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## Effects of active release technique in males as compared to females with postural and psychological cervical muscle spasm: A Quasi experimental study

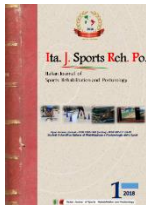
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## Abstract

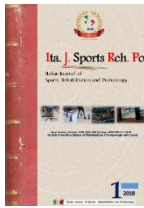
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Active Release Technique is a soft tissue release technique of the soft tissues which is nowadays being commonly practiced in the world as it gains recognition all around. This technique is being introduced in Pakistani community in this study. Further the purpose of application of this technique was to check the difference between gender responses in neck extensor muscle spasm. Bone mineral densities in Asian community are low especially in females which eventually increase stress on muscles resulting in spasm. In this study 15 females and 14 male patients between the age group 20-60 years were selected through simple random sampling making a total of 29 patients. Potential participants were examined and selected through inclusion and exclusion criteria and regional examination of C-spine. 2 questionnaires were used i-e, QVAS and NDI on which subjective measurements were taken. Both groups received heat fermentation for 10 minutes and then were applied with Active Release Technique 3-5 times. This was repeated for 4 sessions on alternate days. Subjective data was collected pre and post treatment on two instruments i-e, Neck Disability Index and Quadruple Visual Analog Scale. The data was recorded and manipulated on SPSS software for analysis. Statistically and clinically significant improvements were seen in both groups throughout the duration of the study with regards to the level of perceived psychological stress, pain and disability. Whereas, female group came up with more improvement. It was seen that ART proved to be better regarding NDI scores as compared to QVAS with a p value of 0.000 and 0.003 respectively. Upon completion of this study, it became evident from subjective data that both treatment groups demonstrated statistically and clinically significant changes. Hence both the groups presented with equal changes as an effect of ART but we have to get more skilled training in this technique. ( Ali Rafaqat, Muhammad Usman, M Farrukh Shahzad,,Muhammad Irfan Sattar "Effects of active release technique in males as compared to females with postural and psychological cervical muscle spasm: A Quasi experimental study" ItaJ Sports Reh Po 2018; 5 ; 1 870 – 887 ISSN 2385-1988 [online]IBSN 007-111-19-55 CGIJ OAJI :0,101)

*Key points: Postural neck muscles spasm, Psychological neck muscle spasm, Active Release Technique*

## Introduction

Levator scapula and upper trapezius are the muscles that are more prone to become short so their length must be checked (1). Tension and fatigue to upper trapezius, levator scapula and erector spinae is mostly experienced by the people who have postural stress to head and neck as these muscles control or counterbalance weight of the head. (2) Surface EMG studies of the trapezius muscle clearly show that muscular activity significantly increases in response to psychological stress (3). Progressive Muscle Relaxation (PMR) is frequently utilized as a relaxation technique in subjects complaining of increased levels of muscular tension, possibly due to an increased perception of psychological stresses (4).



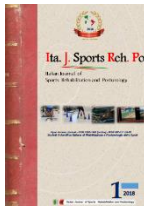
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Tobias et al found that lumbar spine and femoral neck bone mineral density in Caucasians was lower than in Afro-Caribbeans, but higher than in Asians. Consistent with this, bone mineral density was also lower in Asians as compared with the reference Caucasian population, both at the lumbar spine and femoral neck. As a consequence, a higher proportion of Asian women were classified as being at increased risk of osteoporosis than Caucasian women (5). In 1986 after a study revealed that statistical analysis demonstrated a significant positive correlation between lumbar bone mineral density and back extensor strength, even when bone mineral density was corrected for age. Therefore, Asian community is having more bone problems that eventually lead to more muscular pains/strains (6). It is here studied that what are the trends of application of this ART in our Asian community particularly in Islamabad.

## Methodology

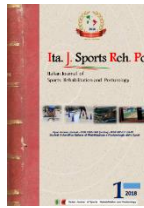
Quasi experimental design was selected as a comparison was to be made pre- and post-treatment and a cause and effect relationship was studied. So, comparison group pre-test post-test quasi experimental design was selected in which both groups were designed on the basis of gender whoever fulfilled the inclusion criteria. Recruitment of the participants was done at the Physical Therapy OPD at 2 settings in Islamabad and Rawalpindi i-e, Fauji Foundation Hospital, Rawalpindi and NIRM Islamabad. This was done through simple random sampling of the patients of either sex who came for treatment at OPD. Patients after assessment were selected who were having pain and limited ROM or either in cervical region due to cervical extensor muscle spasm. Patients between the ages of 20-60 were selected for the study.

Twenty-nine participants who voluntarily partook in this study were placed into two groups. Group 1 for male patients and 2 for females, comprising of fourteen and fifteen participants



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respectively. Each participant was assigned with a number from one to twenty-nine at the start of the study, according to the sequence in which they had entered the study. All the participants were screened through cervical examination and medical history. Further they were included with the help of two questionnaires i-e, quadruple VAS and NDI. All the participants were screened through physical examination. Further inclusion and exclusion criteria was also implicated. Patients who have NDI score less than 22 were excluded. Group 1 was allocated to males, Group 2 was allocated to females. Subjective data was initially collected through VAS and NDI questionnaires and after 4 sessions on alternate days patients were again requested to fill the questionnaires. The VAS is a 100mm continuous line. The number 0 is placed at one end of the line and represents the least level of pain experienced by the patient. At the other end of the line, the number 10 is placed which represents the worse level of pain experienced by the patient. The participant is asked to mark the area on the scale that most accurately relates to their level of pain at that time. The VAS is scored by placing a metric ruler against the line and taking a numeric value for the point marked by the participant (7). The Neck Disability Index (NDI) was developed in the late 1980's by Dr. Howard Vernon and first published in the Journal of Manipulative and Physiological Therapeutics in 1991. The NDI was modelled on a similar instrument for assessing self-rated disability in low back pain patients – the Oswestry Low Back Pain Disability Questionnaire, which had been in existence for about eight years. Dr. Vernon received permission from the developer of the “Oswestry Index” to modify it for use in neck pain patients. After the data collection it was analyzed by comparing the means of NDI and VAS both pre- and post-treatment. Results were compared through paired sample t test to check the alternate hypothesis.



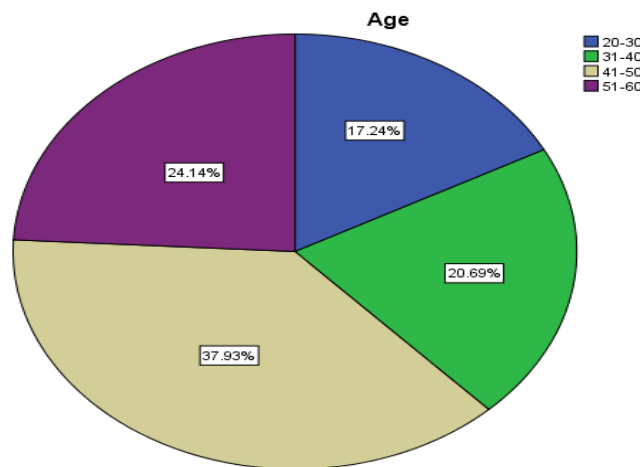
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## Results

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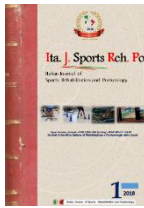
This chapter will cover the results, statistical validity and analysis in the light of subjective findings. 2 groups 1 for male and 2 for female contained 29 patients in total. Both were applied with ART after heat fermentation and results were analyzed. The p-value represents the level of significance of the results and are all set at 0.05. Thus, any p-value that is less than, or equal to 0.05 is considered as statistically significant.

As mentioned in graph 1, In terms of age, 15 female patients between the ages of 23-58 with a mean of 40.8 and 14 male patients between ages of 32-60 years with a mean of 39.43 participated in the study which shows a trend of the groups being comparable. So, both have a mean age of 40.13 years.



Graph 1: Distribution of participant according to their age

In this study Paired Sample t-test was used to compare the average responses on two different variables i.e. visual analog scale and neck disability index and the variation before and after the treatment. T-test has been performed to test the Alternate hypothesis. As discussed earlier it is a ten-point score scale at which the patient marks his/her pain at

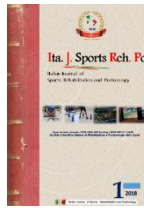


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that time. Here pre- and post-treatment scoring was requested to the patient for VAS and was recorded. .Table 1 shows demographic distribution of each participant and their individual VAS score and NDI score before-and after-treatment.

Table 1: Descriptive statistics of participant and their individual VAS and NDI score before and after treatment

Patient	Gender	Age	Pretreatment VAS score	Post treatment VAS score	Pre- NDI treatment score	Post treatment NDI score
1	M	33	2	2	11	11
2	F	38	6	5	53	31
3	F	50	7	8	57	62
4	M	48	6	5	46	40
5	M	56	5	4	42	32
6	F	45	8	6	60	53
7	M	43	6	4	36	26
8	F	48	6	6	51	46
9	F	42	4	5	29	20
10	M	34	5	7	32	40
11	F	29	7	4	66	51
12	F	23	4	4	24	24
13	M	54	4	4	52	50
14	F	28	5	4	31	24
15	F	58	4	2	25	22
16	M	45	6	5	28	24
17	F	45	4	4	37	35
18	F	46	7	6	46	44
19	F	23	4	2	25	12
20	M	33	3	5	35	40
21	M	57	3	3	26	20
22	M	32	9	7	28	18
23	F	53	8	6	57	27
24	F	47	9	3	70	32
25	M	60	4	3	36	36
26	F	37	7	5	31	23
27	M	57	6	3	27.5	10
28	M	40	5	4	23	19
29	M	51	8	8	40	36



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## Visual Analogues Scale (VAS)

It is a ten-point score scale at which the patient marks his/her pain at that time. Here pre- and post-treatment scoring was requested to the patient for VAS and was recorded. Table 2 shows Visual Analogues Scales of Male and female group separately and mutually.

Table 2: VAS Score before and after treatment in both genders

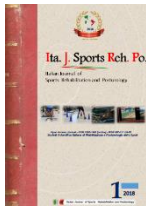
Scale	Male group		Female group		For both groups		
	Mean	Std dev	Mean	Std dev	mean	Variance	St dev
Pretreatment VAS	5.14	1.84	6.0	1.67	5.58	3.27	1.8
Post treatment VAS	4.57	1.67	4.66	1.57	4.6	2.6	1.6

## Paired Sample Statistics

Table 3 has the descriptive statistics for the variables being tested. It shows that the mean value for pre-test visual Analog Scale score is 5.58 while it is more than post -test visual analog scale score which is 4.6.

Table 3 Paired Sample Statistics for Visual Analog Scale Score

Pair 1	Mean	N	Std. Deviation	Std. Error Mean
Pre-test Visual Analog Scale Score	5.58	29	1.8	.11174
post-test Visual Analog Scale Score	4.6	29	1.6	.10386



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### Paired Sample Correlations

Table 4 shows the correlation between the variables being tested. The table below shows that the correlations between the pre-test Visual Analog Scale Score Post-test Visual Analog Scale Score is .428 and they are positively correlated.

Table 4: correlations between pre-and Post-Test VAS score

Pair 1	N	Correlations	Significance
pre-test Visual Analog Scale Score and post-test Visual Analog Scale Score	29	.428	.020

### Neck Disability Index

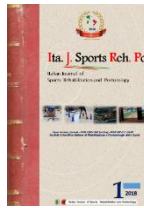
Subjective values of Neck Disability Index score for both groups were recorded. They were recorded on the day 1 initially and then after the completion of whole treatment for both groups and is interpreted in the following.

The table 5 shows that the mean value for pre-test Neck Disability Index score is 38.77 while it is more than for post -test NDI scale score having value 31.31.

Table 5: Mean and st. Deviation of male and female group pre-and-posttreatment NDI

Scale	Male group		Female group		For both groups		
	Mean	Std dev	Mean	Std dev	mean	Variance	St dev
Pretreatment NDI	33	9.98	44.13	15.53	38.77	203.78	14.27
Post treatment NDI	28.7	11.7	33.73	13.86	31.31	172.35	13.12





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Table 6 shows Paired Sample Statistics of NDI with mean value standard deviation and standard error mean.

Table 6: Paired Sample Statistics for Neck Disability Index Score

Pair 2	Mean	N	Std.Deviation	St. Error Mean
pre-test Neck Disability Index Score	38.77	29	14.28	.25556
post-test Neck Disability Index Score	31.31	29	13.12	.24261

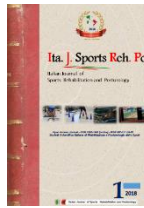
As compared to the visual analog scale score the correlation between pre-test Neck Disability Index Score Post-test Neck Disability Index Score is .781 as shown in table 7 and this shows neck disability is highly correlated as compared to Visual Analog Scale.

Table 7: Paired Sample Correlations for Neck Disability Index Score

Pair 2	N	Correlations	Significance
pre-test Neck Disability Index Score and post-test Neck Disability Index Score	29	.781	.000

### Paired Sample Test

Table 8 shows different statistic measures and the significance level which is .05 at 2-tailed. The t-statistic value for pair -1 is 3.285 and for pair -2 it is 4.170. The degrees of freedom is 28. The 2-tailed significance value for pair -1 is .003 and for pair-2 it is 0.000 showing that



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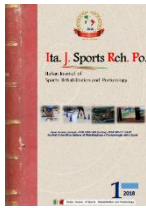
for pair -1 is .37931 and for pair-2 it is .68966 with a standard deviation of .62185 and .89056 respectively. The 95% confidence interval for the difference ranged from .14277 to .61585 for pair-1 and for pair-2 it ranges from .35090 to 1.02841. As  $0.000 < .05$ , conclude that the Neck Disability Index Score statistically significantly higher than the Visual Analog Scale Score where  $0.003 < .05$  but less significant as compared to neck disability index.

Table 8: Paired sample analyses pre- and post-treatment

	Paired Differences					T	df	Sig. (2-tailed)
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1 pre-test Visual Analog Scale Score - post-test Visual Analog Scale Score	.3793	.62185	.11547	.14277	.61585	3.285	28	.003
Pair 2 pre-test Neck Disability Index Score - post-test Neck Disability Index Score	.6896	.89056	.16537	.35090	1.02841	4.170	28	.000

### Discussion

Patients were randomly selected between the ages of 20-60 years. The reason for selecting this slot of age was to observe the trend of which age group is more affected with cervical spasms. Further in ages above the bones are fragile at their most so the response may be worse of the targeted treatment. Data shows that most of the patients having cervical issues age between 40 and 55. The easy and convenient access of working tools



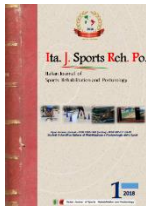
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promotes inactivity and therefore a rise in repetitive stress injuries associated with desk and computer work. Simple, everyday movements—like habitually holding a telephone between the ear and shoulder—can trigger upper trapezius pain (8).

Male and female patients were selected. The inclusion criteria, number of patients and there was no statistically significant difference between both genders so the groups were comparable. Purpose of study focusing on gender was to check the responses of a particular gender as muscle flexibility, bone characteristics vary with respect to gender. It was assumed that the study wouldn't make any difference between the genders as it was about a technique that is recognized and must have similar affects to both gender.

Psychological stress, more specifically the effect of it on skeletal muscles, can be treated effectively with PMR therapy as demonstrated by a study (4). According to the literature in chapter two, there are multiple physiological processes by which psychological stress can influence the development of muscle pain. Amongst these, elevated muscular activity is of particular interest when examining chronic neck pain. This is reflected by the substantial amount of studies investigating the link between chronic neck pain and trapezius muscle activity (9,10,11,12,13,14). PMR therapy may lead to a state of relative freedom from both anxiety and skeletal muscle tension (15).

The presence of a MFTP creates a painful self-perpetuating muscle condition that may lead to a decrease in the flexibility of the affected muscle and therefore, the generation of pain. This muscle subsequently avoids stretching, eventually resulting in a decrease range of motion and general disability (16). When considering the mean scores and change within the same group I-e, male or female this technique showed some level of change in the data which was considered significant. Hence, we can say that pre-treatment and post-treatment scores were different for example pre-treatment score mean for female group was 5.14



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while post-treatment score was 4.17 which shows a positive change in the scores of VAS in the same group

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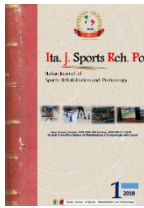
During the group analysis for males and females there are statistically significant results that correlate between both groups which showed marked improvement while the improvement seems to be more significant in female group. Analysis shows that females perceive more pain as their pain cumulative scores were high as compared to males and at the same time showed better results but both the groups showed improvement.

Considering the change pre- and post-treatment, both the groups showed marked change which reveals that both the groups are positively affected by ART. Female group showed improvement as the table 2 shows that the mean value for pre-test Neck Disability Index score is 38.77 while it is more than for post -test NDI scale score having value 31.31.

Both the groups in comparison showed improvement as their mean scores have a positive correlation i-e, male group has a mean of 33 and improved to 28.7 post treatment. Similarly, female group has a score of 38.77 and 31.31 accordingly.

Both the groups showed improvement which reveals that both the genders are affected by ART. But it seems to be more affective in the female group. It was seen that females usually pretend to mark their pain more than actual one which was further confirmed by malingering signs so it may be the reason of significant differences in pre- and post-treatment scores.

Both the instruments which were recorded with data showed significant changes but a paired correlation showed a comparative analysis revealing that ART made significant differences to NDI scores as compared to VAS. It needs to be further investigated that which



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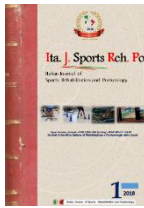
instrument shows greater changes as it may be the result of inability of the patient to mark scores properly or pretending to mark greater pain to acquire attention of the researcher.

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Active Release therapy has been shown to reduce pain and also have an effect on muscle hypertonicity, which is often associated with the development of adhesions and trigger points (17). It has also been shown to induce reflex responses that influence the health of the spine in a variety of ways. These include a reduction in pain, reflex inhibition of spastic muscles, and the short-term reflex activation of skeletal muscles in the back and upper and lower limbs. These reflex responses are produced by a variety of receptors. These receptors include the pain receptors, cutaneous receptors, the mechanoreceptors in the capsule of the spinal facet joints, and the proprioceptors of the skeletal muscles which include the muscle spindles and Golgi tendon organs (10).

When looking at the subjective results of this study, it is evident that both groups regardless of gender, clinically demonstrated the greatest reduction in pain and disability throughout the duration of the study as indicated by the VAS and Vernon-Mior Neck Pain and Disability Index questionnaire.

A study was conducted to assess gender based differences in pain due to upper trapezius spasm and pain induced alterations in muscle activity. Surface EMG was recorded in ten women and 9 men who were volunteers to this study. 5.8 % hypertonic saline was injected to the muscle and short (5 sec) and long (3 min) contraction was performed with 90-degree shoulder abduction. Root mean square and mean power frequency was recorded which showed significant decrease in mean power frequency in men as compared to women. Which shows pain induced changes in motor control strategies with a decrease sustained muscle contraction in men as compared to women which shows variation in pain in upper trapezius between genders (18). Hence it was also seen that women were having



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more musculoskeletal issues of upper extremities as compared to males (19) which was seen later on as the number of female patient with shoulder and cervical pain is more in our OPDs.

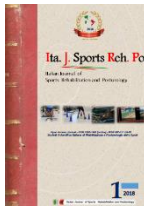
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## Conclusion

The aim of this study was to investigate and compare the effects of Active Release Technique in male and female groups with cervical muscle spasms in which upper trapezius and levator scapula were focused mainly. The conclusion was based on findings gathered from the VAS and Neck Pain and Disability Index Questionnaire readings to measure mean pre- and post-treatment scores. All subjective measurements were taken before and after the treatments and recorded. Upon completion of this study, it became evident from subjective data that both treatment groups demonstrated statistically and clinically significant changes. However, female and male group, demonstrated statistical and clinical improvement with regards to all subjective measurements. Both Groups demonstrated a statistically significant increase in the mean values of VAS and Neck Disability Index Questionnaire readings.

### Corresponding author:

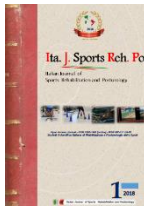
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“Effects of active release technique in males as compared to females with  
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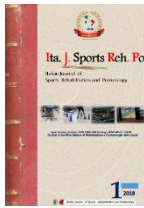
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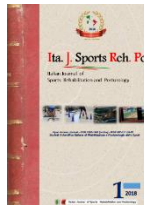
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