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Effect of worksite physical activity program on neck pain among nurses

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Abstract

Background and Objectives: A work site physical activity program that includes the component of physical activity. Benefits of WSPAP are reduce health risk, strengthen the bones and muscles, improves the ability to do daily activities and increase the chance of living longer [9]. Work related musculoskeletal disorder (WMSD) is a wide range of inflammatory and degenerative disease and disorders that result in pain and functional impairment arising when an individual is exposed to work conditions. The cause of work related MSDs are usually multifactorial including physical, ergonomic, and psychological factor [1]. WMSDs usually occurs in workers who have excessive repetition ,awkward postures ,and heavy lifting [2]. Objectives were To obtain the effect of worksite physical activity in reducing neck pain among nurses. To study the effectiveness of worksite physical activity in reducing neck pain among nurses by comparing the findings with a control group.

Methods: This was an experimental study conducted among nurses in the various departments of hospital. 30 subjects participated in the study in which 15 were in experimental group and 15 were in the control group. Prior to the study an informed consent was signed and in the procedure was explained to the subjects. The exercises include Neck warm up and mobility exercise, neck stretching exercises, neck isometrics and postural advices. Duration of the intervention were of 4 weeks. And outcome measure used to rate there pain and subjective discomfort during the working hours was neck disability index and numeric pain rating scale.

Results: the study result suggest that there is a significant improvement in the scores on neck disability index and numeric pain rating scale for the experimental group post intervention. By comparing the pre-test and post-test neck disability scores in nurses in the experimental group, mean change is the 23.74 is the difference between pre-test and post-test (42.67&18.93).

Interpretation and Conclusion: Statistically it is observed that, the work site physical activity program leads to a significant improvement in strength and decrease neck pain of the subjects under study. Based on the performed study, it can be concluded that WSPAP can be performed as a daily routine to improve strength and to decrease pain on neck.

Keywords: neck pain, work site physical activity program, neck disability index, numeric pain rating scale

Introduction

Physical activity is essential for good health, reduce the risk of major illness such as heart diseases, type 2 diabetes and cancers. A work site physical activity program that includes the component of physical activity. The WSPAP also has potential to increase employees productivity, reduce absenteeism and increase morale. Benefits of WSPAP are reduce health risk, strengthen the bones and muscles, improves the ability to do daily activities and increase the chance of living longer [9].

Work related musculoskeletal disorders (WMSDs) are a wide range of degenerative and inflammatory disorders, usually arises as a result of exposure of an individual to a variety of work conditions. Even though the causes of these work related musculoskeletal disorders are multifactorial, it may often results in pain and functional impairments due to physical, ergonomic and psychological factors [1].

WMSDs are of acute and chronic types and this may leads to excessive loading of muscles, ligaments, tendons, inter vertebral discs, cartilages, bones and also nerves and blood vessels supplying these structures [2]. Although the WMSDs affect a wide variety of working populations, nurses, intensive computer users and office workers are in the frontline.

These professionals often keep their neck in awkward postures, perform frequent lifting and transfers of heavy weights or even repetitive usage of neck muscles as part of the nature of their work [5].

Various studies have reported the prevalence of disability rate among individuals having neck pain from 15% to 44%. It is reported that, the female gender is most commonly affected by work related stresses. Also, the neck pain related disability reported globally ranges from 7% to 11%; which suggests that, the neck pain is a common problem among the different work sectors. This may results in tightness of both neck and upper back muscles, or in many other cases it can even lead to pinching sensation of the nerves originating from the cervical vertebrae. Neck pain can also be caused due to other numerous spinous problems, joint disruptions and maintenance of poor postures etc [6].

In order to reduce these work related problems, a work site wellness program can be implemented to maintain a healthier work force, thus increasing the productivity of individuals and also to reduce absenteeism. Work site wellness programs generally involves a physical activity component which encourages physical activity through an multi – component approaches of offering support from management, in forms of social support, policies and access to opportunities [7].

While examining different work sectors and working populations, nurses working in various departments have more chances of getting neck pain due to their repetitive activities of neck, prolonged duty schedules, and also lack of enough break time in between the working hours. Literatures suggest that, in order to correct work related musculoskeletal disorders work site physical activity program possess a potentially effectiveness. Studies are fewer related to work site physical activity among nurses [7].

Hence, this study aims at finding out the effectiveness of worksite physical activity program in reducing neck pain among nurses, in order to reduce the neck pain.

Methodology

Study Design: Experimental Study Design

Sampling Method: Random Sampling Method

Sample Size: 30

Selection Criteria

A. Inclusion Criteria

1. Being employed in the current hospital for atleast 12 months
2. Age below 50 years, females
3. Nurses having history of neck pain for greater than 3 months
4. subject with nonspecific neck pain ie; without any etiology like infection or inflammation
5. subject with minimum to moderate disability score ie; less than 30%.

B. Exclusion Criteria

1. Known case of Disc prolapse, spinal canal stenosis
2. H/o severe trauma
3. Pregnancy
4. H/o surgical treatment of neck
5. Subject taking medical treatment for any other disease condition.

Materials Used

- Stop watch (fast track): display type : digital- 3 button digital stop watch

- Armless plastic chair not cushioned (1 ft 5 in 2 ft) Goniometre (180 degree)

Study Setting: Indo American Hospital, Vaikom, Kottayam, Kerala

Study Duration: 1 Year (August 23, 2019 TO August 24, 2020)

Outcome Measures

1. Neck Disability Index

The NDI is a modification of the Oswestry Low Back Pain Disability Index. It is a Patient completed, condition specific functional status questionnaire with 10 items including pain, personal care, lifting, reading, headache, concentration, work, driving, sleeping and recreation. The test can be interpreted as a raw score, with a maximum score of 50 or as a percentage.

0 points or 0% means: no activity limitations.

50 points or 100% means: complete activity limitations.

A higher score indicates more patient rated disability.

2. Numeric Pain Rating Scale

The NPRS is a segmented numeric version of the visual analogue scale(VAS) in which a respondent selects a whole number (0-10 integers) that best reflects the intensity of his /her pain. The common format is a horizontal bar or line. Similar to the VAS, the NPRS is anchored by terms describing pain severity extremes.

High test-retest reliability has been observed in both literate and illiterate patients ($r = 0.96$ and 0.95 respectively) before and after medical consultation.

Validity

For construct validity, the NPRS was shown to be highly correlated with the VAS in patients with chronic pain conditions, correlation range from 0.86 to 0.95

Variables

Independent Variable: Stretching And Strengthening

Dependent Variable: Pain

Study Procedure

The study population included 30 patients fulfilling both inclusion & exclusion criteria. They were divided into 2 groups in which Group A is the experimental and Group B is the control.. A brief description about the procedure was given to the subjects before commencement of the study. Informed consent was obtained from each subject prior to participation. Group A continued with their normal exercise and they had undergone worksite physical activity program. Group B had not undergone any treatment they stay physically active.

Group A: Experimental Group

15 subjects were randomly assigned in order to participate in the work site physical activity program.

Neck Warm Up and Mobility Exercise include: Cervical flexion, extension, side flexion & rotation of available ROM was performed .Each exercises was performed 2 times a day for 10 repetitions.

Self Neck Stretches: Which include cervical extensor stretching, stretching of trapezius, stretching of sternocleidomastoid muscle. Each of the exercise was

performed 2 times a day for 5 repetitions.

Isometric Strengthening Exercise: Isometric exercises for cervical flexors, extensors, and side flexors. The hold time for these isometric exercises were 5 seconds. These exercises was performed twice a day for 10 repetitions

Postural Advice: Chin tucking, shoulder shrugging, shoulder rolling, scapular retraction were advised. These exercises align the upper back posture.

Chin Tucking: In standing position, subjects pull back the chin while keeping the eyes level. This will be done for 15 repetitions.

Shoulder Shrugs: In standing position, subject shrugs the shoulders, bringing them up towards the ears and dropping them back. This is done for 15 repetitions.

Shoulder Rolls: In standing position, subject rolls the shoulders forward and backward in a circle respectively. Then the participant relaxes and repeats the sequences for 15 times.

Scapular Retraction: In standing position, subjects brings the shoulder blades together; participant then relaxes and repeats the procedure for 15 times. After 4 weeks, post test evaluation was done.



Fig 3: Showing the method of Neck extension Isometrics



Fig 4: Showing the method of Neck flexion Isometrics



Fig 1: Showing the method of Neck Extension (neck warm up exercise)



Fig 5: Showing the method of Neck Stretching (Trapezius)



Fig 2: Showing the method of Neck Side rotation (neck warm up exercise)



Fig 6: Showing the method of Sternocleidomastoid Stretching



Fig 7: Showing the method of Shoulder shrugging



Fig 8: Showing the method of Scapular retraction exercise

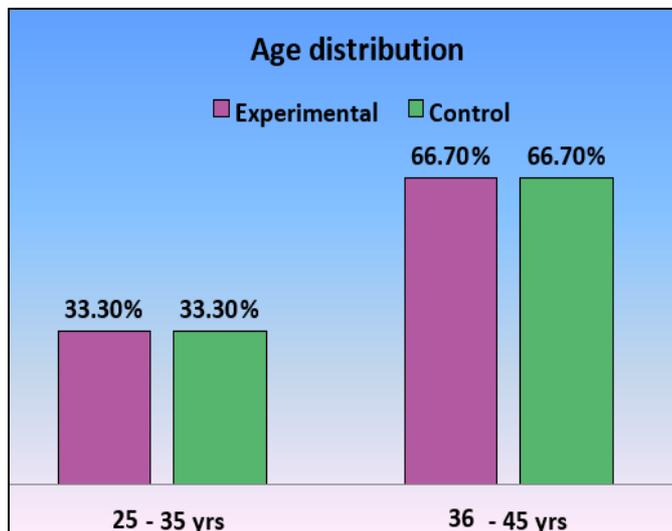


Fig 1: Age Distribution

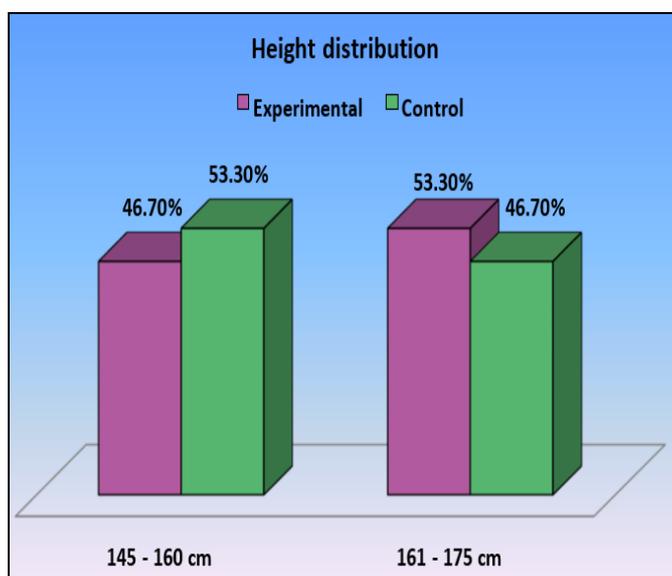


Fig 2: Height distribution

Group B. Control Group

The control group includes 15 subjects, they were instructed to stay physically active and follow their ongoing activities. For both groups pre-test values were taken on the first day & the post-test values were taken after the total study duration of 4 weeks.

Statistical Analysis
Demographic profile

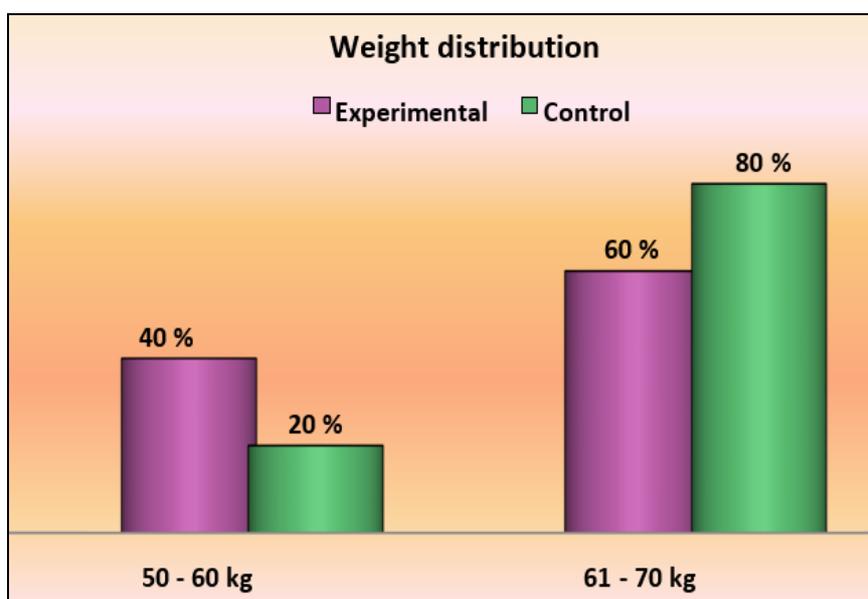


Fig 3: Weight distribution

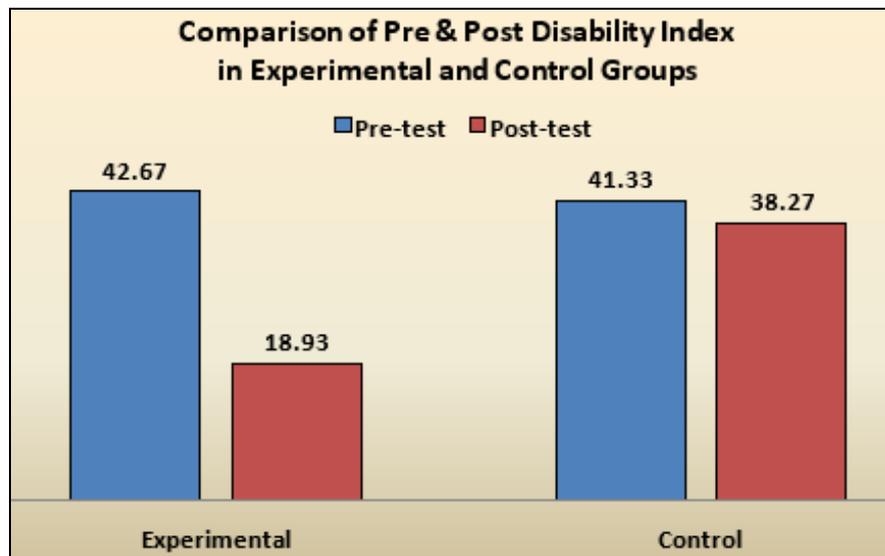


Fig 4: Statistical analysis of Neck disability index using t-tests Comparison of Pre-test Post-test Neck disability index in Experimental and Control Groups

Table 1: Mean, S.D. and t-value to compare the pre-test Neck Disability Index scores between Experimental and Control Groups using t-test

Group	Pre-test Mean	S.D.	Difference in mean	n	t	df	table value	p-value
Experimental	42.67	4.7	1.33	30	0.757	28	2.05	$p = 0.46$
Control	41.33	4.94						

The Mean column in the t test table displays the mean pre-test disability index scores in experimental and control group respectively. The standard deviation column displays the standard deviation of the scores in two groups. The difference (1.33) shows the difference between mean in two groups

(42.67&41.33). Since the t -value 0.757, is less than the $table$ value 2.05, p -value > 0.05, there is no significant difference in pre-test disability index scores between the experimental and the control groups. So we can consider the groups as homogenous in the baseline level.

Table 2: Mean, S.D. and t-value to compare the post-test Neck Disability Index scores between Experimental and Control Groups using t-test

Group	Mean	S.D.	Difference in mean	n	t	df	table value	p-value
Experimental	18.93	3.1	19.34	30	11.69	28	2.05	$p < 0.05$
Control	38.27	5.6						

The Mean column in the t test table displays the mean post-test disability index scores in experimental and control group respectively. The standard deviation column displays the standard deviation of the scores in two groups. The difference (19.34) shows the difference between post-test mean in two groups (18.93&38.27). Since the t -value 11.69, is greater than the $table$ value 2.05, p -value < 0.05, there is a significant difference in post-test disability index scores between the experimental and the control groups. The disability index in the experimental group is significantly low. Hence strengthening and stretching exercise has significant high effect as compared with pre-exercises. Statistical analysis of pain using t-tests

Since the t -value, 5.6 is greater than the $table$ value 2.15, $p < 0.05$, there is a significant difference existing between the pre-test and post-test disability index scores among individuals in the control group.

2. Evaluation of Numeric Pain Rating Scale

By comparing the pre-test and post-test of NPRS in nurses in the control group, mean change -0.4* is the difference between pre-test and post-test (5.93&6.33). Since the t -value, 2.1 is less than the $table$ value 2.15, $p > 0.05$, there is no significant difference existing between the pre-test and post-test pain scores among individuals in the control group.

Experimental Group

1. Evaluation of Neck Disability Index

By comparing the pre-test and post-test neck disability scores in nurses in the experimental group, mean change is the 23.74 is the difference between pre-test and post-test (42.67&18.93). Since the t -value, 31.54 is greater than the $table$ value 2.15, $p < 0.05$, there is a significant difference existing between the pre-test and post-test disability index scores among individuals in the experimental group.

2. valuation of Numeric Pain Rating Scale

By comparing the pre-test and post-test NPRS scores of in nurses in the experimental group, Mean change 2.06 is the

Table 3: Comparison of Pre-test Post-test pain in Experimental and Control Groups

	Pre-test mean	SD	Post-test mean	SD
Experimental	6.33	1.11	4.27	0.29
Control	5.93	0.96	6.33	0.89

Result

Control Group

1. Evaluation of Neck Disability Index

By comparing the pre-test and post-test neck disability index scores in nurses in the control group, mean change 3.06 is the difference between pre-test and post-test (41.33&38.27).

difference between pre-test and post-test (6.33&4.27). Since the t-value, 10.02 is greater than the table value 2.15, $p < 0.05$, there is a significant difference existing between the pre-test and post-test pain scores among individuals in the experimental group. The pain has significantly reduced in the post test. This proves the effect of therapeutic exercise program on pain.

Discussion

The purpose of this study was to find out the effect of worksite physical activity on neck pain among nurses. The therapeutic exercise included warm up exercise, stretching of the neck muscles and strengthening exercise of the neck muscles and postural advice.

In this study Indo American Hospital were taken into consideration. Subjects were selected after screening for fulfilment of the Inclusion and Exclusion criteria. 30 nurses were selected randomly and equally divided into 2 groups- Control group and Experimental group.

Control group continued with their usual activities without the therapeutic exercise program and experimental group underwent therapeutic exercise program for neck pain. The treatment duration was 20 minutes thrice in a week.

On statistical analysis of Numeric Pain rating scale scores, the mean pretreatment pain score of control and experimental group was 6.33 and 5.93 and mean post treatment pain scores of control and experimental group was 6.33 and 4.27 respectively. This result shows that there is an increase of -0.4 units of pain in control group and a decrease of 2.06 units of pain in experimental group; which indicates that there is a considerable decrease in pain in experimental group.

Shereen lou *et al*, found that Work related neck pain is one of the common musculoskeletal disorders that affect millions of workers throughout the world across variant work or sectors of services like nurses and office workers especially among those who are intensive computer users and keeping their neck in awkward postures or moving their neck repetitively[8].

Bruno *et al*, (2008) found that maintaining static posture for a prolonged time as seen in occupational setting compresses the veins and capillaries inside muscles thereby causing microlesions from the absence of oxygenation and nutrition. nurses needs static working postures for prolonged durations which leads to compression of veins and capillaries, which in turn leads to decreased oxygen supply to the muscle and decreased waste removal, this causes muscle imbalance, fatigue, discomfort and pain as a result of disruption of tissues. Stretching lengthens the muscles which are shortened, deprived of oxygen, makes the muscle pliable, increases oxygen supply, remove waste products thus decreasing pain.

On statistical analysis the mean pre-treatment NDI scores of experimental and control group were 42.67 and 41.33 and mean post-treatment NDI scores of experimental and control group was 18.93 and 38.27 respectively. This shows there is a significant difference existing between the experimental and control group.

From the statistical analysis we understood that experimental group who were undergone WSPAP have more effects than that of persons who didn't undergone therapeutic exercise.

The mechanism for which can be similar to the one explained by Magnusson *et al*,1996. In their study they found that stretching reduces pain and following that there is consequent improvement in function by elongation of the muscle tendon unit, reduction in peak force, decrease in rate of force production and tensile stress on the muscle tendon unit, and

alteration of the viscoelastic property of the muscle-tendon unit, thus resulting in less tight tissue.

On the basis of the finding it can be assumed that the Nurses must be engaging in worksite physical activity program exercise routines such that they can prevent the ill effects of prolonged static posture which is an integral part of their profession.

Conclusion

It is observed that, the work site physical activity program leads to a statistically significant improvement in strength and decrease neck pain of the subjects who are participated in the study. Also, in Indian scenario, not much studies has been conducted, proving the benefits of work site physical activity program for neck pain among nurses. Based on the performed study, it can be concluded that WSPAP can be performed as a daily routine to improve strength and to decrease neck pain.

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