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**EFFECT OF SWA-MARMA THERAPY ON MUSCULAR STRENGTH AND
MUSCULAR ENDURANCE OF FEMALE SPORTSPERSONS**

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ABSTRACTS

Objective: To determine the effect of Swa-Marma Therapy on strength and endurance of female sportspersons.

Methods: Study was conducted on 60 female from Banaras Hindu University, Varanasi with mean age of 21 years. Participants were categorised into one experimental and one control group. Three month Swa-marma therapy was given to experimental group whereas control group followed their normal schedule. Pre-test and Post-test was taken on grip, leg, back strength, situps, pull ups, pushups, and free hand squat. Analysis of covariance was applied to test the hypothesis of the study at 0.05 level of significance.

Results: Significant difference was found in case of statistically adjustment mean of grip strength, leg strength, situps, pull ups, pushups and free hand squat whereas no significant difference was found in case of back strength.

Conclusion: Swamarma therapy is a simple and time saving as it can be performed during any other activity. Most of all it requires no cost. Thus, with any additional economic burden, this therapy promises to improve the strength and endurance of female sportsperson.

Keywords: Swamarma therapy, strength, endurance, Banaras Hindu University, Varanasi

INTRODUCTION

Ayurveda is an ancient holistic health science abiding many concepts that are novel to modern medical sciences and applied aspects of these concepts are still a promising area of research. Marma science is on such concept mentioned in the literature of Ayurveda depicting 107 vital areas of the body where prana (life force) resides, and as per literature, these areas should be protected from trauma. The 107 marma are elaborately described in the Susruta Samhita where these are classified from various aspects like classification based on traumatic consequences, structural composition, location in the body, numbers [1].

In present days, these marma regions are stimulated in a controlled manner through pressure, pinch, massage, vibrations, etc. to treat diseases and utilised for maintenance of health. This applied aspect of marma is called marma therapy which is practiced clinically by many practitioners and advised to common mass in form of swa-marma therapy for daily practice for maintenance of health [2, 3].

Marma therapy is an emerging technique of treatment of diseases as well as for keeping the body fit and sound as many pieces of research and books are being published [4-17]. The marma therapy seems to have multimodal action as it is being tried in

many diseases encompassing musculoskeletal diseases to metabolic disorders. Therefore, it was hypothesized that marma therapy may influence muscular endurance and strength and to date, no significant research is done in this area.

Much research supports the notion that greater muscular strength & muscular endurance can enhance the ability to perform general sports skills such as jumping, sprinting, and change of direction tasks. Various complementary therapies have been tried and showed good results in increasing muscular efforts in different ailments [18-25].

In light of the review of literature, a study was planned to evaluate the effect of marma therapy on muscular endurance and strength of the sportsperson which is an important aspect of the physical fitness of the sportsperson.

In physical education, physical fitness is divided into four health- and six skill-related components. Skill-related fitness enhances one's performance in athletic or sports events. Health-related fitness is the ability to become and stay physically healthy. Health-related fitness consists of 4 components namely – Cardiovascular fitness, Muscular strength and endurance, Flexibility, and Body composition,

Muscular strength and endurance is the muscle's ability to produce effort or perform work. Muscular endurance pertains to the ability of the muscle to work over an extended period of time without fatigue. Performing push-ups and sit-ups or crunches for one minute is commonly used in fitness testing of muscular endurance. Muscular endurance differs from muscular strength in that it is a measure of a person's ability to repeatedly apply maximal force, for example in a series of push-ups, over a period of time. Muscular endurance relates to the muscle's ability to continue to perform without fatigue. Muscular strength refers to the maximum amount of force a muscle can exert against an opposing force. Fitness testing usually consists of a one-time maximum lift using weights (bench press, leg press, etc.). Muscular strength is the maximal force that can be applied against a resistance. It could be measured by the largest weight a person could lift or the largest body they could push or pull.

METHODS

The evaluation of swa-marma therapy on the muscle strength, muscle endurance of sportspersons of BHU campus was done. The sportspersons who have consented to participation in the study and are of age group 18 to 25 years were registered. These registered volunteers were divided into 2

groups randomly by using random number generation in an excel sheet. The two groups were as follows -

Group A –A pretest evaluation of the muscle strength and muscular endurance of the volunteers was done on a predesigned proforma. This group followed their routine without any intervention. After each month, an evaluation of muscle strength and strength endurance was done.

Group B –A pretest evaluation of the muscular strength and muscular endurance of the volunteers was done. Then this group was trained for swa-marma therapy by the supervisor and was being instructed to do swa-marma therapy daily in the morning and evening hours. After each month of the swa-marma therapy, an evaluation of muscle strength and strength endurance was done.

CTRI registration number – CTRI /2019/01/016934 Registration date - 07/01/2019

Ethical Clearance – the ethical clearance was obtained from the ethical committee of the Institute of Medical Sciences, BHU, Varanasi -221005. Dean/2018/EC/589 dated 02.05.2018

Objective Parameters – Following test were selected for the assessment of the muscle strength and muscular Endurance.

| S. No. | Physical Parameters | Test | Instrument |
|--------|---------------------|--|-----------------------------|
| 1. | Muscle Strength | a. Grip Strength b. Leg Strength c. Back Strength | Dynamometer |
| 2. | Muscular Endurance | a. Sit-Ups b. Push-Ups c. Pull-Ups d. Free Hand Squat | Stopwatch (wherever needed) |

1.

Muscular Strength

a. Grip Strength- The instrument used for this test item was a hand dynamometer.

Test Administration- The instrument and hand should be dry, in order to ensure that, the subjects were asked to put some magnesium chalk powder on the concerned hand. The tester sets the pointer of the dynamometer to zero and places the dynamometer in the subject's hand and asks the subject to squeeze the dynamometer sharply and steadily as much as possible making certain that no part of the arm touches the body. Three trials are allowed with each hand giving one-minute rest between squeezes.

Scoring- The highest reading out of the 3 squeezes is recorded in kilograms.

b. Leg Strength-The equipment used for this test is a leg lift dynamometer.

Test Administration- The subjects were asked to stand with feet 6 inches apart from each other. The bar is held in the center at the level of the pubis with the palm facing downward. The knees are flexed between 115 and 125 degrees. The subject is asked

to lift the bar or dynamometer upward to make her knees nearly straight at the end of the lift. The chain is adjusted so that a maximum lift is obtained. 3 trials are allowed for each subject.

Scoring- The highest of the 3 lifts attempted, is recorded in kilograms.

c. Back strength-The instrument used, is known as a back dynamometer.

Test administration- The subject takes the standing position with trunk lightly flexed (10-15 degrees) forward at the hip, holding the dynamometer bar. This was achieved by adjusting the bar at a level just below fingertips when the subject stands erect with a hand on the front of thigh. The hands are spread equal to the width of the shoulders. The body weight is balanced on the feet which are placed about 6 inches apart. The knees and the back are kept straight throughout the lift and the lift is steadily upward without jerking. The subject was asked not to lean backward on the heels. 3 trials are allowed for this test.

Scoring-The highest of 3 reading is recorded in kilograms as the score.

2. Muscular Endurance

a. Sit-up

Equipment- Flat surface, Mat, Partner to hold the feet.

Test administration-The subject should lie on the mat with the knees bent, feet flat on the floor, and the arms folded across the chest. Start each sit up with back on the floor. The subject should raise to the 90-degree position and then return to the floor. The feet can be held by a partner **Scoring:** The number of sits up completed in 30 seconds was recorded as the score.

b. Push –up test-

Equipment- A bench 13 inches high and 20 inches high and 20 inches long by 14 inches wide, is used.

Test administration- The bench was placed on a mat about 6 inches away from a wall so that the subject did not take a position too far forward. The subject is asked to grasp the outer edges of the bench or stool at the nearest corners and assume a front-leaning rest position with balls of her feet resting on the mat and with body and arms forming a right angle. Then the subject is asked to lower the body so that the upper chest touches the near edge of the bench or stool and then, to raise it to a straight arm position as many times as possible. During the test, the subject's body should always be held straight. In case, the body sways or arches or the subject does

not push –up completely or go down to the chest bench touch position, half counts are given up to a maximum of 4 half counts. If the subject does the fifth incomplete movement, she is asked to stop the test and repeat it after a rest of 2 minutes.

Scoring: Total number of correct Push up.

c. Pull –up test

Equipment- One parallel bar which permits convenient raising and lowering, is used for this test. A mat is laid on the floor to prevent the feet from slipping.

Test administration- The bar is adjusted to a height equal to the level of the sternum of the subject so that subject has to pull approximately the same proportion of her weight. To save time the subjects are arranged according to their heights at the beginning of the test. The subject grasps the bar with palms outward and slides feet under the bar until the body and arms form nearly a right angle when the body is held straight. The weight rests on the heels. The subject is asked to pull-up to the bar with the body keeping straight as many times as possible. If the body sags, if the hips rise or if the knees bend in a kip motion, or if the subject does not pull completely up or go completely down, half credits are given, up to 4 half credits.

Scoring-The number of complete pull-ups plus one-half of the half counts (if any) constitute the scoring.

d. Freehand Squats test

Equipment-A chair or box that makes the athlete's knees bend at right angles when they are sitting, two Assistant

Test administration-

This test requires the athlete to complete as many squats as possible with no rest. The athlete warms up for 10 minutes. The athlete stands in front of a chair, facing away from it, with their feet shoulder-width apart. The athlete squats down lightly touching the chair with their backside before standing back up and repeats this sequence of movements until they are unable to continue. The assistant counts and records the number of successfully completed squat.

Scoring: Total number of correct and completed squat.

Technique of Swa-Marma Therapy

Preparation for Swa-marma therapy:-

Posture: - For the successful practice of swa-marma therapy, posture is important. The practitioner must remain steady, quiet, and mentally alert during this practice. A sitting posture is most convenient for the practitioners. Usually one should assume a posture of cross-legged position, keeping the spine erect. One should keep the hands on the knees in the upward position.

During the practice, one should try to keep the vertebral column erect and achieve the relaxation of the body musculature.

Pre therapy exercises: - It comprises of the following steps: -

1. Total relaxation of body.
2. Deep breathing exercise.
3. Perception of body as whole.
4. Perception of psychic centers.
5. Perception of *marma* points.
6. Gentle massage with thumb and fingers over the *marma* points.

- After adopting the proper posture one should keep the eyes closed gently and exhale forcefully. Then one should inhale deeply for 5-10 times in rhythmic pattern.

- Try to relax the whole body musculature along with mind.

- one should Concentrate mind on *marma* points. Initially concentrate mind on *guda* (anal region), *nabhi* (umbilicus), *hridaya* (heart), *kantha* (junction of thorax and neck), *bhrumadhya* (middle of the eyes) and top of the head.

- Start pressing the *marma* in the lower and upper extremities from periphery to centre.

- Male should start from the right side & female should start from the left side of the body.

Swa-marma therapy on the upper extremity:

- In the upper extremity, one should place the hand on the opposite shoulder respectively, near the neck. At the position where the tip of middle finger rests on the shoulder, there is *amsa marma*. One

should Press this vital point with the middle finger for 5-10 times. Below the shoulder two *marmas*, *ani* and *urvi*, one should press them in the same manner with the fingers of the other hand. Another important *marma* point is at the elbow joint; one should press the lateral and medial aspects gently. Usually, these points are very painful and initially one can feel severe pain at this site. But the pain decreases after two or three days spontaneously. *Indravasti marma* is situated in the middle of the forearm. *Manibandha marma* (wrist joint) is an important vital point. It should also be pressed with the grip of the index finger and the thumb of another hand. For *kshipra marma*, one should stretch out the thumb at 90 degree angle and find out the midpoint at the base of the thumb. *Kshipra marma* is situated at the junction of thumb and index finger. It can be pressed with the help of the index finger and thumb of the other hand. For *talahridaya marma*, in the open palm, flexing the middle finger and by trying to touch the area above thenar eminence; the depressed area in the line of the middle finger above thenar eminence one can locate *talahridaya marma*. This *marma* also should be pressed with the help of the index finger and thumb of the other hand.

Swamarma therapy on the lower extremity: - The area between the big toe

and the second toe at the base of the big toe is assessed as *kshipra marma*. It should be pressed with thumb of opposite side of the hand. The area near ankle joint at lateral malleolus of limb corresponds to the *gulpha marma*. It should be elicited by pressing and vibrating the tendons near the lateral malleolus. The *janu marma* can be located as the area near knee joint. It should be pressed by the both hands with finger towards popliteal fossa & thumb adjacent to patella. Pressure should be applied evenly on the whole area simultaneously.

OBSERVATION AND RESULTS

The statistical analysis of data collected on (60) sixty female subject-categorized according to experimental and control groups has been presented in this section. The data on selected criterion measures for both groups were collected under similar conditions.

To test the objective of the present study, the data was examined by applying mean, standard deviation, and analysis of covariance (ANCOVA). Analysis of covariance was applied with regards to an experimental group and a control group. The study was conducted at 0.05 level of significance (**Table 1**).

In pre-test a statistically insignificant difference was found among the Experimental Group (with swa marma therapy) on the Total, $F(1, 58) = .014$ p

=.906. As shown in **Table 1** the mean score and standard deviation of grip strength was 50.93 ± 23.44 for Experimental Group 50.30 ± 17.68 and was for control groups. This shows that at initial level the groups were similar in nature. Likewise, in post-test there were no significant mean differences on the mean score of post data grip strength between the groups, $F(1, 58) = .962, p = .331$. Further, there was a significant difference in the experimental group and Control Group on the adjusted mean score of grip strength of the subjects after controlling the effect of pretest score, $F(1, 57) = 34.069, p = .000$.

The **Table 1.1** reveals that the mean difference between experimental and control group in relation to pulse rate was significant as the significance value (0.00) was less than the 0.05 level of significance. Thus, after a training of swa marma therapy, experimental groups were more better in comparison to control group.

In pre-test a statistically insignificant difference was found among the Experimental Group (with swa marma therapy) on the Total, $F(1, 58) = .128, p = .722$. As shown in **Table 2** the mean score and standard deviation of Leg strength was 95.26 ± 18.03 for Experimental Group 93.76 ± 14.27 and was for control groups. This shows that at initial level the groups were similar in nature. Likewise, in post

test there were no significant mean differences on the mean score of post data Leg strength between the groups, $F(1, 58) = 1.820, p = .183$. Further, there was a significant difference in the experimental group and Control Group on the adjusted mean score of Leg strength of the subjects after controlling the effect of pretest score, $F(1, 57) = 26.097, p = .000$.

The **Table 2.1** reveals that the mean difference between experimental and control group in relation to pulse rate was significant as the significance value (0.00) was less than the 0.05 level of significance. Thus, after a training of swa marma therapy, experimental groups were more better in comparison to control group.

In pre test a statistically insignificant difference was found among the Experimental Group (with swa marma therapy) on the Total, $F(1, 58) = .000, p = .991$. As shown in **Table 3** the mean score and standard deviation of back strength was 97.40 ± 22.23 for Experimental Group 97.33 ± 23.70 and was for control groups. This shows that at initial level the groups were similar in nature. Likewise, in post test there were no significant mean differences on the mean score of post data back strength between the groups, $F(1, 58) = .069, p = .794$. Further, there was a no significant difference in the experimental group and Control Group on

the adjusted mean score of back strength of the subjects after controlling the effect of pretest score, $F(1,57) = .193$, $p = .662$

In pre test a statistically insignificant difference was found among the Experimental Group (with swa marma therapy) on the Total, $F(1, 58) = .694$ $p = .408$ As shown in **Table 4** the mean score and standard deviation of Sit ups was 46.73 ± 8.49 for Experimental Group 44.90 ± 8.53 and was for control groups. This shows that at initial level the groups were similar in nature. Likewise, in post test there were significant mean differences on the mean score of post data Sit ups between the groups, $F(1, 58) = 7.725$, $p = .007$ Further, there was a significant difference in the experimental group and Control Group on the adjusted mean score of Sit ups of the subjects after controlling the effect of pre test score, $F(1,57) = 70.305$, $p = .000$.

The **Table 4.1**, reveals that the mean difference between experimental and control group in relation to pulse rate was significant as the significance value (0.00) was less than the 0.05 level of significance. Thus, after a training of swa marma therapy, experimental groups were more better in comparison to control group.

In pre test a statistically insignificant difference was found among the

Experimental Group (with swa marma therapy) on the Total, $F(1, 58) = 1.946$ $p = .168$ As shown in **Table 5** the mean score and standard deviation of Push ups was 33.96 ± 9.40 for Experimental Group 31.13 ± 5.94 and was for control groups. This shows that at initial level the groups were similar in nature. Likewise, in post test there were significant mean differences on the mean score of post data Push ups between the groups, $F(1, 58) = 11.080$, $p = .002$ Further, there was a significant difference in the experimental group and Control Group on the adjusted mean score of Push ups of the subjects after controlling the effect of pretest score, $F(1,57) = 44.179$, $p = .000$.

The **Table 5.1** reveals that the mean difference between experimental and control group in relation to pulse rate was significant as the significance value (0.00) was less than the 0.05 level of significance. Thus, after a training of swa marma therapy, experimental groups were more better in comparison to control group.

In pre test a statistically insignificant difference was found among the Experimental Group (with swa marma therapy) on the Total, $F(1, 58) = 1.247$ $p = .269$ As shown in **Table 6** the mean score and standard deviation of Pull ups was 7.83 ± 7.95 for Experimental Group 6.13 ± 2.48 and was for control groups. This

shows that at initial level the groups were similar in nature. Likewise, in post test there were significant mean differences on the mean score of post data Pull ups between the groups, $F(1, 58) = 5.896, p = .018$. Further, there was a significant difference in the experimental group and Control Group on the adjusted mean score of Pull ups of the subjects after controlling the effect of pretest score, $F(1, 57) = 18.109, p = .000$

The **Table 6.1** reveals that the mean difference between experimental and control group in relation to pulse rate was significant as the significance value (0.00) was less than the 0.05 level of significance. Thus, after a training of swa marma therapy, experimental groups were more better in comparison to control group.

In pre test a statistically insignificant difference was found among the Experimental Group (with swa marma therapy) on the Total, $F(1, 58) = .687, p$

$= .410$. As shown in **Table 7** the mean score and standard deviation of Free hand squat was 81.16 ± 22.17 for Experimental Group 77.10 ± 15.16 and was for control groups. This shows that at initial level the groups were similar in nature. Likewise, in post test there were no significant mean differences on the mean score of post data Free hand squat between the groups, $F(1, 58) = 2.533, p = .117$. Further, there was a significant difference in the experimental group and Control Group on the adjusted mean score of Free hand squat of the subjects after controlling the effect of pretest score, $F(1, 57) = 22.33, p = .000$

The above **Table 7.1** reveals that the mean difference between experimental and control group in relation to pulse rate was significant as the significance value (0.00) was less than the 0.05 level of significance. Thus, after a training of swa marma therapy, experimental groups were more better in comparison to control group.

Table 1: Analysis of Co-Variance (ANCOVA) of One Experimental Group & One Control Group in Relation to grip strength of female sportspersons -

| Tests | Mean;SD | | | |
|---------------|-------------|---------------|-------------|-------------|
| | Exp. Group | Control Group | F-ratio (p) | Significant |
| Pre | 50.93±23.44 | 50.30±17.68 | .014 | .906 |
| Post | 57.96±23.09 | 53.76±17.60 | .962 | .331 |
| Adjusted Mean | 57.657 | 53.076 | 34.069 | .000 |

* Significant at 0.05 level of significance, F = Ratio needed for significance at 0.05 level of significance = $df(1, 58) = 4.00, df(1, 59) = 4.00$

Table: 1.1: Pairwise Adjusted Mean Comparison of grip strength between Experimental and Control Group

| Experimental Group | Control Group | Mean Diff | Sig. |
|--------------------|---------------|-----------|------|
| 57.657 | 53.076 | 4.581 | .000 |

Table 2: Analysis of Co-Variance (ANCOVA) of One Experimental Group & One Control Group in Relation to Leg strength of female sportspersons -

| Tests | Mean | | | |
|---------------|--------------|---------------|------------|-------------|
| | Exp. Group | Control Group | F-ratio(p) | Significant |
| Pre | 95.26±18.03 | 93.76±14.27 | .128 | .722 |
| Post | 101.86±17.46 | 96.30±14.34 | 1.820 | .183 |
| Adjusted Mean | 101.14 | 97.023 | 26.097 | .000 |

* Significant at 0.05 level of significance, F = Ratio needed for significance at 0.05 level of significance = df (1,58) =4.00, df (1, 59) = 4.00

Table 2.1: Pairwise Adjusted Mean Comparison of Leg strength between Experimental and Control Group

| Experimental Group | Control Group | Mean Diff | Sig. |
|--------------------|---------------|-----------|------|
| 101.14 | 97.023 | 4.117 | .000 |

Table 3: Analysis of Co-Variance (ANCOVA) of One Experimental Group & One Control Group in Relation to back strength of Female sportspersons -

| Tests | Mean | | | |
|---------------|--------------|---------------|------------|-------------|
| | Exp. Group | Control Group | F-ratio(p) | Significant |
| Pre | 97.40±22.23 | 97.33±23.70 | .000 | .991 |
| Post | 102.93±23.89 | 101.33±23.48 | .069 | .794 |
| Adjusted Mean | 102.905 | 101.362 | .193 | .662 |

* Significant at 0.05 level of significance, F = Ratio needed for significance at 0.05 level of significance = df (1,58) =4.00, df (1, 59) = 4.00

Table 4: Analysis of Co-Variance (ANCOVA) of One Experimental Group and One Control Group in Relation to Sit ups of Female sportspersons -

| Tests | Mean | | | |
|---------------|------------|---------------|------------|-------------|
| | Exp. Group | Control Group | F-ratio(p) | Significant |
| Pre | 46.73±8.49 | 44.90±8.53 | .694 | .408 |
| Post | 53.53±8.06 | 47.66±8.28 | 7.725 | .007 |
| Adjusted Mean | 54.678 | 48.522 | 70.305 | .000 |

* Significant at 0.05 level of significance, F = Ratio needed for significance at 0.05 level of significance = df (1,58) =4.00, df (1, 59) = 4.00

Table: 4.1: Pairwise Adjusted Mean Comparison of Sit ups between Experimental and Control Group

| Experimental Group | Control Group | Mean Diff | Sig. |
|--------------------|---------------|-----------|------|
| 54.678 | 48.522 | 6.156 | .000 |

Table 5: Analysis of Co-Variance (ANCOVA) of One Experimental Group & One Control Group in Relation to Push ups of Female

| Tests | Mean | | | |
|---------------|------------|---------------|------------|-------------|
| | Exp. Group | Control Group | F-ratio(p) | Significant |
| Pre | 33.96±9.40 | 31.13±5.94 | 1.946 | .168 |
| Post | 40.63±8.74 | 34.10±6.24 | 11.080 | .002 |
| Adjusted Mean | 39.324 | 35.409 | 44.179 | .000 |

* Significant at 0.05 level of significance, F = Ratio needed for significance at 0.05 level of significance = df (1,58) =4.00, df (1, 59) = 4.00

Table 5.1: Pairwise Adjusted Mean Comparison of Push ups between Experimental and Control Group

| Experimental Group | Control Group | Mean Diff | Sig. |
|--------------------|---------------|-----------|------|
| 39.324 | 35.409 | 3.915 | .000 |

Table 6: Analysis of Co-Variance (ANCOVA) of One Experimental Group & One Control Group in Relation to Pull ups of Female sportspersons -

| Tests | Mean | | | |
|---------------|------------|---------------|-------------|-------------|
| | Exp. Group | Control Group | F-ratio (p) | Significant |
| Pre | 7.83±7.95 | 6.13±2.48 | 1.247 | .269 |
| Post | 13.13±8.22 | 9.13±3.70 | 5.896 | .018 |
| Adjusted Mean | 12.260 | 10.006 | 18.109 | .000 |

* Significant at 0.05 level of significance, F = Ratio needed for significance at 0.05 level of significance = df (1,58) =4.00, df (1, 59) = 4.00

Table 6.1: Pairwise Adjusted Mean Comparison of Pull ups between Experimental and Control Group

| Experimental Group | Control Group | Mean Diff | Sig. |
|--------------------|---------------|-----------|------|
| 12.260 | 10.006 | 2.254 | .000 |

Table 7: Analysis of Co-Variance (ANCOVA) of One Experimental Group & One Control Group in Relation to Free hand squat of Female sportspersons -

| Tests | Mean | | | |
|---------------|-------------|---------------|------------|-------------|
| | Exp. Group | Control Group | F-ratio(p) | Significant |
| Pre | 81.16±22.17 | 77.10±15.16 | .687 | .410 |
| Post | 87.96±22.36 | 79.96±16.04 | 2.533 | .117 |
| Adjusted Mean | 85.910 | 82.023 | 22.33 | .000 |

* Significant at 0.05 level of significance, A = Among Means variance, W = Within Group variance, F = Ratio needed for significance at 0.05 level of significance = df (1,58) =4.00, df (1, 59) = 4.00

Table 7.1: Pairwise Adjusted Mean Comparison of Free hand squat between Experimental and Control Group -

| Experimental Group | Control Group | Mean Diff | Sig. |
|--------------------|---------------|-----------|------|
| 85.910 | 82.023 | 3.887 | .000 |

DISCUSSION OF FINDINGS

Game and sports have been part of human life since time immemorial as it was necessary for his survival i.e. hunting for food & safety from wild animals or other enemies or as a pursuit of pleasure. The game and sports have been indispensable to mankind and have become part of his culture and sports are the most enduring activity for all human which needs an excellent physical fitness. Physical fitness indicates the level of strength of the body to perform the day-to-day chores and to overcome dealing with unexpected changes in the life. In physical education physical fitness is divided into four health- and six skill-related components. Skill-related fitness augments the performance events while the health-related fitness is the capacity to become and stay physically healthy. Health-related fitness consists of 4 components namely – cardiovascular fitness, muscular strength and endurance, flexibility, and body composition. Out of these muscular strength and endurance is an important determinant of the fitness and hence performance of a sportsperson and it is of prime importance to know the different methods by which the muscular strength and endurance of the athletes can be developed. Till now only sports training methods with different equipment's have been suggested for the athletes. In recent

times, research on yoga and asanas are also being done for enhancing the fitness of sportsperson and many promising results were published.

The present study focuses on a popular applied aspect of a marma science mentioned in Ayurveda as marma therapy which is done by pressing different specific regions of the body. This marma therapy is getting popular and many research works are being done due to its multidimensional effect encompassing from musculoskeletal diseases to metabolic disorders. The present study was a parallel group randomised controlled trial to study the effect of the swa-marma therapy on muscular strength and endurance.

The findings are suggestive that swa- marma therapy has a promising effect on muscular strength as evident from the findings of grip strength and leg strength as there is a statistically significant improvement in the intervention group in comparison to the control group. The result for back strength was not statistically significant in comparison to control group although there is an increase in the back strength.

The findings are also suggestive that swa-marma therapy has a significant effect on improving muscular endurance as the increase in numbers of sit-ups, push-ups, pull-ups and freehand squat was

statistically significant in the experimental group after the swa-marma therapy in comparison to the control group.

CONCLUSION

The finding of this study concludes that after an training of swa-marma therapy for a period of three month, significant effect was found in grip hand strength, leg strength , situps, pull ups, push ups and free hand squat but no significant difference was found in back strength. The efficiency of persons in doing grip hand strength, leg strength, sit ups, pull ups, push up and free hand squat improved. Thus, this study shows that swa-marma therapy is effective in various aspects for sports persons. Sport persons had to undergo various training modules, which makes their schedule busy. Thus, swamarma therapy is a simple and time saving as it can be performed during any other activity. Most of all it requires no cost. Thus with any additional economic burden, this therapy promises to improve the individual performance.

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