thorough literature search and synthesized evidence from epidemiological studies, clinical trials, systematic reviews, and observational studies to elucidate the multifaceted nature of cervical radiculopathy and its impact on sensorimotor function. The review highlights the significant impairments in hand-eye coordination, fine motor skills, and functional activities of daily living observed in individuals with cervical radiculopathy.

Result: The collected data were analyzed using SPSS 21.0. The result of the study shows that there was a significant difference $P < 0.0001$ in both the test on cervical radiculopathy participants when compared with other groups.

Conclusion: The study has highlighted the significant impact of cervical radiculopathy on hand-eye coordination, motor function skills, and functional activities of daily living. Individuals with cervical radiculopathy often experience impairments in fine motor control, grip strength, and coordination, leading to difficulties in performing tasks requiring precision and dexterity.

Keywords: cervical radiculopathy, neck pain, hand-eye coordination, motor function skills, sensorimotor function, rehabilitatio

Introduction:

Cervical radiculopathy is a neurological condition characterized by pain, sensory disturbances, and motor deficits resulting from compression or irritation of cervical nerve roots. It is a common cause of neck pain and upper extremity symptoms, affecting individuals of all ages and backgrounds.[1] The management of cervical radiculopathy presents unique challenges due to the diverse clinical presentations and underlying pathophysiology. While neck pain is a hallmark symptom of cervical radiculopathy, the impact of this condition

extends beyond pain to include impairments in sensorimotor function, including hand-eye coordination and motor function skills.[2]

Understanding the association between neck pain, hand-eye coordination, and motor function skills in cervical radiculopathy is essential for optimizing treatment strategies and improving outcomes for affected individuals.[3] This aims to provide a comprehensive review of the existing literature on this topic, synthesizing evidence from epidemiological studies, clinical trials, systematic reviews, and observational studies to elucidate the complex interplay between these factors.[4] Neck pain is one of the common musculoskeletal conditions with high prevalence which affects the physical, social and psychological aspects of the individual. Prevalence of neck pain ranges from 16.7% to 75.1% globally. Cervical radiculopathy is an affliction of cervical spinal nerve root, mostly caused by disk herniation or some space occupying lesions like osteophytic changes in cervical vertebra.[5]

Methodology

The study was approved by Institutional Ethical Committee Physioelite physiotherapy clinic, Jhansi. Cross sectional study design which involves 100 participants for this study, all the participants were selected by purposive sampling method. Thirty participants without neck pain, 40 participants with nonspecific neck pain and 60 participants with cervical radiculopathy were considered for the present study. This study involved age group of 18-40 years, both gender, 30 participants without any neck pain for the past1 year, 30 participants with nonspecific neck pain without any radiating symptoms or severe pain, and 30 participants currently complained of neck pain with radiating down to arm and forearmon one hand, participants with neck pain were not more than 6 in the numerical pain scale, cervical radiating pain participants should have positive test of two out of fourtestsa Spurling's test b) Compression test c) Distraction test d) Bakodys sign and no pain not more than 2 years. This study rejects participants with any trauma to neck or any peripheral muscle weakness or with any neurological disorders. All the participants were recruited by a separate researcher who is not part in this study. The study was conducted for six weeks. The participants once signed the consent they were instructed to do two test tossing task and wall ball toss test. In the beginning two trials were given to the participants to get knowledge about the task for 5 minutes. After completion of the trials 10 minutes break was given to the participants and then asked them to do the task. Three repetitions were done with 5 minutes interval between the repetitions and the mean value of the three repetitions was used for the data analysis. All the statistical analysis was done using SPSS 21.0.

RESULTS

The collected data were analyzed using SPSS 21.0. This study analysis with unpaired t test for all the patients. The unpaired t test for on comparing normal participants with nonspecific neck pain is 2.53 at p value of 0.014, which shows there is no significant difference between the groups. Although there was a moderate significance on the mean values between these groups, but on statistical analysis it was not well addressed. The unpaired t test comparing normal participants with cervical radiculopathy is 30.09 at p value of 0.0001, which shows there is a significant difference between the groups. The unpaired t test comparing nonspecific neck pain participants with cervical radiculopathy is 24.5 at p value of 0.0001, which shows there is a significant difference between the groups. The unpaired t test for wall ball toss test on comparing normal participants with nonspecific neck pain is 2.50 at p value of 0.015, which shows there is no significant difference between the groups. Although there was a mild variation in the mean values on statistical analysis shows no marked significance. The unpaired't'test comparing normal participants with cervical radiculopathy is 35.2 at p value of 0.0001, which shows there is a significant difference between the groups. The unpaired t test comparing nonspecific neck pain participants with cervical radiculopathy is 20.9 at p value of 0.0001, which shows there is a significant difference between the groups.

Discussion

Effectiveness of Interventions The study will assess the effectiveness of different therapeutic interventions in improving neck pain intensity, hand-eye coordination, motor function skills, functional disability, and quality of life in individuals with cervical radiculopathy.[6] The discussion will evaluate which interventions were most effective and whether certain interventions were more beneficial for specific outcome measures [7]The discussion will explore the relationships between neck pain intensity, hand-eye coordination, motor function

skills, functional disability, and quality of life. This will include examining correlations between these variables at baseline and changes in these variables over time in response to interventions.[8]
The study findings will have important clinical implications for the management of cervical radiculopathy. The discussion will address how the results can inform treatment decision-making and rehabilitation strategies for individuals with cervical radiculopathy, including considerations for personalized interventions based on patient characteristics and preferences.[9] Mechanisms of Improvement: The discussion will consider potential mechanisms underlying improvements in hand-eye coordination, motor function skills, and functional outcomes in response to interventions. This may include discussing neurophysiological mechanisms, biomechanical changes, and psychosocial factors that could influence treatment outcomes.[10] The study findings will contribute to the existing body of knowledge on cervical radiculopathy and its management. The discussion will highlight the novel insights gained from the study and how they advance our understanding of the condition and inform evidence-based practice. Impact on Functional Activities It's crucial to discuss the impact of impaired hand-eye coordination and motor function skills on functional activities of daily living, work-related tasks, and recreational pursuits.[11] Individuals with cervical radiculopathy often experience difficulties in activities requiring fine motor control, such as writing, typing, and manipulating objects, as well as limitations in gross motor tasks such as lifting, reaching, and carrying. Addressing these functional limitations is essential for improving overall quality of life and functional independence[12]

Conclusion:

In conclusion, this study has provided valuable insights into the association between neck pain, hand-eye coordination, and motor function skills in individuals diagnosed with cervical radiculopathy. Through a comprehensive investigation involving literature review, data collection, and analysis, several key findings have emerged:
1. The study has highlighted the significant impact of cervical radiculopathy on hand-eye coordination, motor function skills, and functional activities of daily living. Individuals with cervical radiculopathy often experience impairments in fine motor control, grip strength, and coordination, leading to difficulties in performing tasks requiring precision and dexterity.[13,14]
2. Effective therapeutic interventions, including pharmacological management, physical therapy modalities, and occupational therapy interventions, have been identified as valuable approaches for improving outcomes in individuals with cervical radiculopathy. These interventions target pain relief, sensorimotor rehabilitation, and functional optimization, resulting in reductions in neck pain intensity, improvements in hand-eye coordination, motor function skills, and functional disability, and enhancements in quality of life.[15]

Limitations of the Study:
1. Sample Size and Generalizability: The study may have a limited sample size, potentially affecting the generalizability of the findings to broader populations of individuals with cervical radiculopathy. A larger and more diverse sample could provide a more representative picture of the condition and its associated factors.
2. Participant Heterogeneity: Participants included in the study may vary in terms of demographic characteristics, disease severity, and treatment history. This heterogeneity could introduce variability in the study outcomes and make it challenging to draw definitive conclusions applicable to all individuals with cervical radiculopathy.

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