IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Correlation of the Intensity of NeckPain, Kinesiophobia and Hand Grip Strength in Chronic Neck Pain Participants

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Abstract

Objective: The objective of the study is to determine the correlation between Intensity of neckpain, Kinesiophobia and handgrip strength in chronic neck pain participants.

Method: A cross sectional study was performed on total 60 participants with chronic neck pain who fulfills inclusion criteria and were selected by convenience sampling method. Readings were taken for pain by using NPRS, Kinesiophobia by using TAMPA Scale for Kinesiophobia(TSK) and Handgrip Strength by using Manual Hand Dynamometer.

Results : Results of the study showed a statistical moderate positive correlation between Intensity of Neck pain and Kinesiophobia ($r=0.352$, $p<0.05$). But no statistical significant correlation was find between Intensity of Neck pain and Handgrip strength ($r = 0.118$, $p>0.05$)as well as for Kinesiophobia and Handgrip strength ($r = - 0.013$, $p>0.05$).

Conclusion : The study concluded that there is moderate positive correlation between Intensity of neck pain and Kinesiophobia but no correlation was found between Intensity of neck pain andHandgrip strength as well as between Kinesiophobia and handgrip strength.

Keywords: Chronic Neck pain, Kinesiophobia , Handgrip strength

INTRODUCTION:

Chronic Neck Pain

Definition

The International Association for Study of Pain (IASP) in its classification of chronic pain defines cervical spinal pain as pain perceived anywhere in the posterior region of cervicalspine, from superior nuchal line to the first thoracic spinous process. This is clearly a topographic definition, and it states that neck pain is usually perceived posteriorly. Another type of classification proposed by IASP is based on the duration.

--Acute Neck Pain - <7 days

-Sub-Acute Neck Pain - >7days but <3months

-Chronic Neck Pain - >3 months

The Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associate Disorders described neck pain as pain located in the anatomical region of the neck with or without radiation to the head, trunk and upper limbs .(1)

Global Burden and Epidemiology

Neck pain is a common musculoskeletal condition and is also common work related musculoskeletal disorder seen in different types of profession. Neck pain is becoming increasingly common throughout the world. It has a considerable impact on individuals and their families, communities, health-care systems, and businesses. There is substantial heterogeneity between neck pain epidemiological studies, which makes it difficult to compareor pool data from different studies. The estimated 1year incidence of neck pain from availablestudies ranges between 10.4% and 21.3% with a higher incidence noted in office and computerworkers. While some studies report that between 33% and 65% of people have recovered froman episode of neck pain at 1 year, most cases run an episodic course over a person's lifetime and, thus, relapses are common. The overall prevalence of neck pain in the general population ranges between 0.4% and 86.8% (mean: 23.1%); point prevalence ranges from 0.4% to 41.5%

(mean: 14.4%); and 1year prevalence ranges from 4.8% to 79.5% (mean: 25.8%). Prevalence is generally higher in women, higher in high-income countries compared with low- and middle-income countries and higher in urban areas compared with rural areas. Many environmental and personal factors influence the onset and course of neck pain. Most studies indicate a higherincidence of neck pain among women and an increased risk of developing neck pain until the 35–49-year age group(2) .Neck pain could even be caused by; spondylosis, spinal stenosis, disc herniation, stress, poor posture, prolonged posture. Symptoms of neck pain may include; neck soreness and headache, pain around shoulder blades, arm complaints (pain, numbness orweakness).

Kinesiophobia

Kinesiophobia is a concept that describes a condition in which a patient has an unwarranted and deteriorating fear of physical movement and actions that results from a feelingof vulnerability to painful injury or re-injury. An exaggerated negative cognitive and affectiveresponse to an anticipated or actual pain is expressed as pain catastrophizing. It is characterizedby an increase in the possible negative aspects of pain, an inability to disengage from stressfulthinking, and a sense of helplessness in dealing with pain. In the acute pain stage,

these habitsmay be adaptive. However, in long-lasting pain, the issue paradoxically worsens, aggravating impairment and pain perception thresholds as patients enter a vicious cycle that perpetuates chronic pain and functional disability. Previous studies have shown that CNP individuals maybe difficult or incapable of performing functional tasks. Also, Kinesiophobia can further hindertheir overall functional performance, which can affect their quality of life. Due to the avoidanceof physical exercise, kinesiophobia may contribute to a deterioration of functional ability, leading to decreased mobility and chronic pain. However, there is no conclusive evidence, howKinesiophobia impacts functional performance among individuals with CNP.(3)

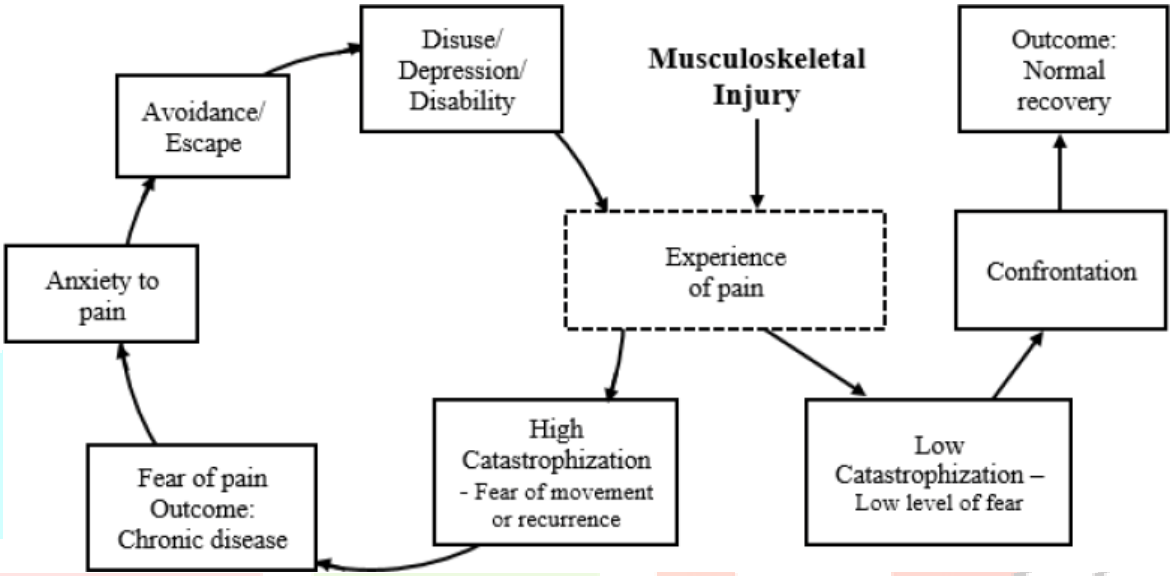


Figure 1: Fear of Avoidance Model (Kinesiophobia)

Handgrip Strength

Grip Strength is important for various professions where people must work with their hands.

Hand grip strength is the force applied by the hand to pull or suspend from object and is a specific part of hand strength. Hand grip strength can be quantified by measure the static force that the hand can squeeze around a dynamometer and is commonly measured in kgs. Grip strength can be affected by gender (male>female), age (peaked at 4th decade), dominant more than non-dominant hand. Grip strength used to assess functional activity of hand. Studies show that persons with unilateral upper limb chronic pain have strength reduction of hand grip 20-30% less than non-painful side. In additionto that, unilateral musculoskeletal pain cause delay grip initiation and relaxation (4). So the purpose of the current study is to determine whether there is an effect on the hand grip strength of Participantsis suffering from chronic neck pain .

OBJECTIVES OF THE STUDY:

To find correlation between Intensity of neck pain, Kinesiophobia and handgrip strength inchronic neck pain participants.

INCLUSION CRIETERIA:

1. Participants with age 45 -65 years

2. Both males and females.

3. Duration: Neck pain of more than 3 months' duration

4. Participants willing to participate in the study

EXCLUSION CRIETERIA:

1. History of Surgery of Neck & Upper limb.

2. Condition related Upper limb lesions.

3.Tingling and Numbness in Upper limb

SCOPE OF THE STUDY:

To find correlation between Intensity of neck pain, Kinesiophobia and handgrip strength inchronic neck pain participants.

Study Design:

Cross sectional study

Study Setting:

Outpatient Department of Physiotherapy in Anand and Nadiad district.

Sampling Method:

Convenient Sampling

Sample Size:

The estimated sample size was 60. ($\alpha = 0.05$, $\beta = 0.2$ and $r= 0.356$)

SUBJECTSAND METHODS:

Data collection and study design:

Data Collection Procedure

- The study was initiated after screening, evaluation and explanation of the procedure toparticipants who met inclusion criteria
- A written and informed consent about enrollment in the study and maintaining adequateprivacy and confidentiality was given to the patient prior to the study.
- A brief explanation of the procedure was given to the participants.
- All participants' bio-data and the particulars were taken before starting the procedures.
- All participants were examined for neck pain using Numerical Pain Rating Scale and TampaScale of Kinesiophobia
- Then all the participants were examined for Handgrip Strength by using Manual Handheld Dynamometer.

RESERCH METHODOLOGY

(1) Intensity of Pain: Pain is a distressing feeling often caused by intense or damaging stimuli.

The International Association for the Study of Pain's widely used definition -defines pain as "An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage." however, due to it being a complex, subjectivephenomenon, defining pain has been a challenge. In medical diagnosis, pain is regarded as a symptom of an underlying condition. In present study it is measured through Numerical painrating scale (NPRS).

NUMERIC PAIN RATING SCALE (NPRS) (9)

Descriptions: The Numerical Pain Rating Scale is one of the most widely used scales to assessself-reported pain intensity in Participants suffering from any musculoskeletal pain.

Equipment needed: Numeric Pain Rating Scale Datasheet, Pen.

Time: 3-5 minutes.

Scoring criteria: The patient is asked to make three pain ratings, corresponding to current, best and worst pain experienced over the past 24 hours. The average of the 3 ratings is used torepresent the Participants level of pain over the previous 24 hours.

Interpretation: A score of 0-3 indicates mild level of pain. Score of 4-6 indicates moderate level of pain. Score of 7-10 indicates severe level of pain.

(2) *Kinesiophobia:*

Kinesiophobia is a concept that describes a condition in which a patient has an unwarranted and deteriorating fear of physical movement and actions that results from a feeling of vulnerability to painful injury or re-injury.

TAMPA SCALE OF KINESIOPHOBIA (TSK) (10)

Description: TSK is 17 items a self-reporting questionnaire based on evaluation of fear of movement, fear of physical activity, and fear avoidance. It was first developed to distinguish between non-excessive fear and phobia in patients with chronic musculoskeletal pain, specifically the fear of movement in patients with chronic low back pain then widely used fordifferent parts of the body. The questionnaire using 4 points to assess that are based on; the model of fear avoidance, fear of work-related activities, fear of movement, and fear of re- injury.

- Activity Avoidance – the belief that activity may result in (re)injury or increased pain.

- Somatic Focus – the belief in underlying and serious medical problems

Equipment Required: TSK Scale and pen

Scoring Criteria: TSK composed of 17 items, scoring range from 1: 4 as follows for items from 1, 2, 3-7, 9-11, 13-15, and 17:

(1) Strongly disagree

(2) Disagree

(3) Agree

(4) Strongly agree.

For items 4, 8, 12, and 16 it is vice versa.

Interpretation:

The total score of the scale range from 17- 68,Score 17 - no kinesiophobia,
Score 18- 37 - there is kinesiophobia.Score 38-68 - severe kinesiophobia.

(3) Handgrip Strength

Hand grip strength is the force applied by the hand to pull or suspend from object and is a specific part of hand strength. Hand grip strength can be quantified by measure the static forcethat the hand can squeeze around a dynamometer and is commonly measured in kgs.

MANUAL HANDHELD DYNAMOMETER (11)

Description: The Adjustable Hand Dynamometer offers many features for both routine screening work and for evaluating hand trauma and disease.

Parts of Hand Dynamometer Dual-Scale Readout: The Baseline Hand Dynamometerdisplays grip force in pounds and kilograms—200 pounds or 90 kilograms maximum reading **Equipment needed:** Manual Handheld Dynamometer

Time: 5 minutes

Procedure:

The subjects were seated comfortably with chairs providing back and arm support. The subjects' shoulders were abducted, with elbows flexed to 90 degrees, and wrists and forearm both in a neutral position. During testing each subject rested his/her contralateral hand on her thigh and was asked to remain in that position during the trials. Subjects were instructed to gripthe dynamometer smoothly for approximately 3 seconds at maximal ability. Before testing, subjects were permitted to practice gripping the device once with each hand. Grip scores wererecorded in kilograms. The same measurement tool was used throughout the data collection process. The display of dynamometers faced the examiner, providing blind measurements to the participant. Each participant performed the test thrice with each hand (right and left alternatively), with 1-minute rest between trials. Participants were instructed to squeezegradually and continuously for at least 3 seconds.

Interpretation: Difference of Handgrip strength between affected and non-affected limb within 5 % to 10% is acceptable. Any difference more than this can be considered abnormal

Data Collection Tools

- Pen, Pencil
- Weighing Machine
- Stature meter
- Chair with back support

- Manual Handheld Dynamometer
- Data Collection Sheet
- Tampa Scale of Kinesiophobia (Gujarati Version)
- Participants Information sheet
- Written Consent Form

DATA ANALYSIS

The Data Analysis was performed using SPSS software version 21.

For correlation statistics Spearman's rank correlation test was performed. Frequency analysis was used to calculate percentage and frequency for gender distribution and affected side. Descriptive analysis was performed for the demographic details to find mean and SD for age,height, weight, BMI & duration. The level of significance was set at 95% (p=0.05) for all observation.

RESULTS

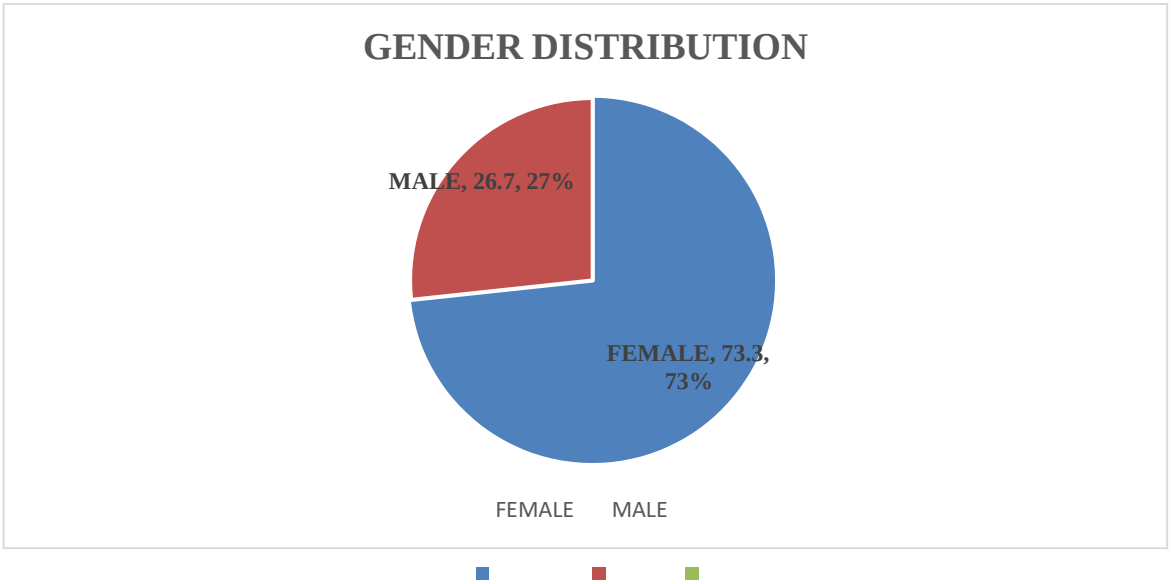
Demographic Details:

The study included total 60 chronic neck pain participants, with age between 45 to 65 years. Gender distribution is summarized in Table 1, which shows out of 60 participants 16 were males (26.7 %) and 44 were females (73.3 %).

Table 1: Gender Distribution in Chronic neck pain participants

GENDER	FREQUENCY	PERCENTAGE
FEMALES	44	73.3
MALES	16	26.7
TOTALS	60	100

Graph 1: Gender Distribution in Chronic neck pain participants



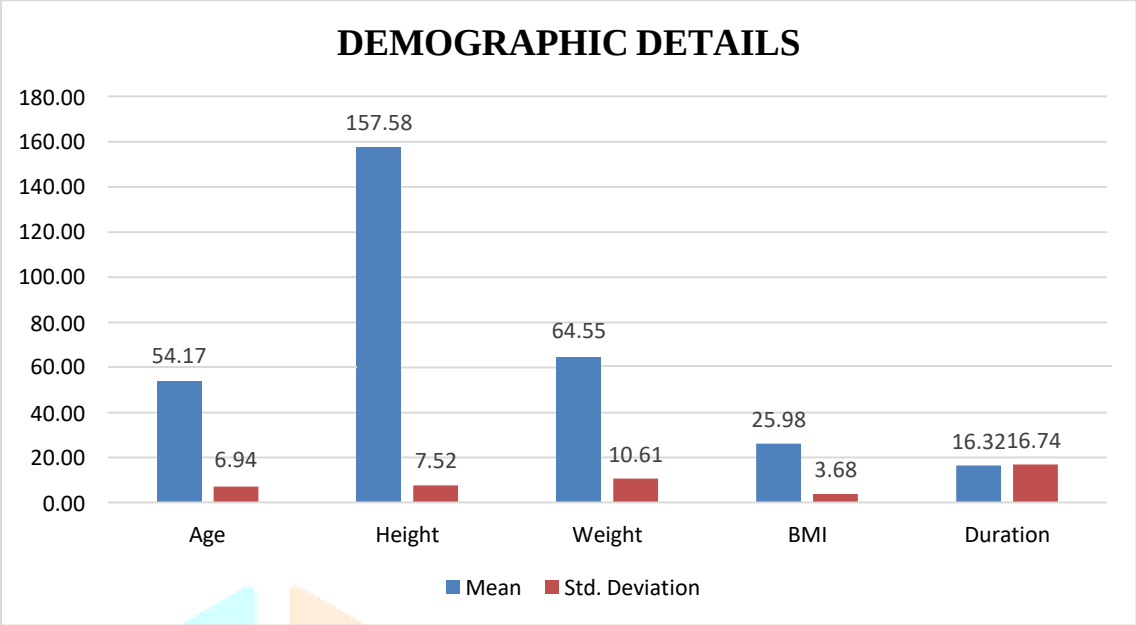
The above graph shows the frequency and percentage of Gender distribution in chronic neck pain participants included in our study.

Table 2 :Descriptive analysis of Demographic details.

Demographic details	N	Minimum	Maximum	Mean	Std. Deviation
Age(years)	60	45	65	54.17	6.94
Height (cm)	60	140	176	157.58	7.52
Weight (kg)	60	48	90	64.55	10.61
BMI (kg/m^2)	60	17.4	36.2	25.98	3.68
Duration (months)	60	3	72	16.32	16.74

Demographic details are summarized in Table 2 which includes minimum, maximum,mean and SD for age(years), height (cm), weight (kg), BMI(kg/m^2) and duration (months). Themean and SD for age, height and weight was 54.17 ± 6.94, 157.58 ± 7.52 and 64.55 ± 10.61 respectively. The mean and SD for duration of Chronic Neck pain participants in our study was
16.32 ± 16.74 respectively. The mean and SD of BMI for the participants in our study was 25.98 ± 3.68 respectively.

Graph 2: Descriptive analysis of Demographic details.



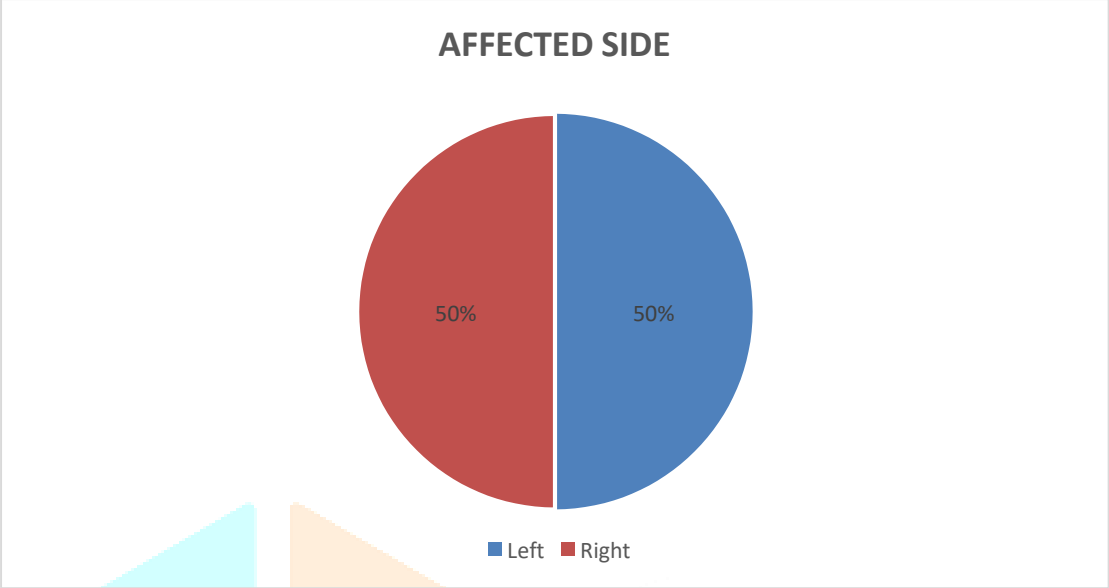
The above graph shows mean and SD for age, height, weight, BMI and Duration

Table 3: Side affected in chronic neck pain participants.

AFFECTED SIDE			
		Frequency	Percent
Side affected	Left	30	50.0
	Right	30	50.0
	Total	60	100.0

The frequency and percentage of affected side in chronic neck pain participantsincluded in this study was summarized in Table 3 which shows in 30 participants right side was affected (50%) and in other 30 participants left side was affected (50%).

Graph 3: Side affected in chronic neck pain participants



The above graph shows the percentage of affected side in chronic neck pain participants

Shapiro-Wilk test was used to determine the normality of data. Since the data were notnormally distributed they were analyzed by the non-parametric test.

Spearman's rank correlation test was performed to find the correlation between

(i) Intensity of Neck Pain and Kinesiophobia

(ii) Intensity of Neck Pain and Handgrip strength

(iii) Kinesiophobia and Handgrip strength.

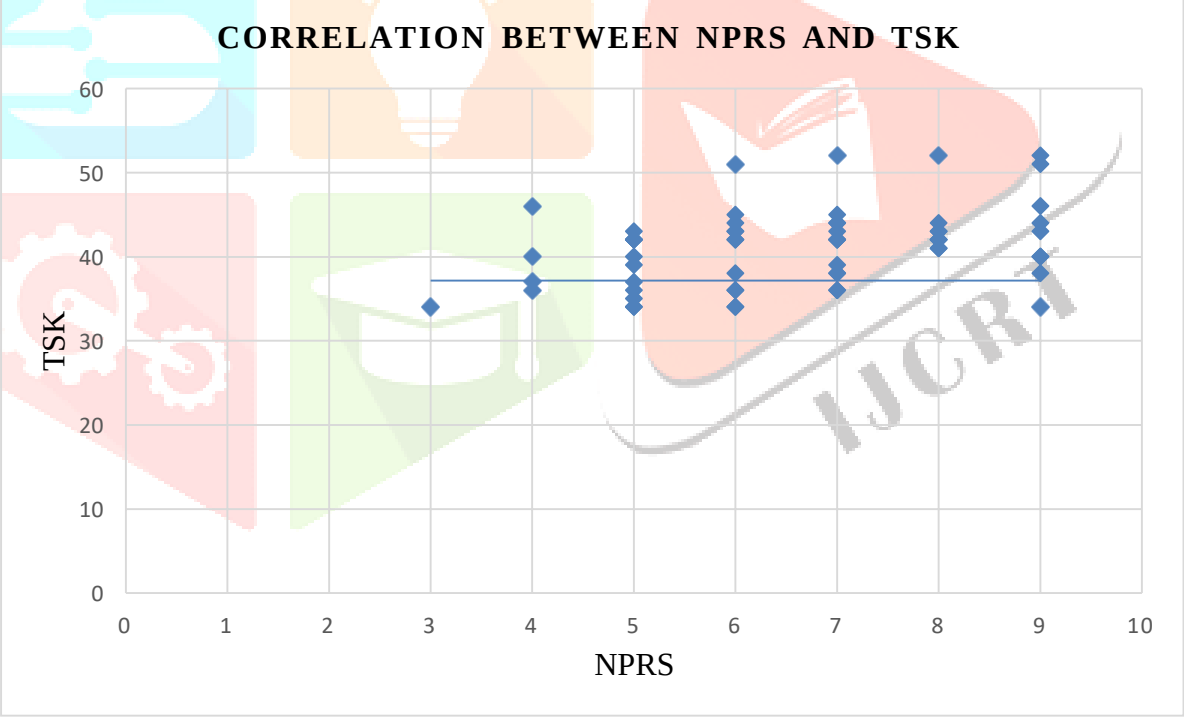
Intensity of Neck Pain and Kinesiophobia:

As mentioned in Table 4, results showed statistically significant difference with $p= 0.06 (p<0.05)$ and Spearman's rank correlation coefficient value for intensity of neck pain and Kinesiophobia was ($r= + 0.352$), which suggest moderate positive correlation.

Table 4: Spearman's rank correlation test between Intensity of Neck Pain andKinesiophobia

Correlations				
			NPRS	TSK
Spearman'srho	NPRS	Correlation Coefficient	1.000	.352**
		Sig. (2-tailed)	.	.006
		N	60	60
	TSK	Correlation Coefficient	.352**	1.000
		Sig. (2-tailed)	.006	.
		N	60	60
**. Correlation is significant at the 0.01 level (2-tailed).				

Graph 4: Correlation between Intensity of Neck Pain and Kinesiophobia



The above Graph 4 represents correlation between intensity of neck pain and Kinesiophobia, which shows direct relationship with each other (upward trend) . This suggest as intensity of neck pain increases the Kinesiophobia also increases.

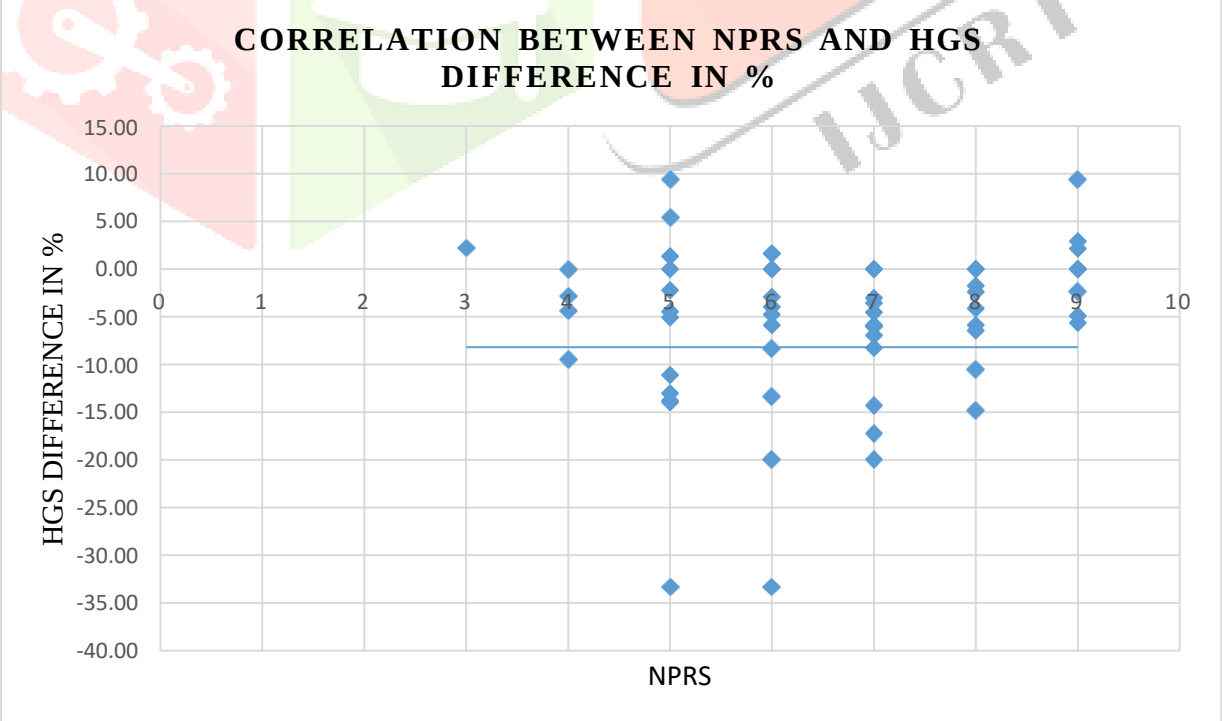
Intensity of Neck Pain and Handgrip Strength

As mentioned in Table 5, results showed no statistically significant difference with p= 0.368 (p>0.05) and Spearman's rank correlation coefficient value for intensity of neck painand handgrip strength was (r= + 0.118), which suggest negligible positive correlation.

Table 5: Spearman's rank correlation test between Intensity of Neck Pain andHandgrip Strength

Correlations				
			NPRS	HGS Differencein %
Spearman'srho	NPRS	Correlation Coefficient	1.000	.118
		Sig. (2-tailed)	.	.368
		N	60	60
	HGS Differencein %	Correlation Coefficient	.118	1.000
		Sig. (2-tailed)	.368	.
		N	60	60

Graph 5: Correlation between Intensity of Neck Pain and Handgrip Strength



The above Graph 5 represents correlation between intensity of neck pain and Handgripstrength, which shows there was no significant upward or downward trends. This suggest no correlation was there between intensity of neck pain and handgrip strength.

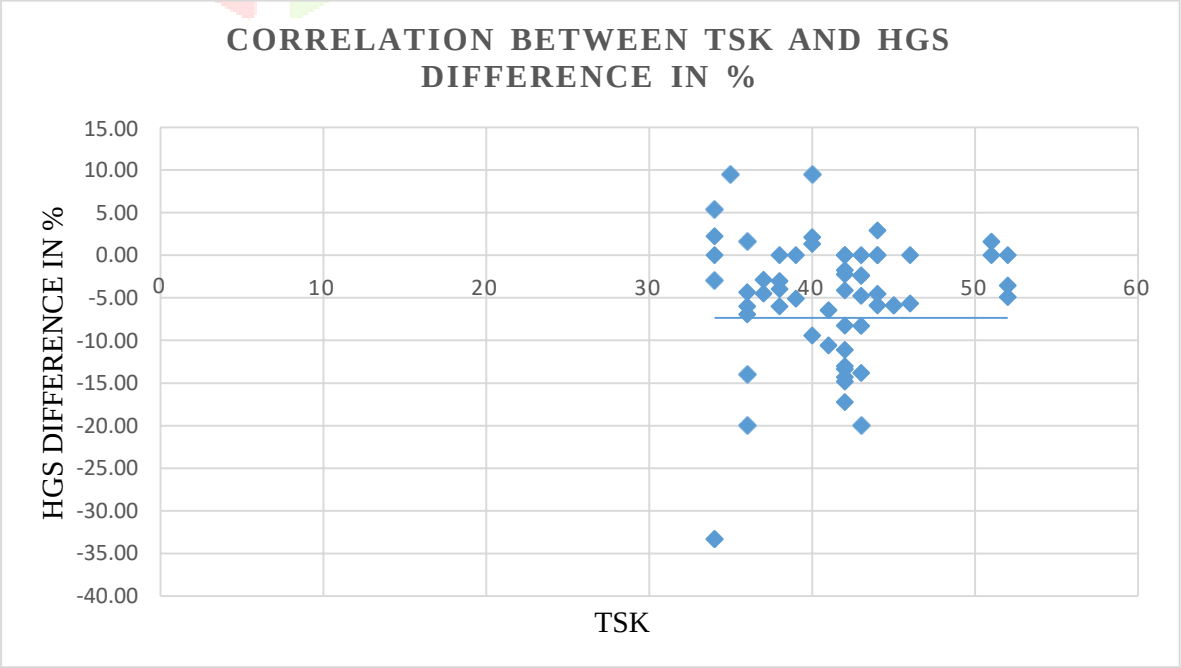
Kinesiophobia and Handgrip Strength

As mentioned in Table 6, results showed no statistically significant difference with p= 0.921 (p>0.05) and Spearman's rank correlation coefficient value for Kinesiophobia and handgrip strength was (r= - 0.013), which suggest no correlation was there between each other.

Table 6: Spearman's rank correlation test between Kinesiophobia and HandgripStrength

Correlations				
			TSK	HGS Difference in %
Spearman's rho	TSK	Correlation Coefficient	1.000	-.013
		Sig. (2-tailed)	.	.921
		N	60	60
	HGS Differencein %	Correlation Coefficient	-.013	1.000
		Sig. (2-tailed)	.921	.
		N	60	60

Graph 6: Correlation between Kinesiophobia and Handgrip Strength



The above Graph 6 represents correlation between Kinesiophobia and Handgrip strength,which shows there was no significant upward or downward trends. This suggest no correlation was there between Kinesiophobia and handgrip strength.

DISCUSSION:

The aim of our research is to find correlation between Intensity of neck pain, Kinesiophobia and handgrip strength in chronic neck pain participants. In this cross sectional study total 60 chronic neck pain participants between 45-65 years were included who fulfills inclusion criteria. Readings were taken for pain by using NPRS, Kinesiophobia by using TAMPA Scale for Kinesiophobia (TSK) and Handgrip Strength by using Manual Hand Dynamometer. In current study the female was more than the male having chronic neck pain (female – 73.3 %, male 26.7 %). The side affected was equal for right (50%) and left side (50%). The demographic details for each patient was taken which includes age, height, BMI and duration.The current study shows moderate positive correlation ($r = 0.352$) and statistical significant difference ($p<0.05$) between Intensity of Neck pain and Kinesiophobia whichsuggest with increases in intensity of neck pain, the Kinesiophobia also increases. Our resultis in line with the previous study which shows moderate positive correlation between neck painand Kinesiophobia in tailors. This study assessed tailors with neck pain reported that painscores increases because the fear of movement-related (8). The other study by F. Asiri intendedto establish the relationship between kinesiophobia, neck pain intensity, functionalperformance, and proprioception in CNP individuals. Kinesiophobia induced by painstimulation ultimately leads to fear avoidance behavior that can impact functional performance,including upper limb functions. This study found a significant association between kinesiophobia and handgrip strength among individuals with CNP (3).

The current study does not show statistical correlation between the Intensity of Neck pain and Handgrip strength ($r = 0.118$, $p>0.05$) which is not in line with previous study by Fayez ES which shows a positive correlation between the Neck pain and Handgrip strength this suggests that neck pain and hand grip strength is directly proportional due to sensory motor integration deficit or due to neuro hyper excitability (4) while the other study by Gnanasekaranshows the negative correlation between neck pain and handgrip strength (6).

Similarly, the current study does not show statistical correlation between the Kinesiophobia and Handgrip strength ($r = - 0.013$, $p>0.05$) which is not in line with the previous studies by F. Asiri intended to establish the relationship between kinesiophobia, neck pain intensity, functional performance, and proprioception in CNP individuals. Kinesiophobia induced by pain stimulation ultimately leads to fear avoidance behavior that can impact functional performance, including upper limb functions (3). The factors that may affect the result of our study are duration of pain, occupation, posture, BMI. In our study the mean duration of pain was found to be 16 months. If the Neck pain and Kinesiophobia remains for longer duration than it may leads to disuse atrophy of the muscle which further impacts the functional performance of the participants with CNP. The findings of this study may be concluded that Intensity of neck pain and Kinesiophobia have moderate positive correlation while no correlation was found between Intensity of Neck

pain and Handgrip strength as well as between Kinesiophobia and Handgripstrength.

CONCLUSION:

- The study concluded that there is moderate positive correlation between Intensity of neck pain and Kinesiophobia but no correlation was found between Intensity of neck pain and Handgrip strength as well as between Kinesiophobia and handgrip strength.

FUTURE RECOMMENDATION

- The study can be conducted using a larger number of the sample size.
- The causes of Chronic Neck Pain which can influence the Kinesiophobia and Handgripstrength can be included in further study.
- The difference of handgrip strength and kinesiophobia can be assessed between acuteneck pain and chronic neck pain.
- The Handgrip strength and Kinesiophobia can be assessed in CNP with poor posture
- i.e forward head posture and rounded shoulder

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