

## To Analyse the Effectiveness of Yoga, Pilates and Tai Chi Exercise for Chronic Mechanical Neck Pain -A Randomized Controlled Trial

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### ABSTRACT

**Introduction and Aim:** Chronic mechanical neck pain is a common medical complaint with a high socio economic impact .Approximately 70% of individual at some point in their lives being considered a frequent problem of disability. The life time prevalence of chronic mechanical neck pain is approximately 50% and is associated with substantial societal and individual burden. Recent studies estimated its print of prevalence to be between 6 and 22% which increases with age, although symptoms of neck pain are common among the population with the age group of 35-55 years. Conservative treatment such as exercise, massage, stretching, physical therapy, local anaesthetic filtration has been found beneficial for chronic mechanical neck pain. Alternative medicinal approach such as Yoga Pilates, Tai chi have found efficacious for chronic mechanical neck pain. The aim of the study is to analyse and compare the effectiveness of Yoga, Pilates and tai chi exercise for chronic mechanical neck pain.

**Materials and Methods:** Chronic mechanical neck pain is a common medical complaint with a high socio economic impact .Approximately 70% of individual at some point in their lives experience chronic mechanical neck pain. 40 Samples from 60 volunteers were selected based on the inclusion criteria Painful restriction of cervical spine, Neck pain, Age between 35-55 years, more than 40% of Tampa scale for kinesiophobia and Northwick pain park questionnaire. The study excluded those with Whiplash injury, frozen shoulder syndrome, Prolapse or protrusion, invasive treatment (surgery, nerve blocks, and neurotomy) within last 6 weeks, Spinal stenosis, Herniated vertebral disc. 40 samples were equally divided into 4 groups 10 in each. Group A received yoga, B –Tai Chi, C- Pilates, D-Control group. Participant will be given a consent form, Northwick pain park questionnaire and Tampa scale for kinesiophobia for final screening of inclusion and also used as pre –test. Post –test done after 3 weeks of intervention.

**Results:** The analysis was randomized experimental study for the subjects with chronic mechanical neck pain. Statistical analysis was done using SPSS software, All the four Groups showed improvement comparing Pre and Post treatment mean value ,while Group A Yoga post-test NPPQ (24.60) and TSK (55.20) showed significant difference compared to Group B Pilates post-test NPPQ (29.20) and TSK (58.10)and Group C Tai chi post-test NPPQ (48.80) and TSK (60.80) and Group D Control Group post-test NPPQ (56.70) and TSK (63.70) in reduction of pain by statistically comparing the mean values of Northwick pain park questionnaire and Tampa scale for kinesiophobia of four treatment groups indicated that Yoga as more efficient than the Pilates, Tai chi and Control group.

**Conclusion:** The study concluded that the Yoga is more effective than the Pilates and Tai chi and Control Group exercise for chronic mechanical neck pain while Pilates,Tai chi and control Group exercise even showed a considerable decrease in symptoms when comparing the post-test mean values. Yoga is effective in reducing pain, disability, quality of life and fear of movements in subjects with mechanical neck pain. Yoga proved to be equally efficacious and safe, it may be considered a suitable alternative in the treatment for subjects with neck pain.

**Key Words:** Yoga, Pilates, Tai Chi, Control group, Chronic Mechanical Neck pain, Northwick pain park questionnaire, Tampa scale for kinesiophobia.

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## INTRODUCTION

**A** Mechanical neck pain is defined as the pain in the anatomical region of neck for which it is not possible to identify a specific pathological cause of pain. It generally includes neck pain, with or without pain in the upper limb which may or may not interfere with activities of daily living. Chronic mechanical neck pain in the spine is a musculoskeletal disorder in modern society with public health and economic impact. It is also defined as the pain caused by placing abnormal stress or strain on the muscles of vertebral column.

Research shows that spinal pain has become the largest category of medical claim, placing a major burden on the individuals and health care system. A recent study estimates its point prevalence to be between 6 and 22% which increases with age 12 months prevalence is estimated to be between 30 and 50%(1). About 19% of population may suffer from chronic mechanical neck pain at any given time, creating substantial societal burden. Chronic mechanical neck pain is more common in females than the males (2).

Significant amount of money spend in today health care environment is used for the treatment of chronic health conditions. This includes neck pain and other related diseases. These lifestyle related conditions are usually the result of stubborn behaviour which immensely contribute to morbidity and mortality of population such as lack of physical activity, over eating, improper diet, cigarette smoking, excessive alcohol consumption, socio economic stress, low social support, poor sleep etc.

Neck pain results from bad habits such as poor posture, poorly designed seating and incorrect bending and lifting motions. These habits can be corrected by maintaining proper posture, adapting proper lifting and bending techniques.

For mechanical neck disorder with or without headache, it appears to be most beneficial, manual therapies should be done with exercise for improving pain and patient satisfaction. It can also be corrected by inhibiting exercises. The exercises which show effective in chronic mechanical neck pain include Yoga, Pilates and Tai chi exercises (3).

Yoga, Pilates and Tai chi are different types of exercises they all have something in common. They can help to alleviate pain and improve quality of life. However there is difference between the forms.

Yoga considered a branch of classical philosophy in India, uses meditation, exercise and breathing practices to improve overall health (4-7).

Pilates focuses on the core postural muscles which help keeps the body balanced and are essential to providing support for the spine. These group of exercise helps to treat the chronic condition including neck pain (8,9).

Tai chi, a Chinese soft martial art form, uses gentle, slow movements and posture to keep the body in constant motion while the person meditates. Tai chi may contribute to the psychological well-being among healthy adults (10).

A few specific outcome measurement tools that are available for assessing neck pain includes Northwick park pain questionnaire (11) and Tampa scale for kinesiophobia. Specific outcome measurement tool for neck pain that reflects the local cultural practice. It is important that the outcome measurement tool must demonstrate reliability (consistency), validity (trueness) and responsiveness (the ability to detect change).

## MATERIALS AND METHODS

The design of this study was experimental study. This study was done in Outpatient department of Physiotherapy at A.C.S. Medical College and Hospital. The period of this study was twice in a day for 3 weeks. The study group included 40 patients; patients were selected using simple random sampling method. The study includes only 40 patients of both males and females with the age group between 35 and 55 years, painful restriction of cervical spine, neck pain, more than 40% of Tampa scale for kinesiophobia and Northwick pain park questionnaire. Patients with Whiplash injury, frozen shoulder syndrome prolapsed or protrusion, invasive treatment within last 6 weeks, spinal stenosis, and herniated vertebral disc were excluded in this study. Northwick pain park questionnaire and Tampa scale for kinesiophobia were used as a outcome measure.

Once the study is approved by institution review board. 60 volunteers were recruited from the outpatient physiotherapy department with chronic mechanical neck pain. Out of which 40 samples are selected based on the inclusion criteria, they were fully explained about the study and asked to fill consent form, Northwick pain park questionnaire and Tampa scale for kinesiophobia for final screening of participating in the study.

In this study, the patients were allocated into 4 groups. Group A received yoga, Group B received Pilates, Group C received tai chi exercise and Group D received Control group exercise. All the exercises were given for 5 repetitions, 2 session/day for 6 days/week for 3 weeks, progressed to 10 and 15 repetition in 2nd and 3rd week respectively.

**Group A:** Yogasanas (1. Savasana, 2. Balasana, 3. Bitilasana, 4. Marjaryasana)

**Group B:** Pilates Exercise (1. Chest Lift, 2. Breast Strokes Arm, 3. Lower Trap Activation, 4. Swan Preparation)

**Group C:** Tai Chi (1. Head Roll, 2. Carrying Moon, 3. Picking Fruit, 4. Dancing With Rainbow, 5. Spinning Wheel)

**Group D:** In this Group isometric neck exercise was given. All other 3 Groups also receive isometric neck exercise as a common intervention.

### Data Analysis

The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (SPSS) version 24. One Way ANOVA includes of following tests (Test of Homogeneity of Variance, ANOVA, Robust Equality of Means, Post Hoc test Tukey HSD) (multiple comparison) was adopted to find statistical difference between four groups

**Table 1: Comparison of pre nppq score using test of homogeneity of variance and one ANOVA test between Group A , Group B, Group C and Group D**

TEST	GROUPS	MEAN	S.D	df1	df2	F-VALUE	SIGNIF-ICANCE
PRE NPQ	GROUP-A	57.3	8.32	3	36	0.29	.993*
	GROUP-B	56.4	13.36	3	36		
	GROUP-C	56.8	6.87	3	36		
	GROUP-D	57.6	9.86	3	36		

**Table 2: Comparison of post nppq score using test of homogeneity of variance and one ANOVA test between Group A , Group B, Group C and Group D**

TEST	GROUPS	MEAN	S.D	df1	df2	F-VALUE	SIGNIF-ICANCE
POST NPQ	GROUP-A	24.60	4.35	3	36	73.59	.000***
	GROUP-B	29.20	5.53	3	36		
	GROUP-C	48.80	7.03	3	36		
	GROUP-D	56.70	5.43	3	36		

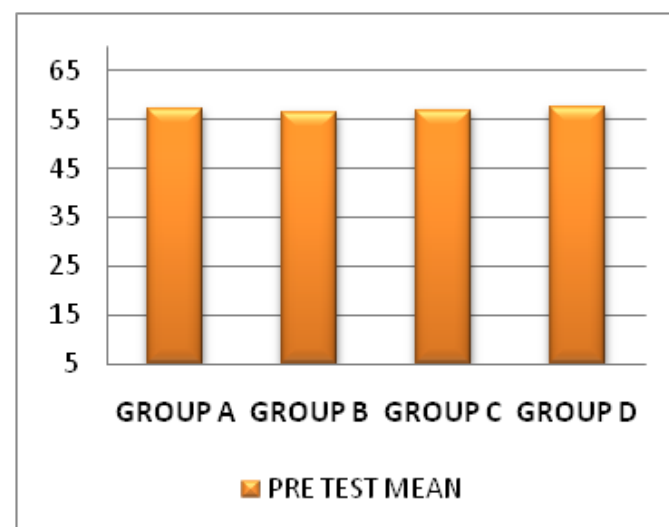
**Table 3: Comparison of Pre Tsk Score Using Test of Homogeneity of Variance & One Anova Test Between Group A, Group B, Group C & Group D**

TEST	GROUPS	MEAN	S.D	df1	df2	F-VALUE	SIGNIF-ICANCE
POST TSK	GROUP-A	55.20	2.29	3	36	10.94	.000***
	GROUP-B	58.10	3.17	3	36		
	GROUP-C	60.80	4.31	3	36		
	GROUP-D	63.70	3.80	3	36		

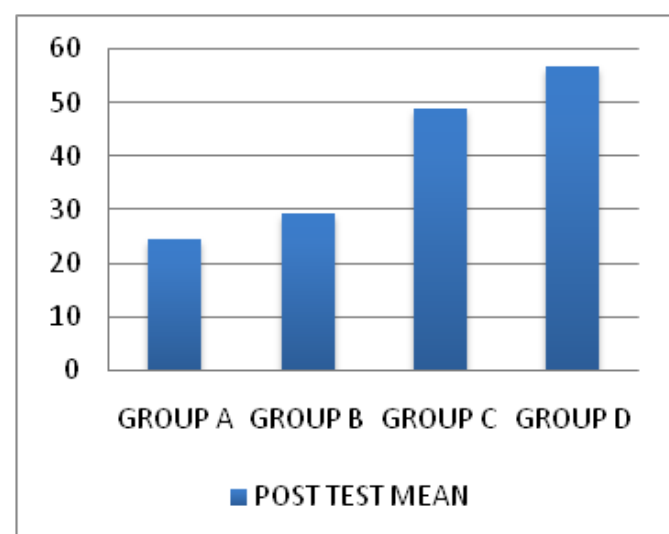
**Table 4: Comparison of Post Tsk Score Using Test of Homogeneity of Variance & one Anova Test Between Group A , Group B, Group C & Group D**

TEST	GROUPS	MEAN	S.D	df1	df2	F-VALUE	SIGNIF-ICANCE
PRE TSK	GROUP-A	65.9	3.87	3	36	0.423	.737*
	GROUP-B	68.6	7.51	3	36		
	GROUP-C	67.2	5.11	3	36		
	GROUP-D	67.0	4.29	3	36		

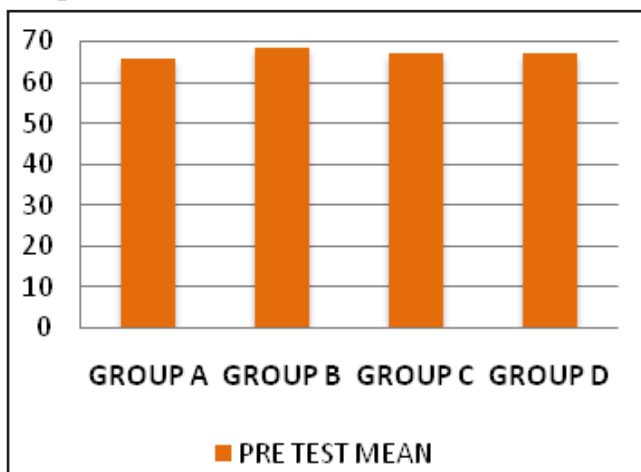
**Graph 1:**



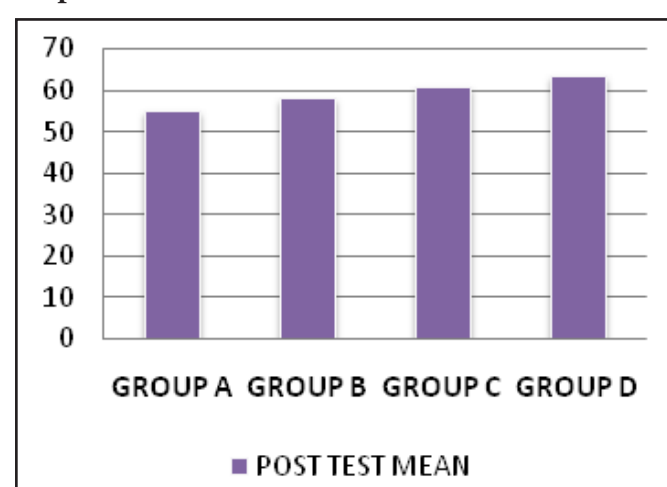
**Graph 2:**



Graph 3:



Graph 4:



## RESULTS

The analysis was randomized experimental study for the subjects with chronic mechanical neck pain. Statistical analysis was done using SPSS software, All the four Groups showed improvement comparing Pre and Post treatment mean value, while Group A Yoga post-test NPPQ (24.60) and TSK (55.20) showed significant difference compared to Group B Pilates post-test NPPQ (29.20) and TSK (58.10) and Group C Tai chi post-test NPPQ (48.80) and TSK (60.80) and Group D Control Group post-test NPPQ (56.70) and TSK (63.70) in reduction of pain by statistically comparing the mean values of Northwick pain park questionnaire and Tampa scale for kinesiophobia of four treatment groups indicated that Yoga as more efficient than the Pilates, Tai chi and Control group.

## DISCUSSION

The present study was done to compare the effectiveness of Yoga, Pilates, Tai chi exercise along with control group in patients with chronic mechanical neck pain.

Group A- received Yoga exercise, Group B received Pilates exercise, Group C received Tai chi exercise and Group D received Control Group exercise. All the groups had equal number of participants and showed no statistical significance with respect to their gender distribution, which could have altered the results of the study and were well matched.

When the intra group mean value of Northwick pain park questionnaire was analyzed. Group A pre test mean NPPQ (57.3) and post test NPPQ (24.60). The mean value of Group B Pre test NPPQ (56.4) and the post test NPPQ (29.20). Group C pre test mean NPPQ (56.8) and post test NPPQ (48.80) and group D pre test NPPQ (57.6) and post test NPPQ (56.70) from the data analysis: it shows that there was significant decrease in pain (NPPQ) within Group A, Group B and Group C and Group D at ( $p \leq 0.001$ )

When the intra Group mean value of Tampa scale for Kinesiophobia was analyzed. Group A pre test mean TSK (65.9) and post test TSK (55.2). The mean value of Group B Pre test TSK (68.6) and the post test TSK (58.10). Group C pre test mean TSK (67.2) and post test TSK (60.80) and Group D pre test TSK (67.0) and post test TSK (63.70) from the data analysis: it shows that there was significant decrease in pain (TSK) within Group A, Group B, Group C, and Group D at ( $p \leq 0.001$ )

When Standard deviation values of NPQ was analyzed. Group A post standard deviation NPPQ (4.35), Group B post standard deviation NPPQ (5.53), Group C post standard deviation NPPQ (7.03) and Group D post standard deviation NPPQ (5.43) clearly indicated that there was equal reduction in pain intensity (NPQ) at  $P > 0.05$ .

When Standard deviation values of TSK was analyzed. Group A post standard deviation TSK (2.29), Group B post standard deviation TSK (3.17), Group C post standard deviation TSK (4.31) and Group D post standard deviation TSK (3.80) clearly indicated that there was equal reduction in pain intensity (TSK) at  $P > 0.05$  shows statistically significant improvements.

Bussing A, Ostermann et al, 2012 - effect of Yoga interventions on pain and pain associated disability 'had concluded that Yoga is useful for several pain associated disorders.

Michalsen - 2012 - 'Yoga for chronic neck pain' had concluded that yoga appears to be an effective treatment in chronic neck pain with additional effects on



psychological well being and quality of life.

Sang - Dol Kim - 2016 -Effects of Yoga on chronic neck pain – A systemic review of RCT had discussed about benefits of yoga in chronic neck pain and it was found to provide a safe, effective therapy for chronic neck pain relief.

## CONCLUSION

The study concluded that the Yoga is more effective than the Pilates and Tai chi and Control Group exercise for chronic mechanical neck pain while Pilates. Tai chi and control Group exercise even showed a considerable decrease in symptoms when comparing the post test mean values. Yoga is effective in reducing pain, disability, quality of life and fear of movements in subjects with mechanical neck pain. Yoga proved to be equally efficacious and safe, it may be considered a suitable alternative in the treatment for subjects with neck pain.

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