

Research Article

Neck Pain and Its Effects on Handgrip Strength

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ABSTRACT:

Objective: This research finds the association between handgrip strengths and neck pain in both male and female dentists, both the genders are treated separately.

Background: Strain injuries are common to dentists as their job demands these stresses and disorders of musculoskeletal. Dentists mostly rely on their hand-grip because they need to handle their instruments firmly and slight movements of the instruments may injure the patients. Cervical nerves supply the hand-grip muscles. As the dentists put pressure on their neck, this leads to the acute pains of the neck and it also becomes chronic in some of the cases, if prolonged. This is amongst common reason of quitting job as dentists.

Methodology: We observed forty dentists in our research, who suffered such pains and there were fifteen male and rest female cases. Without any previous trauma history, the age group of the dentists was from 23 – 26 years. Intensity of the pain was determined through VAS scale that means visual analog scale. The strength of the hand-grip was observed through standard adjustable handgrip dynamometer and the unit of calculation was kilogram (kg).

Result: A significant negative association was present in the handgrip strength and pain of the neck with a p-value of (<0.05).

Conclusion: It is concluded in the research that there is a significant association between strength of the hand-grip and pain of the neck.

Keywords: Visual Analog Scale (VAS), Neck pain, Hand-grip Strength and Musculoskeletal disorders.

INTRODUCTION

Over the year's dentists face issues of common injuries of strain and such related to work osteo-muscular disorders that may lead to the risk of biological nature and also cause an increased incidence of workplace risks. An occupational risk in the life of a dentist is pain of the neck, numerous research studies has reflected the incidence of neck pain in the profession of dentists specially at early stage and over the period of educational training [1]. A recent research has reflected musculoskeletal pain in 72.80 percent of the dentists in the course of their professional practice. A Saudi research reflected pain of neck in 54 percent of the dentists and 21.69 percent of

the dentists left their profession because of this pain [2, 3].

Any anatomical area discomfort related to occiput region and third thoracic vertebrae and laterally in the middle scapula margin was considered as pain of neck in the dentists. This was also considered chronic and dentists were in this pain from last 3 months. The possible causes of the pain of the neck include spondylosis, disc herniation, spinal stenosis, stress, prolonged posture and poor posture. Other related symptoms of pain of neck are headache and soreness of neck including shoulder blades pain, weakness and numbness [4]. Musculoskeletal disorders (MSDs) like pain of

the neck are wide spread occupational tension in the dentists in both developed and underdeveloped countries. In services and industry sector health costs expands, compensations and salaries are increasing; on the opposite side, quality of life and productivity is declining. Various factors of risk are involved in these disorders; we can classify these disorders into physical, individual and psychosocial factors [5].

Instrument and observation based strategies are recommended for the conduct of a quantitative research for the measurement of the postural strain and discomfort of various positions of the body. A recent research reflects a strong association between duration of work and pain of neck in the working staff of a dental college. Whereas, dentists' functional tool is his hand that holds the instrument and other related tools for micro precisions. Squeezed static force of the hand around a dynamometer is counted as dentists' hand-grip [6]. This strength of the grip may be affected in the gender classification as male have this force and grip more than females and in terms of hand dominance and age factor as well. Handgrip strength used to assess functional activity. Upper arm strength is measured through the strength of the hand-grip and numerous researches have also reflected the decrease in the strength of the hand-grip as 20 – 30 percent painful in nature. Additionally, unilateral musculoskeletal pain also causes relaxation and grip initiation delay. Research was aimed at the definition of the association of the intensity of the pain to the strength of the handgrip in both female and male dentists [7, 8].

MATERIAL AND METHODS

Subject Selection: We observed forty dentists in our research, who suffered such pains and there were fifteen male and rest female cases of Faridabad Dental College. Table-I shows the demographic information of the participants in

RESULTS

Extreme association was observed through results of research in terms of hand-grip strength and neck pain in the male and female participant of the research. These values are shown in Table-II and III and different slope can be observed in Figure I & II.

terms of their gender, weight, BMI, age and height. Study was also expanded to the other hospitals, tertiary healthcare centers and local hospital working under the sub-district health promoting hospital, local district and tertiary hospital working under the supervision of the Dental College. Design of the research was cross-sectional. Smoking and alcoholic dentists were not included in the research. Neurologic and Orthopedic and respiratory issues dentists were also removed from the research.

Participants were included in the research after securing informed written consent and they were evaluated through a detailed clinical examination before the commencement of the research. Ethical committee approved the protocols of the research and every principle of Helsinki declaration of 1964 was observed in the research.

Experimental Design: All dentists were measured for their strength of the grip in the same posture and position. Position was such as they were made to sit in the chair with support of the back and arm in the rest position, abducted shoulders, 90 degree flexed elbow, wrist and forearm were in the rest position. Dynamometer was held in the dominant hand and squeezed the dynamometer as per the instructions of the instructor with maximum possible force. Reading was taken by the instructor while standing in the front of the participant and unit for the measurement of the strength was in kilograms. The rate of pain during measuring squeezing was observed through VAS in the range of 0 – 10 as no pain to unbearable pain.

Data Analysis: We collected data for the statistical analysis on a pre-designed sheet and through a software R (v. 3.2.5) analysis of the data was performed. Presentation of the data was made throughout in the form of Mean \pm Standard Deviation (SD) values. Analysis and correlation of the data was also considered in female and male dentists with a significant p-value of <0.05.

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Table-1: Demographic details			
Sr No	Parameters	Male (n=15)	Female (n=25)
1	Age (Years)	23 ± 1.51	23 ± 1.29
2	Height (cm)	169.93 ± 2.62	161.82 ± 6.84
3	Weight (Kg)	71.81 ± 4.21	58.62 ± 8.73
4	BMI (kg/m ²)	24.86 ± 1.23	22.32 ± 2.46

Values were conveyed in Mean ± S.D; Body mass index (BMD); centimeters (cm); Kilogram (kg) and meters (m)

Table-II and Figure-I. There is an evident negative association reflected through significant p-value as (< 0.05) with negative correlation as (-0.6030 and 0.0173).

Table-2: Correlation between neck pain and Handgrip strength in males (n=15)			
Grip Strength	Neck Pain	p-value	Correlation Value
29.4 ± 4.03	4.87 ± 2.36	0.0173	-0.6030

Values expressed in Mean ± S.D; Significance level (p<0.05)

Figure-I: Correlation between handgrip strength and neck pain in Males

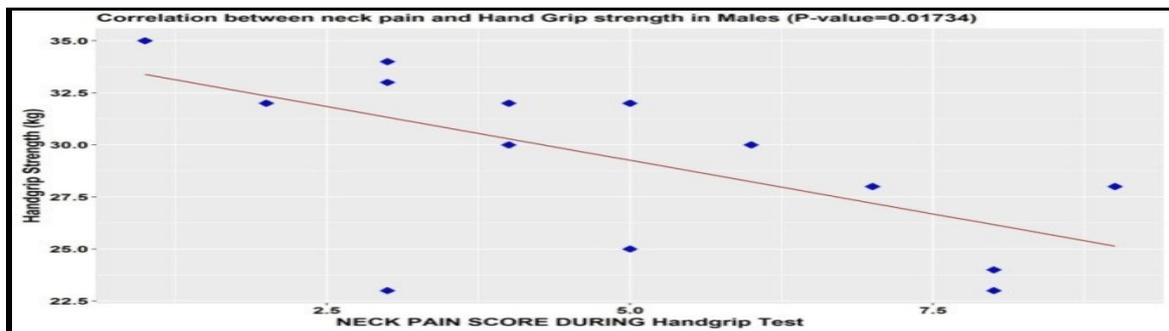
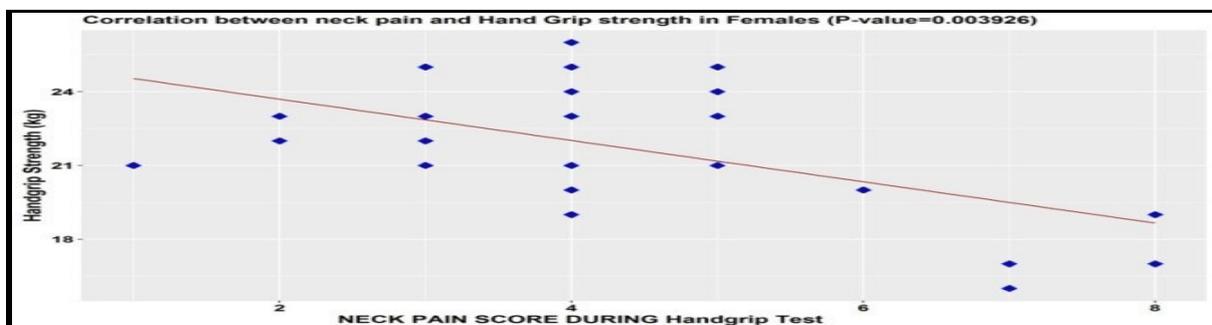


Table-III and Figure-II shows a significant association in the hand-grip strength and pain of the neck in the female dentists having negative association as (-0.5557) & a significant p-value of 0.0039 (<0.001).

Table-3: Correlation between neck pain and Handgrip strength in Females (n=25)			
Grip Strength	Neck Pain	p-value	Correlation Value
21.68±2.69	4.4±1.78	0.0039	-0.5557

Values expressed in Mean ± S.D; Significance level (p<0.001)

Figure-II: Correlation between handgrip strength and neck pain in females



DISCUSSION

This research finds the association between handgrip strengths and neck pain in both male and female dentists, both the genders are treated separately. Strength of the handgrip is considered gold standard for the measurement of the function of a hand. It also benefits the objectivity index of the upper extremity integrity function and rehabilitation therapies. In routine if an individual repeats certain movements of the fingers for the longer duration of the time faces issues of handgrip strength pains and related other side effects. Most common reason behind the persistency of the neck pain is the cervical nerve compression that is caused because of the cervical spondylosis. Research was supported through various negative associations of the negative associations with the strength of the hand-grip and pain of the neck. An increase in the intensity of the pain of the neck causes the reduction of the hand-grip strength. Sensory abnormality may be attributed to these issues of these pain factors. Autonomic and motor neurons are also involved in the pain of the neck as a deficiency in the sensory information quality that is responsible for the motor output generation causes these issues. An existence of neurons neuronal nodes interconnection system between handgrip and head, which permits various degrees of influence on one another. Our outcomes are not same as the outcomes of Faye ES research, who propounded that hand-grip strength is directly proportional to the pain of the neck, in other words, if dentist squeezes his hand more, the ratio of the pain will be more. According to Michael, hand-grip strength is reduced in the dentists significantly having spondylosis in comparison to control group in terms of dominant hand & non-dominant hand. These degenerative changes were clarified as that they lead to increased tissue pressure and also comprise of the changes in monaural velocity conduction, tissue blood flow and oxygenation. These all factors associate to the interfere in nervous system ability for the activation of the hand muscles.

CONCLUSION

At the end of the research we conclude that a significant direct link in the intensity of the neck-pain and strength of the hand-grip is persistent. Repetitive and dreary routine of work while maintaining the similar body posture causes rapid muscle fatigue, that makes inflammation and injury even susceptible. That is why, illness and injury to active muscles can be minimized in term of fatigue. In the light of these correlations few safety measures can be added for the reduction and remedial action of the pain of the neck and handgrip strengths to ensure high performance, safety, health, satisfaction and motivation of the dentists.

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