RELATIONSHIP OF PRE – STRENGTHENING EXERCISE BEFORE TOURNAMENT FOR THE PERFORMANCE OF FEMALE WHEEL CHAIR BASKETBALL PLAYERS IN FREE THROW

DISSERTATION

Submitted to the partial fulfillment of the requirement for the degree of

MASTER OF PHYSIOTHERAPY (MPT)

(Elective – MPT Sports)

SWARNALATHA . C.S

Bearing the Registration No: 271650226

submitted to

THE TAMIL NADU DR. M.G.R.MEDICAL UNIVERSITY

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MOHAMMED SATHAK A.J.COLLEGE OF PHYSIOTHERAPY

Nungambakkam, Chennai – 600034

CERTIFICATE

This is to certify that the dissertation entitled "**RELATIONSHIP OF PRE – STRENGTHENING EXERCISE BEFORE TOURNAMENT FOR THE PERFORMANCE OF FEMALE WHEEL CHAIR BASKETBALL PLAYERS IN FREE THROW**" was done by bearing Registration No: 271650226 . This work has been done as a partial fulfillment for the degree of **Master of Physiotherapy** done at Mohamed Sathak A.J.College of Physiotherapy, Chennai, and Submitted in the year of April 2018 to the Tamil Nadu Dr.M.G.R.Medical University.

Seal & Signature of Principal

……..

Prof. R. RADHAKRISHNAN, M.P.T.,PGHDM

Place : Chennai

Date :

MOHAMMED SATHAK A.J.COLLEGE OF PHYSIOTHERAPY

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SIGNATURE OF GUIDE

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Mohamed Sathak A.J.College of Physiotherapy

Place : Chennai

Date :

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Nungambakkam, Chennai – 600034.

CERTIFICATE

This is to certify that the project work entitled "**RELATIONSHIP OF PRE – STRENGTHENING EXERCISE BEFORE TOURNAMENT FOR THE PERFORMANCE OF FEMALE WHEEL CHAIR BASKETBALL PLAYERS IN SHOOTING**" was done by bearing Registration No: 271650226 . The undersigned examiner has duly verified and examined the submitted project work done by the above candidate.

INTERNAL EXAMINER **EXTERNAL EXAMINER**

…….. ……

Place : Chennai.

Date :

DECLARATION BY THE CANDITATE

I hereby declare that the dissertation entitled "**RELATIONSHIP OF PRE – STRENGTHENING EXERCISE BEFORE TOURNAMENT FOR THE PERFORMANCE OF FEMALE WHEEL CHAIR BASKETBALL PLAYERS IN SHOOTING**" was done by me for the partial fulfillment of the requirement of Master of Physiotherapy degree. The dissertation had been done under the direct supervision and guidance of my guide **Professor R. Radhakrishnan, MPT**, **at Mohamed Sathak A.J.College of Physiotherapy**, Chennai and submitted the same during the year April 2018 to the Tamilnadu Dr.M.G.R.Medical University

Signature of the Candidate

…….

SWARNALATHA. C. S

Place : Chennai

Date :


S.A.J.COLLEGE OF PHYSIOTHERAPY
CHENNAI - 34

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INTRODUCTION

INTRODUCTION

Cross-sectional studies have reported that a majority of long-term wheelchair users experience upper extremity pain. Overuse and repetitive stress often result in degenerative soft tissue changes it been observed that **18%** of active persons and 45% of inactive persons with long-term paraplegia also showed degenerative changes in the shoulder joint on radiographs. Other researchers have reported that wheelchair users often show chronic degenerative injuries to soft tissues, including impingement syndromes, rotator cuff tears, sprains, strains, and avascular necrosis

Athletes who compete in wheelchairs, in particular, experience frequent upper extremity soft tissue injuries. Participation in wheelchair basketball, together with wheelchair track and road racing, accounts for the majority of reported soft-tissue injuries in athletes in wheelchair.

Wheelchair basketball, specifically, is characterized by intermittent high intensity activity for wheelchair propulsion and maneuvering as well as reaching overhead for shooting, passing, and rebounding. These actions put the shoulder at risk for overuse injury or impingement of the soft tissue structures below the acromion process as the player reaches over- head.3 In addition, the constant stresses of wheelchair propulsion on the palmar surface of the hand often results in symptoms of carpal tunnel syndrome." Muscle imbalance, in particular, has been implicated in the pathogenesis of shoulder pain in athletes who use wheelchair.

Weakness of the external rotator and shoulder adductor muscles contributes to impingement of the supra spinatus tendon beneath the acromion during humeral elevation Shoulder weakness and forces of gravity often lead to an increased thoracic kyphosis while sitting in and propelling the wheelchair. This sitting posture, characterized by scapular protraction and internal rotation of the humerus, may further compromise shoulder motion during use of the arm.

Long training hours and busy sports competition schedules have been associated with increased incidence of injuries in athletes who use wheelchairs. Although wheelchair basketball competition began over **50** years ago, opportunities for women to participate in wheelchair have recently increased both nationally and internationally.

Elite women basketball players have competed in 3 world championships and 3 Paralympic Games in the past **10** years.

Chronic overuse and injury during sports contribute to the development of upper extremity pain, which interferes with function in the long-term wheelchair user. Full-time wheelchair users depend on the integrity of their upper limbs for their daily independent wheelchair users are not only prone to developing shoulder pain; they may not be able to rest an injury sufficiently to allow for it to heal without further strain and re injury.

Several studies have shown that shoulder pain is a limiting factor in the daily activities of individuals with paraplegia, especially during transfers and wheelchair propulsion .We could find only 1 article that studied shoulder pain in women who use wheelchairs.

Pentlandetall reported that women with paraplegia experience difficulty because of shoulder pain with work and school activities, outdoor wheeling, household work, reaching and lifting, driving, loading the wheelchair into the car, and transferring between the wheelchair and the car or bed. Although female subjects have been included in most studies on wheelchair athletes, no studies have specifically focused on shoulder pain in female athletes who use wheelchairs. Additionally, some athletes who have unilateral amputations or lower extremity musculoskeletal and neuromuscular disorders use wheelchairs only for sports participation and are ambulatory for daily activities. Shoulder pain in these ambulatory athletes has not been compared with shoulder pain in athletes who are full-time wheelchair users.

The purpose of my study was to assess activity level, medical history, and the prevalence and intensity of shoulder and upper extremity pain in female wheelchair basketball players. We

hypothesized that age, years of wheelchair use, and high activity levels would be positively associated with higher intensities of shoulder pain during functional activities. We further hypothesized that subjects with disabilities requiring full-time wheelchair **use** (such as spinal cord injury and spina bifida) would report more intense shoulder pain than subjects with disabilities that allowed them to be ambulatory when not competing in basketball.

NEED FOR THE STUDY

The study would be helpful to physical therapists, sports bio - mechanists, Coaches in the following ways.

The study may indicate the variables, which might be considered as factors affecting the performance of basketball players while shooting and it also provide a model for the technique of skill for analyzing the performance of the players. Which will be helpful in preparing how effectively the shooting has been made.

Thus knowledge of the shoulder pain may help in treating, training and coaching the shooting in players.

AIM OF THE STUDY

To find out the effect of Strength Training , reducing the pain & performance of Upper limb for Wheelchair Basketball Players. Thus it provides a model for the technique of skill for analyzing the performance of the players. Which will be helpful in preparing how effectively the free throw and shooting and set shot has made.

OBJECTIVE OF THE STUDY

To determine in performing the shooting the ball with the help of upper extremities of female wheelchair basket ball players.

HYPOTHESIS

NULL HYPOTHESIS (H_0):

There is no significant difference between the Pre Strengthening Training (Group A) and Simple Training (Group B) in improving shooting

ALTERNATE HYPOTHESIS (H_1):

There will be a significant difference between the Pre Strengthening Training (Group A) and Simple Training (Group B) in improving in shooting

REVIEW OF LITERATURE

Kathleen A. Curtis, Ph D, PT,Kathryn Black, MS, 0TR:

Wheelchair basketball players in this study have experienced shoulder pain since beginning wheelchair use. Further, almost all subjects (over 90%) reported a history of upper extremity pain or injury involving the shoulder, elbow, or hand since beginning wheelchair use.

Saleky García Gómez and Javier Pérez-Tejero :

Shoulder injuries are a common problem among wheelchair basketball players (WB). The purpose of this study was to detect the influence of shoulder pain (SP) in WB sport skills. In conclusion, SP could affect the specific activities of WB according to gender, especially during shooting in females, so ways to promote shoulder health must be develop.

Richard Weiler1, • Willem Van Mechelen1, • Colin Fuller • Evert Verhagen1:

Issues include lack of conformity on sports injury definitions, lack of consensus on methodology and reporting for disability sports injury studies, disability and impairment descriptor reporting omissions, focus on short-term competition-based studies, lack of long-term follow-up, athlete baseline data rarely being collected, consistency of exposure reporting and injury severity not being reported.

Benjamin F. Johnson, Ed.D. Associate Professor, Georgia State University, Atlanta, Georgia: Exercise and sport can be used as a therapeutic or preventative intervention for enhancing physical and mental health for adolescents; Regular physical activity helps reduce symptoms of stress and depression; Sport participation enhances mental health in a variety of ways.

Hiroki Okubo[a],*, Mont Hubbard : Chiba Institute of Technology, 2-17-1, Tsudanuma, Narashino, Chiba, 2750016, Japan, University of California, Davis, CA, 95616, USA :

A basketball shooting arm model is used to estimate arm joint motions for a set of desired release speed, angle and backspin. Shoulder rotation contributes to the vertical component of release of the ball and elbow and wrist actions mostly produce the horizontal component of release and backspin of the ball when the forearm and hand are nearly vertical at release.

Dr. Julia Alleyne BHSc(PT) MD MScCH Dip Sport Med

CMO, 2015 Parapan Games, Toronto : Prevalence and intensity of shoulder pain was significantly higher with patients with tetraplegia than paraplegia.

ISABEL ROSINGOLI, JUNA MATRIN: Stated that Promotion of active exercise for wheelchair users is encouraged to decrease shoulder pain and Involvement in athletics decreases the risk of shoulder pain (Fullerton, 2003)

Ozlem Ustunkaya, Ayse Ozcan Edeer, Hulya Donat, Nuray Yozbatiran

School of Physical Therapy and Rehabilitation, Dokuz Eylul University, Balcova, Izmir, Turkey: Wheelchair users are exposed to many stresses on their upper extremities. The appearance of shoulder pain related to these stresses could affect their functional capacity and quality of life.

Varatharajan lingam PT,DPT, PGDCP,PhD (c): Has Specially designed the PARALYMPIC ASSESSMENT FORM

Stacy Green, CTRS: He states that specific exercise programme will help to prevent post tournament injuries in shoulder

Ajay Vasani, Texas Woman's University : Disability sports are a recreational outreach for individuals who have experienced injuries or have physical limitations. Athletes participating in disability sports need comprehensive strength and conditioning programs to compete at high levels. Aerobic and anaerobic training is essential for wheelchair basketball players. The purpose of this program is to improve cardiorespiratory fitness, muscular strength and endurance, confidence levels during pre-season training program.

METHODOLOGY

❖ Study design:

Comparitive study

❖ Study setting:

The study was done in 15 wheel chair players in Chennai

❖ Source of data:

Data was collected from 15 private players in chennai. All subjects were assessed and selected based upon who fulfilled the inclusion criteria. The purpose of the study was explained to all subjects and consent from each subject was taken. The subjects were randomly assigned into the either Pre Strengthening Training (Group A) and Simple Training (Group B)

❖ Sample size:

15 subjects

❖ Inclusion criteria:

- Impaired muscle power
- Impaired passive range of movement
- Hypertonia
- Limb deficiency
- Ataxia
- Leg length difference
- Short stature

❖ Exclusion criteria:

- Foot ulcers

- Vision impairment

❖ Variables:

- Dependent variable :

  Performance of the players

- Independent variables :

❖ Measurement tool :

- VAS SCALE
- Shoulder Assessment form

❖ Study materials:

- Exercise Training Area
- Medicine Ball
- Resistance Tube

PROCEDURE

Fifteen female wheelchair basket players were purposively selected from Chennai team, the age of the subject range from 24 to 28 years . The subjects has past playing experience of at least five years in wheelchair basketball.

15 subjects were selected and evaluated using the assessment form, 3m Timed up and Go test and Functional Reach Test. Patients were informed about the procedure, merits and demerits of the treatment. Consent is obtained from each patient for voluntary participation.

Participants were randomly assigned into two groups I.e., Group-A and Group-B. Patients were assessed before the commencement of treatment and also reassesed after 6 weeks of training.

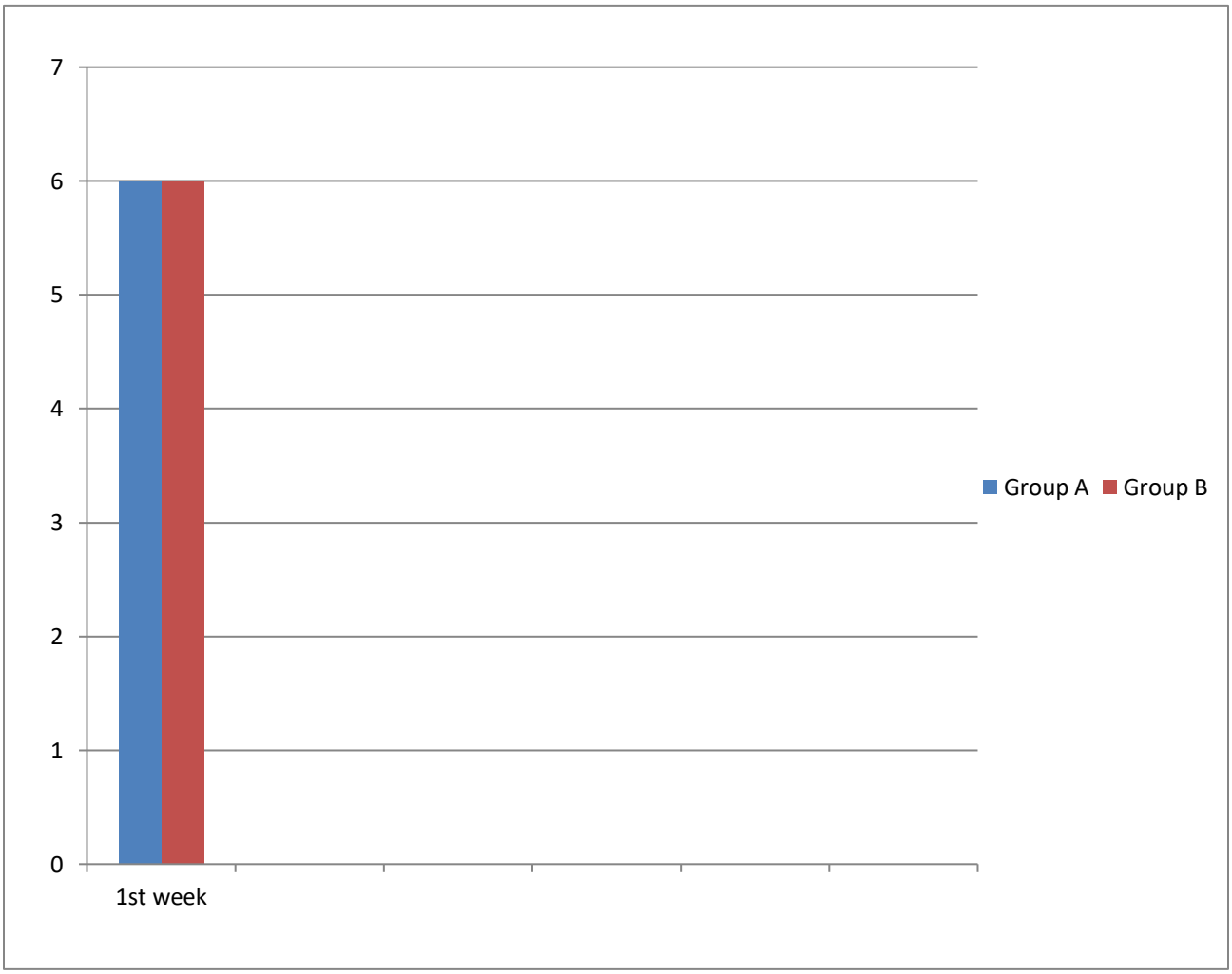
- Group-A: Pre Strengthening Training
- Group-B: Simple Training

DATA ANALYSIS AND INTERPRETATION

This deals with the analysis of data collected from the subjects under study. The primary concern of the present study was to find out significance relationship between the selected pre strengthening exercise and the performance of the subjects in the free throw and shooting the ball analyzing among the female wheelchair from Chennai team . to facilitate the study, 15 shoulder pain female wheelchair basket ball players were randomly selected for the purpose of this study . their age was between 24 to 28 years .

VAS SCALE:

Pain is assessed by using VAS Scale before the Pre - strengthening Exercise, Scale is of 0 - 10



SPECIAL TEST

Test for significance of the person from shoulder pain to perform the movement prior to the matches. For the players with class 4.5

Shoulder tests ;

Trunk balance tests:

Modified functional reach test

Players :

were evaluated in a chair having back support leaning 10° and without arm support. The reason for this 10° back support is to let the players with 3-4.5 points to sit back and relax between trials (Figure 1a). The reason for this is that players with these points are unable to raise their whole trunk from chair's back support. Another reason was to stabilize the pelvis, as this position is also their playing position. Subjects sat in the same position for each trial. Players were positioned as trunk at straight position; hips, knees and ankles positionedThe anatomical landmark used to measure reach was the ulnar styloid process. The ulnar styloid process is a prominent landmark and was proximal enough to allow accurate measurements to be taken for all players.[2] Subjects were instructed to reach as far forward as possible without losing balance. This distance was recorded as functional reach.[10] No compensatory activities like shoulder protraction and neck flexion is wanted during forward reach. Subjects were to move as far as possible and hold the terminal position for 3 seconds.[8] The players were guarded for safety and the trial was repeated if the player required assistance to recover. Each player had one practice trial of maximal forward reach, followed by one trial during which data were collected.[2] The dominant upper extremity was

used for forward reach. The contralateral hand was placed on the umbilicus, negating any upper extremity compensatory stabilization (Figure 2).

Bilateral reach test

Differently from modified functional reach test, bilateral reach test was tested with 90° bilateral shoulder flexion. Subjects were instructed to reach as far forward as possible without losing balance. This distance was recorded as Bilateral Reach.

Principles

OVERLOAD :

Used in strength and endurance development

An activity must be upgraded to a consistently higher level

Amount of work should be increased as body adapts to growing demands

Use of overload principle (in 6 week program)

2 weeks 1-2 hours of exercise (3 days/week)

2 weeks 2-3 hours of exercise & playing (5d/W)

2 weeks 4-5 hours of training & playing (6 d/W)

STRETCHING EXERCISES

Bilateral Pectoral Stretch:

Latissmusdorsi Stretch

Deltoid Stretch:

Lateral Stretch :

Wrist Extensor Stretch:

Wrist Flexor Stretch :

Trunk Stretch :

Strength and Endurance training

Pushing around the block or doing laps around a track builds cardiovascular endurance

Weight training - Maximal repetition for longer duration to improve endurance for muscles around shoulder and elbow .

The following exercises are subjective.

You will have to decide what supports and assistance each Class (1, 2, 3) of players will need to perform.

Dynamic muscular strength training

Medicine ball exercises :

.Helpful to strengthen shoulder muscles

.Useful for stops/starts

.during competition

Fitness training

Active/passive cycling for upper/lower limbs for all players

Aim – to improve fitness and joint range of motion

Pushing up the ramp backwards to increase strength of shoulder musculature

Specific exercises

Spinal rotation stretch

Shoulder flexor strengthening with free weights and push - ups between plinths & Swiss Ball

Theraband exercises

Resistance Tube Exercise:

STATISTICS

After give 6 weeks Pre – Strengthening Shoulder Exercise, its been proved that the players where playing their game without the pain on there shoulder while passing , shooting , free throws

The collected data were tabulated and analyzed using descriptive and interferential statistics. Mean and standard deviation were used to asses all the parameters of the 25 data using statistical package for social science (SPSS) version 17. Paired t-test and independent t test was adopted to find out the effect of pre strentgthening training before the tournament versus training with basic exercise

STATISTICAL TOOL

Paired t-test was used to find out the difference in the pre-test & post-test scores within the groups.

Formula : Paired t-test

$$S.D = \frac{\Sigma(d - d')}{n - 1}$$

$$S = SD/\sqrt{n}$$

$$t = \frac{d'}{S/\sqrt{n}}$$

$d = x - y$, $d' = \Sigma d$

Where

d' is the mean of change in values between pre and post treatment.

S.D is the standard deviation of pre and post treatment.

S is the standard error of the mean.

Table 1:

Group A : Under went Pre – Strengthening Exercise

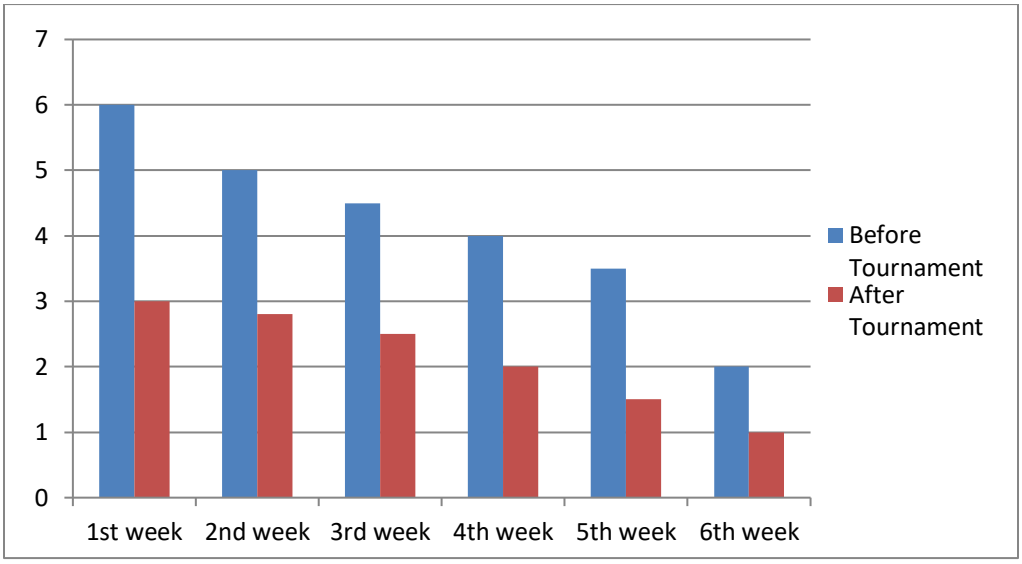
S.NO	Classification	Free throws	Long pass	Dribbling
1	4	19	17	50.7
2	4.5	24	12	44.4
3	4.5	19	19	43.1
4	4.5	20	16	51
5	4.5	10	11	44.8
M		18.43	15	47.14
SD		4.65	3	3.16

Group B : Under went –Basic Shoulder exercise

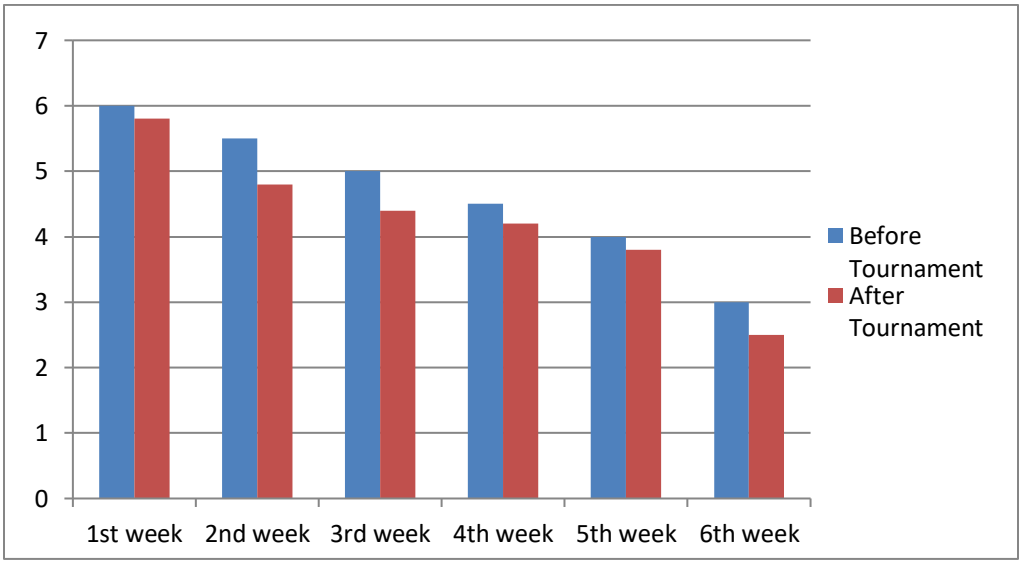
S.NO	Classification	Free throws	Long pass	Dribbling
1	4	16	14	48.6
2	4.5	20	9	38.6
3	4.5	16	16	43.1
4	4.5	18	14	51
5	4.5	8	9	44.8
M		18.43	15	47.14
SD		3.55	2.65	2.12

VAS SCORE

Graph – 1 : Group A - VAS Score



Graph – 2 : Group B - Score



RESULTS

After give 6 weeks Pre – Strengthening Shoulder Exercise, its been proved that the players where playing their game without the pain on there shoulder while passing , shooting , free throws

In table 1 & graph 1, the pre test values were compared with post test values of Free throw, Long Pass , Dribbling of group A players after Pre – Strengthening exercise. According to this table pvalue is less than .05 which shows that there is a significant difference in tournament in group A who underwent Pre – strengthening training.

In table 2 & graph 2, the pre test values were compared with post test values of Free throw, Long Pass , Dribbling of group B players trained on ground. According to this table p - value is more than .05 which shows that there is a no significant difference in shoulder pain in group B who underwent basic training in ground.

Thus player in Group A where able to perform better then the Players in Group B after the 6 – weeks Pre – Strengthening exercise Program

Discussion:

Wheelchair basketball players in this study have experienced shoulder pain since beginning wheelchair use. Further, almost all subjects (over 90%) reported a history of upper extremity pain or injury involving the shoulder, elbow, or hand since beginning wheelchair use.In the group we studied, over half of the subjects reported current pain. Mean VAS SCALE scores appeared to differ in subjects who did and did not report shoulder pain .Yet, the overall intensity of pain in the subject pool averaged 15.6 points on a 150- point scale. For the 24 subjects who reported current shoulder pain, however, the intensity of shoulder pain averaged over 8 times higher (at 26.3 points) than those subjects who did not report current shoulder pain (at 3.2 points). Shoulder pain may interfere with daily function, specifically during performance of household chores, pushing up ramps or inclines outdoors, lifting objects down from an overhead shelf, and while sleeping.

The group that we studied may not fit patterns that were evident in other groups of full-time wheelchair users, because approximately one-third of the subjects in our study have disabilities that require wheelchairs for sports participation, but not necessarily for their daily activities. We must consider the possibility that the stresses of using a wheelchair may be excessive to these athletes who are not accustomed to this type of upper extremity exercise and may result in early shoulder pain.

A player's role on the team may also determine the specific shoulder stresses she faces. Athletes with minimal disabilities are likely to have normal trunk function and pelvic control. They often assume ball handling roles on the team that involve extensive overhead activity for rebounding, shooting, and passing. Repetitive stress in these specific actions may be more likely to cause shoulder impingement. Thus, the athletes went for 6 weeks pre – strengthening exercise before the tournament to prevent shoulder pain while passing, shooting and free throw skils

LIMITATION AND RECOMMENDATION

Limitations:

- The sample size was limited
- No control group present
- Traing duration was short

Recommendations:

- The future studies need to be done with larger group
- The future studies can be done to improve the activities of daily living of the patients
- The future studies can be done to assess the incidence of pain in shoulder immediate after play
- The study can be done with longer duration
- The study can be done with a control group

CONCLUSION

The results obtained from this study shows significant difference for players trained under pre – strengthening program before the tournament .The mean difference for free throw, long pass , dribbling showed significant increase in the group – A compared with group - B.

From the above result it can be concluded that six weeks pre - strenthening training is more effective in improving the performance in the tournament the Female wheelchair basketball players. Hence it can be recommended that 6 weeks pre – strengthening training is more effective,useful & performance oriented rather than the usual training program.

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School of Physical Therapy and Rehabilitation, Dokuz Eylul University, Balcova, Izmir, Turkey:
Wheelchair users are exposed to many stresses on their upper extremities. The appearance of shoulder pain related to these stresses could affect their functional capacity and quality of life.

ANNEXURE

ANNEXURE I

INFORMED CONSENT FORM LETTER

Consent form

This is to certify that I _____ age _____freely and voluntarily agreed to participate in the study _____. She has been explained about the procedures and the benefits and risk that would occur during the study on all the information given by me will be kept strictly confidential and used for research purpose.

ANNEXTURE:II

GENERAL ASSESSMENT FORM:

Name

Age / Sex

DOB

Therapist

Wheelchair being considered : Manual / Elec

MEDICAL HISTORY :

Diagnosis / Onset: Stable / Detoriating

Past Surgeries : Bone / Skin / Muscles / Other

Orthotics / Prosthetics :

Medications:

SOCIAL HISTORY:

Lives alone / Spouse / Other Family / Friend / other

Primary carer details : (eg general health, agency contact)

Accommodation: Home / Unit / Retirement Villas / Condo / Other

Primary Living / Work Enivornment

FUNCTIONAL STATUS

Transfers : Hoist / Standing pivot / Non – standing pivot / Pull to Stand/ push to stand / Sliding / other

Ambulation status :

Wheelchair Use : Independent / Assisted / Dependent _____ Hours / Day:

Bed Mobility :

Other Daily Activities , eg sport

PHYSICAL EVALUATION:

Visual Scanning / Acuity / Fields

Hearing: normal / impaired / deaf

Communication : verbal / Non – verbal

Cognition & Perception:

Respiration

Sensation :

Upper limb Function : (note coordination & strength)

Lower Limb Function : (note amputation etc)

CURRENT SEATED POSITION (as best evaluated – note fixed position)

Balance / Trunk Control: _____

Head : Neutral / Hyperextended / Fwd Flexed / Laterally Flexed: R / L

Rotated : R / L

Shoulders : Level / Elevated : R / L , Sublaxed : R /L

Rib Cage : Neutral / Elevated : R / L, Rotated fwd : R / L

Spine : Neutral / Scoliosis / Kyphosis / Normal Lumbar Space /

Flat Lumbar Space / Hyper – lordotic

Pelvis : Neutral / Posterior Tilt / Anterior Tilt / Rotated fwd / Oblique , lower

Hips : Flexed / Extended / Abducted / Adducted

Knees : Flexed (beyond 90 degree) / Extended (beyond 90 degree)

Feet : Dorsiflexed / Plantar Flexed / Supinate / invert/ Pronate / Evert

Spasticity / Reflexes / Tone :

WHEELCHAIR HISTORY

1. Manual / Elec . Model
   Frame : Folding / Rigid , Armrest Hgt : Hanger Length:
   Seat : Depth: _____ Width: _____, Hgt (front): _____ Hgt (back)
   Other measurements : _____
   Accessories / Features : _____
   Issues : _____

CLIENT GOALS & CONCERNS

ADDITIONAL NOTES / SUMMARY

Short Term Plan (s): Mat Evaluation

Trial Equipment:

Obtain Medical Clearance from Doctor

Obtain further info: _____

Other : _____

ADDITIONAL NOTES:

ANNEXURE III

SHOULDER ASSESSMENT

Affected Side :

Attitude of UL

Mechanism of injury

Pain : Painful movement / position/ Relieving factor/ Duration

On Observation:

Removing T – Shirt : Easy / Difficult

Anterior View:

1. Neck
2. Shoulders
3. Step Deformity
4. Sulcus Deformity
5. Deltoid Wasting
6. Functional Position – Abd. 60 Deg

Posterior View:

1. Lennie Test: T2 – superior angle of Scapula
   T4 – Root of spine
   T7 – inferior angle of scapula
2. Wasting

Examination

1. Elevation through abduction / Flexion
2. Active Lateral Rotation (80 – 90 Deg)
3. Medial rotation

4. Extension 50 – 75 Deg
5. Horizontal Adduction
6. Scapular movements
7. Combined Movements
8. Dynamic Winging
9. Rotary Winging
10. Scapular tilt
11. Push Ups – wall
12. Passive Movements
13. Resisted Isometrics

SPECIAL TESTS:

Instability :

1. Load and Shift test Grade (Sitting / Supine)
2. Apprehension test for Ant. And Post Instability
3. Rowe test
4. Norwood test
5. Inferior Instability – Sulcus
6. Multi Directional – Waist 45 Deg
7. Neer Impingement
8. Speed's Test
9. Yergason Test
10. Empty can Test
11. Lift off Sign
12. ULTT – ULTT 1, ULTT 2 , ULTT 3, ULTT 4
13. Joint Play : ACJ Cephalo Caudal
    ACJ anteroposterior
    SCJ Cephalo Caudal
    SCJ anteroposterior

MASTER CHART

No of Weeks	Before Tournament	After Tournament
1st week	6	3
2nd week	5	2.8
3rd week	4.5	2.5
4th week	4	2
5th week	3.5	1.5
6th week	2	1