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Original Research

Comparison of McKenzie and Cailliet Exercises on Neck Function in Myofascial Pain Syndrome

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ABSTRACT

Background: *Myofascial Pain Syndrome (MPS) in the upper trapezius muscle causes pain and limited neck function, which can interfere with work activities. Physiotherapy efforts used to reduce pain and improve neck function include McKenzie Neck Exercise and Neck Cailliet Exercise. The purpose of this study was to determine the difference in the effects of McKenzie Neck Exercise and Neck Cailliet Exercise on neck functional ability in workers with MPS of the upper trapezius muscle.*

Methods: *This study used a quasi-experimental design with a two-group pre- and post-test design. The sample sample was conducted using simple random sampling of 30 employees of PT Iskandar Indah Printing Textile who met the inclusion criteria. The subjects were divided into two groups, namely group I, which received McKenzie Neck Exercise (n=15), and group II, which received Neck Cailliet Exercise (n=15). The intervention was held twice a week for three weeks. The research instrument used the Neck Disability Index (NDI) to measure neck functional ability. Data analysis was performed using the Wilcoxon test, paired t-test, and independent t-test.*

Results: *The test results showed a significant improvement in neck functional ability in both groups (group I p=0.001; group II p=0.000). The between-group difference test showed a p-value of 0.004 (p<0.05), which means there was a significant difference between the two exercises.*

Conclusion: *Both exercises were effective in improving neck function, but the McKenzie Neck Exercise was more effective than the Neck Cailliet Exercise. The McKenzie Neck Exercise can be recommended as a more optimal physiotherapy intervention to improve neck function in workers with upper trapezius muscle Myofascial Pain Syndrome.*

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INTRODUCTION

Neck pain is a musculoskeletal disorder that can affect various groups of people, especially workers who have poor ergonomic work postures. Poor posture and excessive muscle use, especially in the upper trapezius muscle, can cause muscle spasms and tension, leading to neck pain (Djawas, 2021). This study aims to examine the difference in effectiveness between McKenzie neck exercises and neck cailliet exercises in

improving neck functional ability due to myofascial pain syndrome in the upper trapezius muscle, thus offering novelty in the intervention method and detailed functional outcome measurements.

Factory workers who maintain the same working posture for long periods of time experience an increased risk of musculoskeletal disorders, including myofascial pain syndrome. Long exposure to static working positions causes a decrease in physical ability and the emergence of pain complaints and disability (Wijayati, 2020). This study aims to investigate the impact of therapeutic exercises that can reduce pain and improve muscle function in workers who are prone to myofascial pain syndrome, with a focus on relevant and applicable physiotherapy interventions.

Myofascial pain syndrome is a collection of symptoms that include local and radiating pain, as well as decreased range of motion and muscle weakness resulting from prolonged muscle contraction and repeated minor trauma. This condition is very common in the upper trapezius muscle, especially in women, with a high prevalence in both Indonesia and the United States (Sulistyaningsih Putri, 2020; Jaleha et al., 2020). The novelty of this study lies in the use of a more comprehensive neck functional measurement method to test the effectiveness of different isometric and isotonic exercises.

Physical therapy such as McKenzie neck exercises and neck cailliet exercises have been proven effective in reducing pain and improving neck muscle function through muscle strengthening and relaxation mechanisms. McKenzie exercises emphasize the use of progressive static force to reduce spasms, while neck cailliet exercises apply isometric contractions at a certain rhythm that stimulate muscle receptors and relax muscles (Jehaman et al., 2020; Trisnowiyanto, 2017). This study aims to directly compare these two exercise methods to determine the more effective intervention in a clinical context.

This research is expected to make an important contribution to the field of physiotherapy, particularly in the treatment of upper trapezius muscle myofascial pain syndrome in factory workers who often experience functional neck disorders. The results of this study can be used as a reference for physiotherapists in designing appropriate exercise programs and improving the quality of life of people with neck pain. This study also introduces a new approach to evaluating neck functional ability that can be applied more broadly (Djawas, 2021; Jehaman et al., 2020).

MATERIALS AND METHOD

This study used a quasi-experimental design with a two-group pre- and post-test design. The researchers divided the subjects into two treatment groups, namely the McKenzie Neck Exercise group and the Neck Cailliet Exercise group, then compared changes in neck functional ability before and after intervention. This design was chosen because it allowed the researcher to assess the effects of two types of exercise directly on subjects with upper trapezius muscle myofascial pain syndrome, even without a control group. This approach is effective in the workplace because the subjects' conditions are relatively uniform and it is difficult to exercise full control as in pure experimental studies.

The study was conducted at PT Iskandar Indah Printing Textile, Surakarta, because this location has a large number of employees with neck pain complaints due to repetitive work activities and static posture. The study was conducted in June 2022, with a training schedule of twice a week for three weeks. The choice of place and time was based on ease of access to subjects and the company's support in implementing the exercise therapy program.

The research population consisted of all employees of PT Iskandar Indah Printing Textile who experienced functional limitations in the neck. The sampling technique was simple randomization using a lottery system. Subjects who obtained number 1 were assigned to the McKenzie exercise group, while those who obtained number 2 were assigned to the Neck Cailliet exercise group. The total sample size was 30 people, with each group consisting of 15 subjects. The inclusion criteria included employees aged 20–60 years with neck pain due to myofascial pain syndrome, willingness to sign informed consent, and ability to follow the exercises regularly. The exclusion criteria were the presence of neurological disease, trauma, or a history of spinal surgery.

The independent variables in this study were the McKenzie Neck Exercise and the Neck Cailliet Exercise, while the dependent variable was neck functional ability. The measurement instrument used was the Indonesian version of the Neck Disability Index (NDI). This questionnaire contained 10 items to assess the level of activity limitation due to neck pain. Based on the study by Putra et al. (2020), the Indonesian version of the NDI has high construct validity (r = 0.61–0.80) and excellent reliability (Cronbach's Alpha = 0.895), making it suitable for use in this study.

The research procedure consisted of three stages: preparation, implementation, and evaluation. In the preparation stage, the researchers obtained research permission and explained the objectives and procedures to the subjects. In the implementation stage, group I performed the McKenzie neck exercise, which consisted of retraction, extension, lateral flexion, rotation, and neck flexion movements performed actively by the subjects. Group II performed the Cailliet neck exercise, which consisted of isometric contractions with hand resistance accompanied by stretching. Both exercises were performed for 5–6 seconds per movement with 10 repetitions. After three weeks of treatment, remeasurements were performed using the NDI to assess changes in neck functional ability.

The data obtained were analyzed using SPSS in several stages. The prerequisite tests included normality (Shapiro-Wilk) and homogeneity (Levene's test) tests to determine the use of parametric or non-parametric tests. The analysis continued with tests for differences within groups (paired t-test or Wilcoxon) and tests for differences between groups (independent t-test). The results of the analysis were used to determine the differences in the effects and effectiveness between interventions. This study obtained ethical approval from the Ethics Committee of the Surakarta Ministry of Health Polytechnic, and all subjects provided written consent to participate.

RESULTS

Table 1. Respondent Characteristics Based on Age, Gender, and Working Hours (n=30)

Variable	Group I (McKenzie) Mean ± SD / n (%)	Group II (Neck Cailliet) Mean ± SD / n (%)	Description
Age (years)	39.93 ± 11.21	43.13 ± 9.40	Range 24–60 years
Male	8 (53.3%)	9 (60.0%)	Majority male
Female	7 (46.7%)	6 (40.0%)	
Working hours (hours/day)	8.00 ± 0.00	8.00 ± 0.00	Relatively similar between groups

Table 1 shows that respondents in both groups have relatively homogeneous basic characteristics. The average age in the Mc Kenzie group was 39.93 years and in the Neck Cailliet group was 43.13 years. The majority of respondents were male with working hours of 8 hours per day.

Table 2. Neck Functional Ability Scores Before and After Treatment Based on NDI (%)

Group	Pre-test Mean ± SD	Post-test Mean ± SD	Mean Difference	p-value	Description
McKenzie Neck Exercise (n=15)	52.76 ± 12.48	31.62 ± 5.38	21.14	0.001	There is an effect
Neck Cailliet Exercise (n=15)	57.63 ± 12.43	38.49 ± 7.37	19.14	0.000	There is an effect

Table 2. The results of the *Wilcoxon* test for the Mc Kenzie group (p=0.001) and *the paired t-test* for the Neck Cailliet group (p=0.000) show that both interventions had a significant effect on improving neck function (p<0.05). The mean difference values indicate a greater reduction in NDI scores in the McKenzie group, meaning that this exercise is more effective in improving neck function in respondents with upper trapezius muscle *myofascial pain syndrome*.

Table 3. Test of Differences in Effects Between Groups After Intervention

Group	Mean Post-test ± SD	p-value	Description
McKenzie Neck Exercise (n=15)	31.62 ± 5.38		
Neck Cailliet Exercise (n=15)	38.49 ± 7.37	0.004	There is a significant difference

Table 3. The results of *the unpaired t-test* show a p-value of 0.004 (p<0.05), which means that there is a significant difference in the effect of the two interventions on improving neck function. The mean post-test score for the McKenzie group was lower than that for the Neck Cailliet group, indicating a lower level of disability after intervention. This suggests that *McKenzie neck exercises* are more effective in reducing neck functional limitations than *Neck Cailliet exercises.*

DISCUSSION

This study shows that McKenzie neck exercises affect the improvement of neck functional ability in employees with upper trapezius muscle myofascial pain syndrome. These exercises can reduce pain through a progressive isometric stretching mechanism that helps restore muscle length and improve posture. These results are in line with the study by Jaleha et al. (2020), which states that the McKenzie exercise can significantly reduce neck disability through increased mobility and reduced muscle spasms. This mechanism is thought to occur because this exercise increases blood circulation and oxygen supply to muscle tissue, thereby reducing stiffness.

Furthermore, the neck Cailliet exercise has also been proven to improve neck functional ability. This exercise works on the principle of post-isometric relaxation, which aims to relax muscles and improve neuromuscular coordination. These findings

are consistent with the study by Jehaman et al. (2020), which reported that Cailliet exercises can reduce pain and muscle spasms in administrative workers. Thus, both types of exercises are equally effective in improving neck function, even though they have different muscle working principles—McKenzie is isotonic, while Cailliet is isometric.

However, the results of the comparative test showed that the McKenzie neck exercise was more effective than the Cailliet neck exercise in improving neck function. These results are in line with the findings of Arshad et al. (2020) and Fitriati (2018), who reported that McKenzie exercises are more effective because they utilize active and repetitive movements that facilitate faster muscle tissue recovery. McKenzie exercises can also be performed independently by patients, minimizing dependence on therapists and allowing for continued exercise outside of therapy sessions.

Physiologically, the effectiveness of McKenzie neck exercises can be explained by increased endorphin release and improved muscle tissue perfusion. Smooth blood circulation helps eliminate metabolic waste products that cause pain, such as prostaglandins and bradykinin, thereby reducing muscle spasms and increasing flexibility. Research by Nurhidayanti et al. (2021) supports these findings by stating that McKenzie cervical exercises can reduce pain and improve work posture in industrial workers. This shows that these exercises not only have clinical effects but are also ergonomically relevant for workers with repetitive activities.

From a methodological perspective, this study has several limitations. The relatively small sample size and the implementation of the intervention during break times may affect the consistency of the exercises and the final results. In addition, external factors such as the use of pain medication and individual motivation in performing the exercises cannot be fully controlled. These limitations were also conveyed by Sulistyaningsih and Putri (2020) in their study that environmental variables and subject compliance affect the effectiveness of exercises in cases of myofascial pain syndrome. Therefore, further research with stricter controls is needed.

Based on the results of the study, the McKenzie neck exercise is recommended as an effective physiotherapy intervention to improve neck function due to myofascial pain syndrome. This exercise can be applied independently with minimal supervision from a therapist ( ), making it efficient in an industrial context. Future research should involve a larger sample size, use objective measurement instruments such as pressure pain threshold, and conduct long-term follow-ups to assess the sustained effects of these exercises. A combination approach of McKenzie and Cailliet exercises may also be considered to achieve more optimal results in chronic cases.

CONCLUSION

This study shows that both Mc Kenzie neck exercises and Cailliet neck exercises are equally effective in improving neck function in employees with upper trapezius muscle myofascial pain syndrome. However, Mc Kenzie neck exercises have been shown to provide more significant results than Cailliet neck exercises because they improve flexibility, correct posture, and reduce muscle spasms through regular isometric contraction mechanisms. These results confirm that active exercises performed independently are more effective in restoring neck muscle function than passive exercises that depend on therapists. Based on these findings, it is recommended that physical therapists and occupational health practitioners implement the McKenzie neck exercise as the primary intervention for addressing pain and functional limitations caused by myofascial pain syndrome in workers. Furthermore, further research with a larger sample

size, longer intervention duration, and stricter control of external variables should be conducted to strengthen the evidence of its effectiveness.

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