



**ORIGINAL RESEARCH PAPER**

**Physiotherapy**

**EFFECTIVENESS OF HOME EXERCISE PROGRAM ON SHOULDER PAIN AND FUNCTIONAL STATUS IN HORTICULTURE WORKERS**

**KEY WORDS:** Horticulture workers, Shoulder pain, Shoulder function, Home exercise program.

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**ABSTRACT**

**BACKGROUND:** The person who are working in the horticulture field they are having repeated movements, heavy physical work, lifting, bending, twisting, forceful and vibratory movement. It may lead to shoulder pain and reduction in shoulder function.

**OBJECTIVE:** The purpose of the study is to determine the effectiveness of home exercise program on shoulder pain and shoulder function in horticulture workers.

**METHODOLOGY:** Study design was Quasi-experimental design. Study type was Pretest- Posttest type. 18 subjects were selected according to convenient sampling method. Duration of the study was 4 weeks and the study was done in SRM University, Kattankulathur campus.

**PROCEDURE:** The subjects were selected according to inclusion and exclusion criteria and they were treated with home exercise protocol. Pretest and Posttest values of Visual Analogue Scale (VAS) and Shoulder Pain and Disability Index (SPADI) were assessed and documented.

**RESULTS:** At the end of the analysis it was concluded that the Posttest values result was significant (p=0.0001). It shows that there is a significant improvement in shoulder function and reduction in shoulder pain followed by a home exercise program among horticulture workers.

**CONCLUSION:** There was a significant improvement in shoulder function and reduction in shoulder pain followed by a home exercise program among horticulture workers.

**INTRODUCTION**

Horticulture is a branch of agriculture which mainly deals with reproduction of plant life. Work system and tasks of horticulture involves Soil preparation, Seeding production, Planting, Crop Handling, Harvesting, and Post-Harvesting.<sup>1</sup> It fully involves the management and cultivation of gardens and lands. These cultivation and management of gardening involves repetitive movements which affects the whole upper limb.

Types of accidents in horticultural services leads to serious sprains and strains such as;

- 1) During Lifting, Pulling, and Pushing (Overexertion) causes 65.0% of accident.
- 2) Slips, Trips and Falling type of activities causes 17.0% of accident.
- 3) Others may causes 18% of accident.<sup>2</sup>

Meyers et al(1995) stated that the muscles, joints, tendons, nerves and related soft tissues are affected by occupational musculoskeletal disorders. The upper extremities including neck and shoulders, and the lower back are most commonly affected regions. The inflammation and injuries are more prone to affect the workers due to repeated exposure of same muscle, tendon, or other region. The injuries such as repetitive motion injury, repetitive strain injury, cumulative trauma disorder and occupational overuse syndrome are the most common conditions.<sup>3</sup>

Working in horticulture is tough and physical, and it is usual to feel tired at the end of the day. But ordinary aches and pain usually disappear after a good night rest, while ongoing discomfort and pain can develop into an injury, and that can become a serious long term problem.<sup>4</sup> During an occupational tasks, shoulder tendonitis or non-specific shoulder pain are said to occur due to repeated shoulder activities. Repeated impingement may cause shoulder tendonitis if it is untreated, and may leads to rotator cuff tears.<sup>5</sup>

Shoulder Impingement: when the arm is lifted the acromion presses the rotator cuff which cause shoulder impingement. If any inflammation or injury to the rotator cuff, this impingement will causes pain.

Shoulder Tendonitis: One of the tendons in shoulder's rotator cuff gets inflamed.

Rotator cuff tear: A tear in one of the tendon of these muscles such as supraspinatus, infraspinatus, subscapularis and teres minor. It may occurs due to a sudden injury or result from study overuse.<sup>6</sup>

Mainly the shoulder pain occur due to repeated movements, Long working hours with few break, Heavy physical work, Lifting and forceful movement, Bending and twisting (awkward postures), and Vibration.<sup>7</sup> Aim of this study to find out the effect of therapeutic home exercise program over the shoulder function among horticulture workers. The need of the study is to assess the risk of shoulder pain in horticulture workers due to repetitive work. As there are limited studies on shoulder pain among horticulture workers, hence this study was done. This study is done to promote awareness among physiotherapist to better focus on the management of shoulder pain among horticulture workers.

**METHODOLOGY**

Study Design : Quasi experimental design. Study Type: Pre test – Post test. Sampling method: Convenient Sampling. Sampling Size: 18 Subjects. Study Duration : 4 weeks Study Setting :SRM University, Kattankulathur Campus.

**INCLUSION CRITERIA** of this Study as follows: Total 18 subjects with minimum 5 years experience, Age of 25-40 years both men and women, Visual Analogue Scale Score 3-6 was included, Subjects presented with any of one positive shoulder Impingement test (Neer, Hawkins-Kennedy test). Pain with one or more resisted glenohumeral joint motion (Flexion, Abduction, External Rotation or Internal Rotation).

**EXCLUSION CRITERIA** of this Study as follows: Past history of any rotator cuff surgeries, History of glenohumeral dislocation, or other injuries to the shoulder, Shoulder pain due to cervical pathology.

**MATERIALS USED:** Dumbbells, Exercise Mat, Chair, Stick Towel, Paper, Pen and Pencils

**PROCEDURE**

All the subjects were selected according to the inclusion and exclusion criteria. Further they were explained about the purpose and procedure of this study in their local language and an informed consent was obtained from all the subjects. All the

subjects voluntarily participated after the purpose of the study was explained. A proper clinical evaluation was done and the subjects received pictorial instructions of the exercise intervention for home reference at the end of the initial visit. A preliminary assessment of their pain and shoulder function were assessed using Visual Analogue Scale (VAS) and Shoulder Pain and Disability Index (SPADI) both at the entry of the study (pre-test) and at the follow up (post-test). Subjects outcome data was recorded at the end of 4<sup>th</sup> week.

The following exercise interventions are given to subjects.

1. Posterior shoulder stretch
2. Pectoralis stretch
3. Upper trapezius relaxation exercise
4. Serratus anterior strengthening exercise
5. External rotators strengthening exercise

The subjects performed these two stretches, and the stretches were performed five times per day and holding time for each stretch was 30 seconds. Posterior shoulder stretch was performed by placing the hand over the opposite scapula and by using the opposite hand to adduct the humerus horizontally until the feel of the stretch was achieved. Pectoralis stretch was performed by placing the both hands at shoulder level on adjacent side corner of the room and patient was asked to lean forward into the corner of room and hold it for 30 seconds. Upper trapezius exercise was performed for muscle relaxation, it was performed in front the mirror to get a feedback and it was done five times per day. This exercise was given by raising the arm overhead in the scapular plane. Shoulder shrugging was avoided. The below two strengthening exercises were given three days per week. For serratus anterior strengthening, the subjects performed the exercise in supine lying by protracting the scapula and raising the humerus superiorly with a resistance which is given by using dumbbells. Humeral external rotators strengthening was performed in side lying and the subjects were instructed that, at the initial position the arm is close to their side and then extend the forearm with a hand held weight. At the initial day of treatment subjects 10RM was calculated according to that the resistance were given.

Schedule for strengthening exercise program as given below

- First week - 3 sets of 10 repetitions.
- Second week - 3 sets of 15 repetitions.
- Third week - 3 sets of 20 repetitions.
- Fourth week - The resistance increased with 3 sets of 20 repetitions.

**The following Exercises were given to improve Range Of Motion:**

1. Wall climbing in forward flexion.
2. Wand exercise.
3. Towel stretch. (Internal rotation and External rotation).
4. Codman's pendular exercise.

**DATA ANALYSIS**

The collected data were analyzed and tabulated with the descriptive and inferential statistics. For the descriptive statistics, the mean and standard deviation were calculated and for the inferential statistics, the parametric variables were treated with t-test. The results were tabulated and the results were plotted accordingly.

Data analysis was done by using IBM SPSS STATISTICS 20.

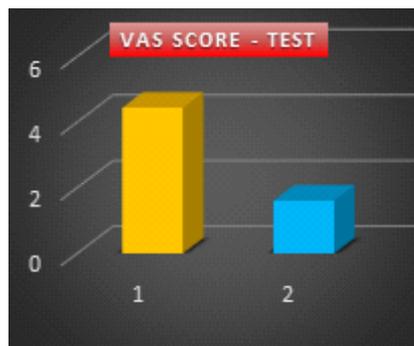
**TABLE 1 PRE-TEST AND POST-TEST VALUE OF VISUAL ANALOGUE SCALE (VAS)**

S. No	Test	Mean	S.D	Variables	T- Test	Significance
1.	Pre-test	4.44	0.98	1.96	4.43	0.0001
2.	Post-test	1.61	0.84	1.69		

P<0.05

From the table 1, the descriptive statistics such as mean and standard deviation of mean for the pre-test and post-test was calculated. It is found that the mean pre-test value of 4.44 has been reduced to the post test value of 1.61. It also shows a statistically significant (p<0.0001) reduction in pain between the pre and post test values of Visual Analogue Scale (VAS).

**GRAPH 1 PRE-TEST AND POST-TEST VALUE OF VISUAL ANALOGUE SCALE (VAS)**



**TABLE 2 PRE-TEST AND POST TEST VALUE OF SHOULDER PAIN AND DISABILITY INDEX - PAIN SCORE**

S. no	Test	Mean	S.D	Variables	T-test	Significance
1.	Pre-test	42.77	10.01	20.03	11.17	0.0001
2.	Post-test	20.88	7.23	14.46		

P<0.05

From the table 2,, the descriptive statistics such as mean and standard deviation of mean for the pre-test and post-test was calculated. It is found that the mean pre-test value of 42.77 has been reduced to the post test value of 20.88. It also shows a statistically significant (p<0.0001) reduction in pain between the pre and post test values of Shoulder Pain and Disability Index (SPADI) – Pain Score.

**GRAPH 2 PRE-TEST AND POST TEST VALUE OF SHOULDER PAIN AND DISABILITY INDEX - PAIN SCORE**



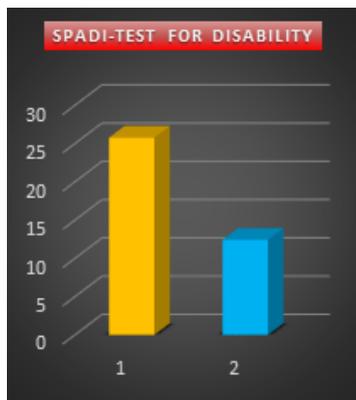
**TABLE 3 PRE-TEST AND POST TEST VALUE OF SHOULDER PAIN AND DISABILITY INDEX - DISABILITY SCORE**

S.no	Test	Mean	S.D	Variables	T-test	Significance
1.	Pre-test	25.76	6.06	12.13	8.34	0.0001
2.	Post-test	12.43	5.41	10.85		

P<0.05

From the table 3, the descriptive statistics such as mean and standard deviation of mean for the pre-test and post-test. It is found that the mean pre-test value of 25.76 has been reduced to the post test value of 12.43. It also shows a statistically significant (p=0.0001) reduction in disability between the pre and post test values of Shoulder Pain and Disability Index (SPADI) – Disability Score.

**GRAPH 3 PRE-TEST AND POST TEST VALUE OF SHOULDER PAIN AND DISABILITY INDEX - DISABILITY SCORE**



**TABLE 4 PRE-TEST AND POST TEST VALUE OF SHOULDER PAIN AND DISABILITY INDEX - TOTAL SCORE**

S.no	Test	Mean	S.D	Variables	T-test	Significance
1.	Pre-test	32.21	6.79	13.59	9.97	0.0001
2.	Post-test	15.46	5.89	11.79		

P<0.05

From the table 4, the descriptive statistics such as mean and standard deviation of mean for the pre-test and post-test. It is found that the mean pre-test value of 32.21 has been reduced to the post test value of 15.46. It also shows a statistically significant (p=0.0001) reduction in pain and disability between the pre and post test values of Shoulder Pain and Disability Index (SPADI) – Total Score

**GRAPH 4 PRE-TEST AND POST TEST VALUE OF SHOULDER PAIN AND DISABILITY INDEX - TOTAL SCORE**



**RESULTS**

From the table 1, the descriptive statistics such as mean and standard deviation of mean for the pre-test and post-test was calculated. It is found that the mean pre-test value of 4.44 has been reduced to the post test value of 1.61. It also shows a statistically significant (p=0.0001) reduction in pain between the pre and post test values of Visual Analogue Scale (VAS). From the table 2, the descriptive statistics such as mean and standard deviation of mean for the pre-test and post-test was calculated. It is found that the mean pre-test value of 42.77 has been reduced to the post test value of 20.88. It also shows a statistically significant (p=0.0001) reduction in pain between the pre and post test values of Shoulder Pain and Disability Index (SPADI) – Pain Score. From the table 3, the descriptive statistics such as mean and standard deviation of mean for the pre-test and post-test. It is found that the mean pre-test value of 25.76 has been reduced to the post test value of 12.43. It also shows a statistically significant (p=0.0001) reduction in disability between the pre and post test values of Shoulder Pain and Disability Index (SPADI) – Disability Score. From the table 4, the descriptive statistics such as mean and standard deviation of mean for the pre-test and post-test. It is found that the mean pre-test value of 32.21 has been reduced to the post test

value of 15.46. It also shows a statistically significant (p=0.0001) reduction in pain and disability between the pre and post test values of Shoulder Pain and Disability Index (SPADI) – Total Score.

**DISCUSSION**

The results of this study support the idea that there is an improvement in shoulder function and reduction in shoulder pain after giving an home exercise interventions to the horticulture workers. Although such conditions like shoulder tendonitis and impingement symptoms were treated with exercise programs as a conservative treatment,<sup>9</sup> and the effectiveness of home exercises on shoulder pain and shoulder function was assessed by few randomized controlled studies,<sup>10,11,12,13</sup> none of the studies have targeted on home exercise for shoulder pain and functional status in horticulture workers.

In this study, 20 subjects participated in the home exercise programme. Two subjects were dropped out from follow up. One subject withdrew due to some health issues and another subject was not able to continue the follow up due to some personal reason. 18 subjects completed exercise log at the time of follow up.

18 subjects were assessed for shoulder pain on both sides and the maximum pain side was taken for visual analogue scale (VAS) and shoulder pain and disability index (SPADI). Mostly the subjects had complaints with maximum pain on the dominant side. The exercise protocol was given for both side of the shoulder. At the end of the follow up the subjects were analyzed and they showed a significant improvement in shoulder function and reduction in shoulder pain followed by the home exercise protocol.

This study shows the Visual analogue scale (VAS) score and Shoulder pain and disability index (SPADI) score is reduced in the post test when compared to the pre test and the p value shows it is statistically significant (p=0.0001)

**Brox and colleagues**, showed that the exercise interventions are given under supervision in twice a week with a physiotherapist and the other days home exercises was given to the subjects. The duration of the treatment was 3-6 months and the exercise progressed from relaxed repetitive movements to strengthening exercises.<sup>12,13</sup>

Stretching and strengthening programs were used in shoulder pain as a conservative treatment, which aims to reduce shoulder symptoms and alter the abnormal muscle activity and also alters the identified movements.<sup>11</sup> Serratus anterior muscle weakness is extremely common to a range of painful shoulder conditions on examination the patient experience pain in the neck while lifting and carrying. The serratus muscle activity is reduced in impingement subjects.<sup>14</sup>

In impingement subjects the upper trapezius muscle activity is more active, it causes abnormal superior translation and reduction in scapular rotation. Therefore, exercise programs for upper trapezius was given in this study it may attempt to reduce the activity of upper trapezius during elevation of humerus. Additionally, two stretches was given. The normal scapular movement was limited by tightness of pectoralis muscle, hence the pectoralis minor muscle was stretched. Posterior capsule was also stretched, it helps for normal posterior translation of humeral head and during elevation of arm it prevents the excessive anterior translation of humeral head.<sup>1</sup>

The rotator cuff muscles having a critical functional role, mainly teres minor and infraspinatus. So that, the rotator cuff exercises are included in the impingement treatment program.<sup>16</sup>

**Reddy et al** took a comparison in subjects with shoulder impingement and normal subjects and compared the muscle activity of the rotator cuff and middle deltoid during scapular plane abduction. The comparison shows that the impingement group having decreased activities in the deltoid and rotator cuff muscles. This was mostly seen in early arcs of motion. It shows decreased

activity during 30 to 60 degree arc. The infraspinatus was only shows a decreased activity during 60 to 90 degree arc. In 90 to 120 degree arc shows none of comparisons.

**Ginn et al** compared a control group and intervention group. That study showed the intervention group improved significantly in shoulder function compared to control group. The intervention period was one duration. Each subject were treated with shoulder stretching and strengthening exercises, and "motor retraining aimed at restoring scapulohumeral rhythm"<sup>17</sup>.

**Greg Cooper, D.C et al** recommended that the codman exercises are effective to relax the muscles of shoulder, relieves pain and increases the range of motion in the shoulder joint.<sup>18</sup>

**P M Ludewig and J D Borstad et al** result suggest that the intervention group showed significantly greater improvement in shoulder rating questionnaire(SRQ) score and shoulder satisfaction score than the control groups. Intervention subjects also reported significantly greater reduction in pain and disability than control group it concludes that a home exercise programme can be effective in reducing symptoms and improving function in construction workers with shoulder pain.<sup>10,19</sup>

**CONCLUSION**

Home exercise program for shoulder showed a significant improvement in shoulder function and reduction in shoulder pain and disability in horticulture workers with routine exposure to repetitive shoulder activities.

**LIMITATIONS:** Smaller sample size, There is a limited study about the horticulture workers No long term follow up has been studied.

**RECOMMENDATIONS:** A comparative study can be done between the outcome of both male and female horticultural workers. A similar study can be done with larger sample size. A comparative study can be done between the intervention group and the control group

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