

Effect of neck pain on pinch grip strength and neck disability in calligraphy students

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Abstract-

Background: This study has been undertaken to investigate the effect of neck pain on pinch grip strength and neck disability in calligraphy students. The control and manipulation while writing in calligraphy come from pinch grip and wrist. The posture required to performed calligraphy task involves upper back curved and neck flexion and they have to maintain one posture for a long period of time which may lead to neck pain, this neck pain can cause an effect on pinch grip strength in calligraphy students.

Aim and objectives: To find the effect of neck pain on pinch grip strength and neck disability in calligraphy students.

Method: Seventy-six participants were selected according to inclusion and exclusion criteria. Calligraphy students with neck pain were selected using Nordic Musculoskeletal questionnaire and the intensity of neck pain was assessed using Numerical rating scale. Pinch grip dynamometer was used to measure pinch grip strength. Disability was interpreted using Neck disability index. Pearson's correlation coefficient test was done to determine correlation. Statistical analysis was done using Microsoft Excel.

Result: There is a weak correlation between neck pain and pinch grip strength on the dominant side in calligraphy students. There is mild neck disability in 42.10% out of 76 calligraphy students.

Conclusion: It has been concluded that there is a weak correlation between neck pain and pinch grip strength on the dominant side of calligraphy students and mild neck disability in 42.10%.

Keywords: Neck pain, Pinch grip strength, Neck disability, Calligraphy students.

I. INTRODUCTION

Calligraphy is the art of beautiful writing and it takes many years of practice to perfect the different techniques. Calligraphy is one of a part fine art. The posture of calligraphy students is very important for practicing calligraphy. The calligraphy student task involves highly repetitive task performed in sitting posture with upper back curved and forward head during writing. The work task of calligraphy students requires maintaining one posture for a long period of time.² Poor posture and repetitive strain in calligraphy students can lead to neck pain. Neck pain is an ache or discomfort in the anatomical area between the occipital and 3rd thoracic vertebrae. The prevalence of neck pain varies between 16.7% and 75.1% in the general population⁴ and according to one study, most of the calligraphers have neck pain (21%).² Dentists whose posture during their work is similar to calligraphy student result in neck pain caused an effect on their hand grip strength.⁴

A hand is the functional unit of the calligraphy students and is helped in keeping a firm holding of instruments and tools used in calligraphy tasks. The muscular strength used while writing in calligraphy will come from the shoulder, upper arm and wrist. The control and manipulation come from the finger. The hand grip and pinch grip is an important and basic functions for various movements in calligraphy. In pinch strength, any one finger is used to manipulate objects in coordination with thumb movements without having contact with the palm.⁵

From these previous literature reviews, we can conclude that there is a high prevalence of neck pain in calligraphy students. In India there are none of the studies investigating the occurrence of neck pain and its effect on pinch grip strength among calligraphy students was done. So, the purpose of this study is to correlate neck pain and pinch grip strength in calligraphy students and to determine the intensity of neck disability due to neck pain among them.

II. MATERIALS AND METHODOLOGY

The study was across-sectional study where 76 calligraphy students were selected according to convenient sampling. The inclusion criteria to select the study population were both males and females calligraphy students willing to participate in the age group of 18-25 years with mild to moderate intensity of neck pain on the numerical rating scale. The exclusion criteria were any recent trauma to the upper limb and cervical spine, neurological condition, metabolic disorders, pain radiating from the cervical spine to the hand and non-cooperative subjects. Materials used in the study included consent form, demographic data proforma, Nordic musculoskeletal questionnaire, Numerical rating scale, Pinch grip dynamometer, and Neck disability index.

III. PROCEDURE

A written consent was taken from all the participants who are willing to participate. Participants were selected according to inclusion and exclusion criteria. The purpose and procedure of the study were explained to all the participants prior to the study. Demographic data was filled in. Nordic musculoskeletal questionnaire was distributed to select students with neck pain and the intensity of neck

pain was assessed using Numerical rating scale. Pinch grip strength was measured using a pinch grip dynamometer. Intensity of neck disability was assessed using the neck disability index.

Clinical test: Measurement of pinch grip strength

Description of the test: Performed with participant sitting on a chair with back and arm supported, elbow flexed to 90°, arm adducted at side and forearm and wrist in mid-position. Participants were instructed to squeeze the dynamometer with maximum effort and maintain it for 5seconds. 3 readings were taken and a mean value of them was considered for the study.

IV. STATISTICAL ANALYSIS

Data was collected on an assessment sheet and encoded for computerized analysis. Table and graphs were made using Microsoft Excel. Statistical analysis was done using Microsoft Excel. Pearson’s correlation coefficient test was done to determine correlation between the neck pain and pinch grip strength.

V. RESULTS

A total 76 participants were included in the study from those 42 participants were females and 34 participants were males.

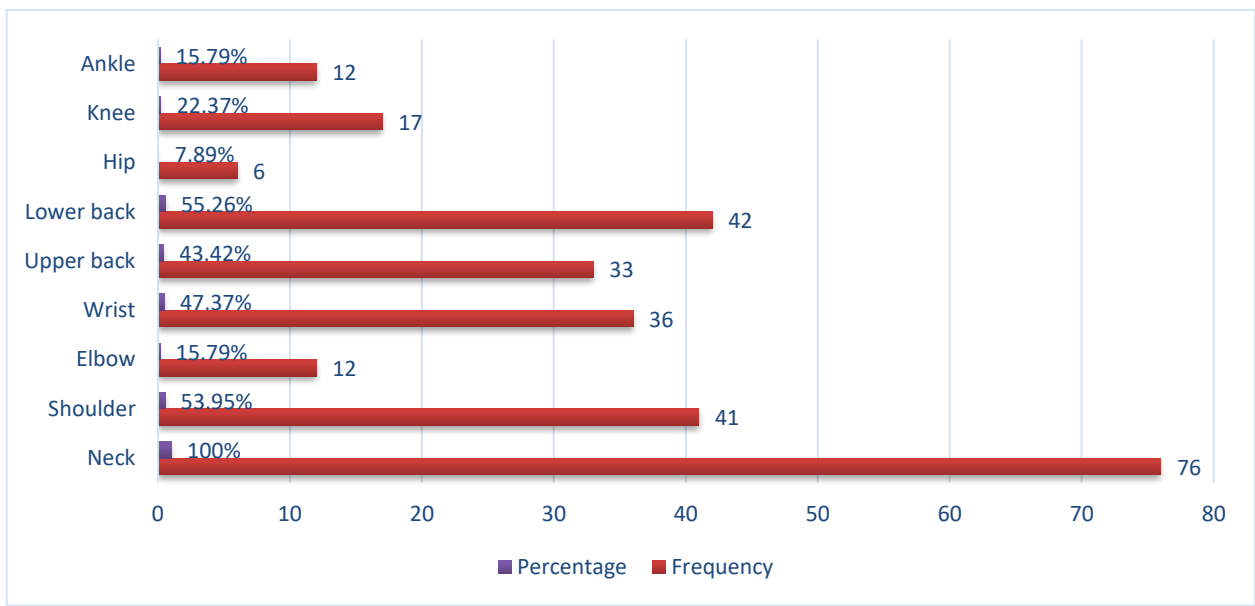


Figure 1: Frequency and percentage of pain area

Fig. 1 Illustrates that neck pain were present in all the participants 76(100%), shoulder pain in 41(53.95%), elbow pain in 12(15.79%), wrist pain in 36(47.37%), upper back pain in 33(43.42%), lower back pain in 42(55.26%), hip pain in 6(7.89%), knee pain in 17(22.37%), ankle pain in 12(15.79%).

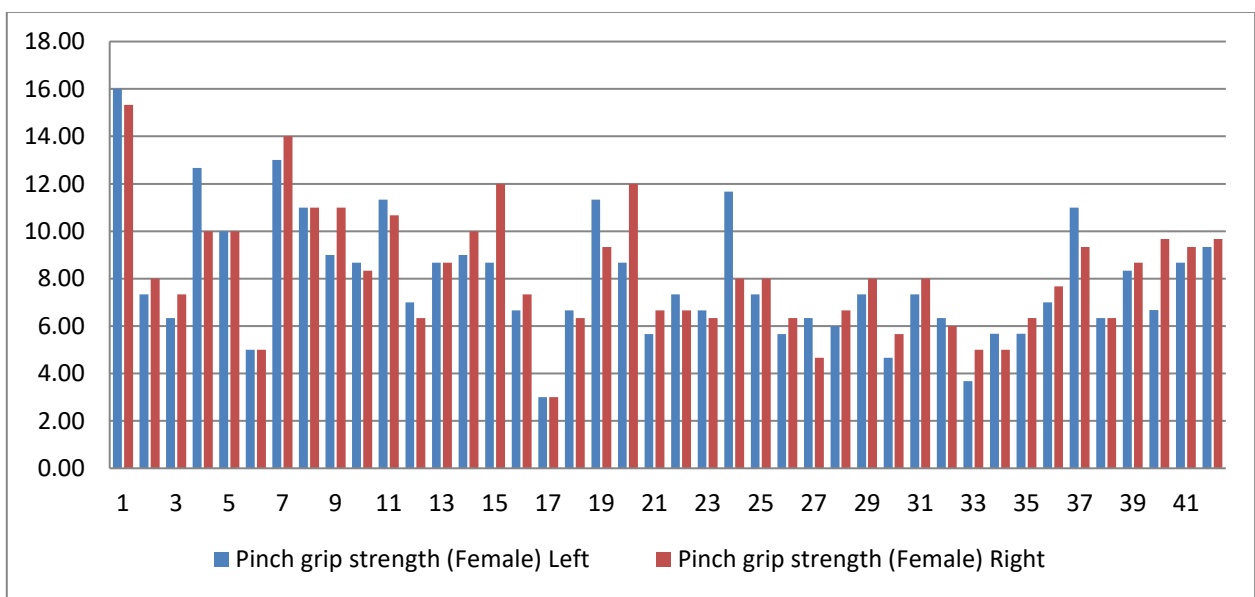


Figure 2: Pinch grip strength in female

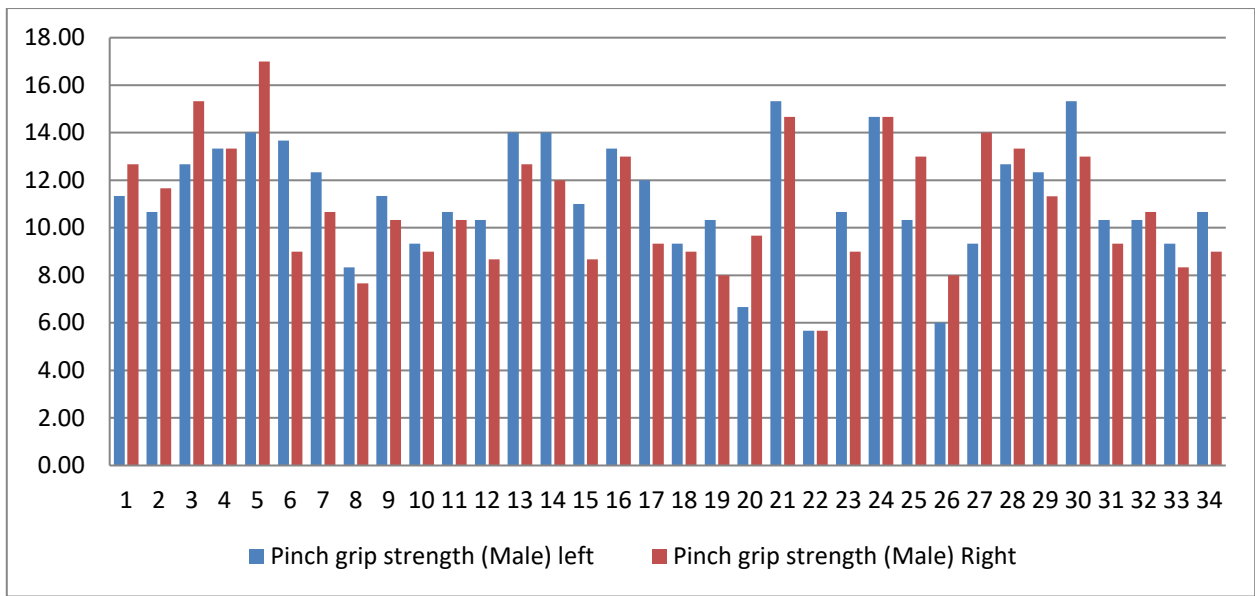


Figure 3: Pinch grip strength in male

Fig.2 and fig. 3 Illustrate that only 9(12%) calligraphy students out of 76, who were assessed for pinch grip strength, show equal pinch grip strength in both hands., 49(64%) calligraphy students out of 76 pinch grip strength of dominant side was greater than the non-dominant side, 19(24%) participants the pinch grip strength of non- dominant side was greater than the dominant side.

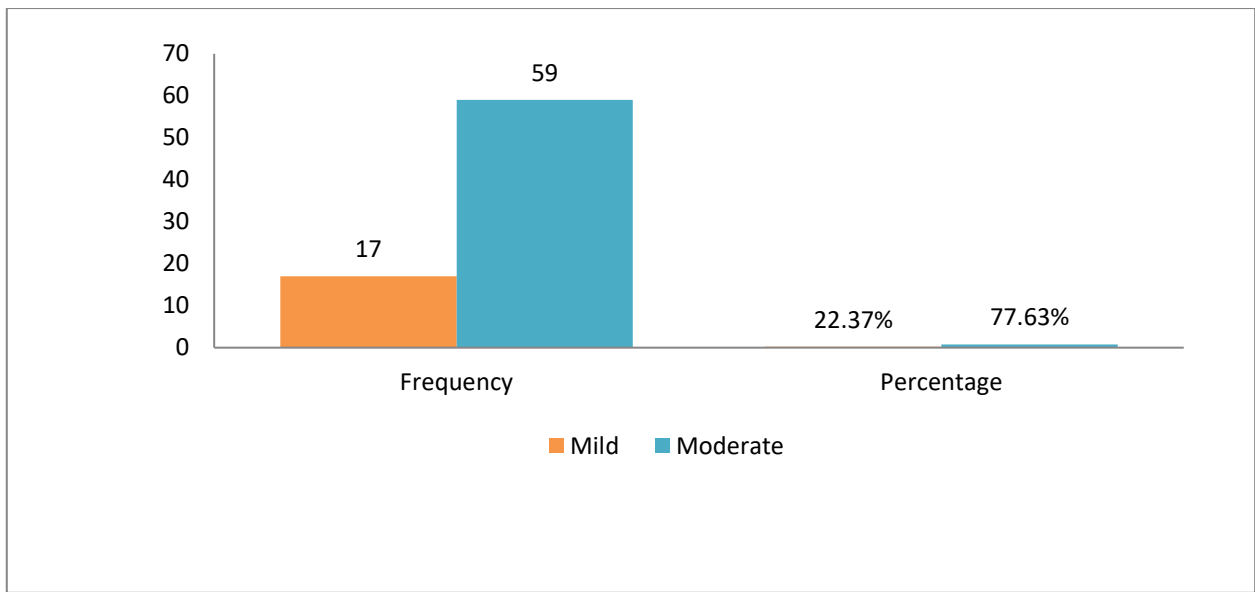


Figure 4: Frequency and percentage of Numerical rating scale

Fig. 4 Illustrate that there were 22.27% of calligraphy students with mild neck pain and 77.63% of calligraphy students with moderate neck pain on Numerical rating scale.

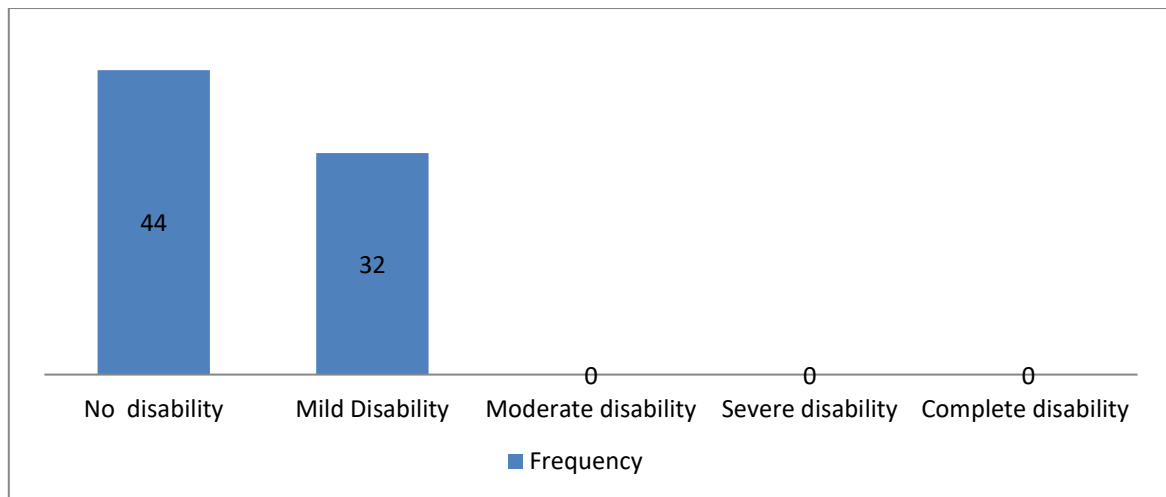


Figure 5: Intensity of neck disability

Fig. 5 Illustrate that 32 students with mild neck disability and 42 with no disability.

In this study we have considered pinch grip strength as dependent variable and neck pain as independent variable. From the data set available, we calculated P value using regression model.

Pearson's correlation coefficient value between neck pain and pinch grip strength of dominant side for both females and males is R value= -0.1207(P value= 0.299) which shows a weak correlation between neck pain and pinch grip strength of dominant side for both females and males.

Pearson's correlation coefficient value between neck pain and pinch grip strength of dominant side for females is R value= -0.0625 (P value= 0.69427) which shows a weak correlation between neck pain and pinch grip strength of dominant side in females.

Pearson's correlation coefficient value between neck pain and pinch grip strength of dominant side for males is R value= -0.0188 (P value= 0.91582) which shows a weak correlation between neck pain and pinch grip strength of dominant side in males.

VI. DISCUSSION

The following cross-sectional study was undertaken with the aim to find a correlation between neck pain and pinch grip strength of dominant hand and neck disability in calligraphy students. In this study, 76 participants screened in which 42 were females and 34 were males according to inclusion and exclusion criteria. Subjective assessment was done by using Nordic musculoskeletal questionnaire to determine musculoskeletal pain. To determine neck pain intensity Numerical rating scale was used. To determine pinch grip strength Pinch grip dynamometer was used. To determine the disability of the neck, the Neck disability index was used. Pearson's correlation coefficient test was done to determine correlation in the study.

In this study, by using a musculoskeletal questionnaire we found that out of 76 calligraphy students, neck pain was present in all the participants 76 (100%), shoulder pain was present in 41(53.95%) participants, elbow pain in 12(15.79%) participants, wrist pain in 36(47.37%) participants, upper back pain in 33(43.42%) participants, lower back pain in 42(55.26%) participants, hip pain in 6(7.89%) participants, knee pain in 17(22.37%) participants, ankle pain in 12(15.79%) participants. Mustafa Ahmed Alshagga et al conducted a study among calligraphers to find out the prevalence and associated factors of musculoskeletal disorders among Arabic calligraphers living in Saudi Arabia stated that there is a high prevalence of musculoskeletal pain (59.7%) among Arabic calligraphers. The most common area of musculoskeletal pain was the lower back (26.6%), neck (21%), and the lowest area of musculoskeletal pain was the shoulder area (12.1%).² Contrast to this study in which we found out the most common area of musculoskeletal pain was neck pain (100%) followed by lower back pain (55.26%) and the lowest area of musculoskeletal pain was the hip (7.89%).The main cause of this musculoskeletal pain is found to be the posture of calligraphers required for their task i.e. sitting posture with upper back curved and neck flexion. A faulty posture causes constant loading of the muscles in and around the neck, shoulder and back.

The hand grip and pinch grip is an important and basic functions for various fine movements in calligraphy tasks. In this study, we used a pinch grip dynamometer to measure pinch grip strength in 76 calligraphy students out of which 64% of participants pinch grip strength was more on dominant side, 24% of participants pinch grip strength was more on non dominant side and only 9% participants pinch grip strength were equal. Similar to the study conducted by Nurgul Arinci Incel et.al he stated that dominant hand grip strength is stronger in right-handed participants but no such difference between sides could be noted in left-handed people.¹⁴

In this study, we found that there is weak between neck pain and pinch grip strength in female calligraphy students. A study conducted by Nejad NH et.al titled as A relationship of grip and pinch Strength to musculoskeletal disorders in female carpet weavers in Southern Iran concluded that the high prevalence of musculoskeletal disorders results in decreased grip and pinch strength.⁵

In this study we found out that there is a weak ($p = 0.299002319$, $r = -0.120696899$) between neck pain and pinch grip strength common for males and females. Also, we found out a weak correlation between neck pain and pinch grip strength in females ($p = 0.694265255$, $r = -0.062478749$) and males ($p = 0.915822348$, $r = -0.018829708$) separately. Contrast to this study conducted by Eman Samir Fayez et.al has found a significant correlation between neck pain and hand grip strength among dentists. The most common cause of neck pain in dentists is their prolonged work posture which makes a high load on muscles of the neck and shoulder region. The main working posture of dentist is sitting, with neck flexion, shoulder elevation, and upper extremity abduction which

is similar to calligraphy students. Eman Samir Fayed et.al revealed that there was a significant positive correlation of the neck pain and hand grip strength. ⁴ An increase in the intensity of neck pain lead to an increase in grip strength. Dr. Mansi Bidja et.al conducted a study has found a negative correlation between neck pain and hand grip strength among beautician which concluded that those participantsts who were having high complaints of neck pain are at a risk of decrease in grip strength. ³ Above studies have shown that neck pain can correlate positively or negatively with pinch grip strength.

In this study, we found that 42% of calligraphy students have mild neck disability and 58% have no disability. Similar to this study, Mahajan Richa conducted study stated that incidence of neck pain is very high in computer users but the incidence of the disability caused by it is not very high. Results of the present study showed that there is a weak correlation between neck pain and pinch grip strength and mild neck disability is found in 42.10% of calligraphy students.

VII. CONCLUSION

It has been concluded that there is a weak correlation found between neck pain and pinch grip strength on the dominant side of calligraphy students. Out of 76 participants, 42.10% have mild neck disability.

VIII. CLINICAL IMPLICATION

Ergonomic advice for calligraphy students work posture and slight modification in their work environment along with strengthening Protocol can be implemented to maintain integrity of musculoskeletal system and can also serve long term benefits.

IX. LIMITATIONS

In this study, we have targeted a particular age group i.e. 18-25 years and we have included mild to moderate intensity of pain on Numerical rating scale. The study was conducted only in the urban population.

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