Effect of Fitness Training Encompassing Gymnastics-Oriented Program of Six Weeks Duration on Performance of Volleyball Players

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Abstract

The main purpose of the present study was to find out the effect of six weeks of gymnastic oriented training program on the physical fitness and the level of technical performance of Volleyball players. A group of 27 Volleyball players were divided into 12 experimental and 15 control groups and their age ranged between 18 to 24 years.

Physical Fitness tests comprising of vertical jump, push-ups, chin ups, sit ups, back strength, 30 m sprint, boomerangs test, 600 m run, sit and reach, bridge up and shoulder rotation and technical skill tests like passing, spiking and service were used for the study. A pre and post test was conducted before starting the training program and after the 6 weeks. It was found that both the physical fitness and skill level of the Volleyball players increased through the participation in the gymnastics oriented program.

Keywords: Gymnastic; Physical fitness; Technical skill tests; Elite player; Volleyball

Introduction

It is a global phenomenon that fitness is a pre-requisite to the desired end of optimum efficiency in elite class Volleyball players which can be achieved through appropriate conditioning program [1]. It is an accepted fact that the discipline of Gymnastics is a mother sport. The term Gymnastics dates back to the Greek culture, who used it for all kinds of physical activities like running, jumping, climbing, throwing, wrestling, boxing, chariot racing etc. Later the concept of Gymnastics underwent innumerable changes and evolved the present day Gymnastics including Artistic and Rhythmic Gymnastics [2].

There are a wide range of activities with or without apparatus which fall under the family of Gymnastics. The sport is based on man's primary movements like running, jumping, climbing, swinging, tumbling, balancing, revolving, twisting, pirouetting, throwing etc. It is a foregone conclusion that almost all the sports discipline and events use them over demanding situations all over the world [3]. An athlete’s fitness is enhanced with selected gymnastic exercises with or without apparatus. Keeping this fact in mind almost all the athletes irrespective of the game participate and learn gymnastic exercises. Sports scientists and coaches agree that fitness is considered as one of the prime factors responsible for high performance in any sports activity. The domain of sports and games encompasses and places a special status to fitness. Cole et al. clearly defines that the heath related components of physical fitness comprise of cardio-respiratory fitness, muscular strength and endurance, body composition and flexibility [4]. The motor components of fitness classified are power, speed, agility, balance, reaction time and coordination. Hence it is imperative that a good training program should emphasize on activities aimed at improving all the components of physical fitness and gymnastics exercise aid in the development of these qualities. According to Trevor Dowdell perhaps gymnastics has more to offer than any other single activity towards an all-round development of physical fitness. Hein et al. [5], laid emphasis on learning as a combination of tumbling skills to enhance psycho-physiological factors as strength, agility, endurance, flexibility, coordination, kinesthetic perception, courage and self-confidence. George and Paschalis stated, that the student’s physical or motor attributes can be enhanced through the use of gymnastics and that athletes can supplement their training with gymnastic exercises [6].

Volleyball is a popular fast paced game with many moving skills. A volleyball player has to perform many moves in multiple directions by running, scuffing, side stepping, cross stepping, pivoting, jumping and combination of other movements. It has been pointed that the game requires strength, speed, endurance, flexibility, agility and coordination along with the skills for performing well in competitions [7]. Therefor it is imperative that fitness forms a pre-requisite to the desired end of optimum efficiency in elite volleyball teams which can be achieved with appropriate fitness conditioning regime. It has been analyzed that in the game of basketball a players indulges in 300 to 400 acts of motor movements of which 50 to 60% of jumps, 30 to 35% of dashes and 15 to 20% of defensive movements. To perform these activities a player has to possess a high amount of physical fitness, mental alertness, and exceptional precision, differentiation of movements, fast switching from one form of movements to another with different rhythm, speed and coordination. For the development of the all the above qualities there is a need to schedule the training of agility and vestibular steadiness. Cormie et al. [8] suggested complex coordinative type of exercises encompassing acrobatics and gymnastic exercise like jumps on trampoline, depth jumps, different rotational movements, possible accelerations, sharp changes in running directions with sudden stops etc. Keeping the above factors in mind...
the present study was undertaken to find the effect the gymnastic oriented program on the fitness and performance level of basketball players.

Materials and Methods

Twenty seven male Volleyball players undergoing training for the Interuniversity Competition were divided into an experimental group (n=12) and a control group (n=15). Their age ranged between 18 to 24 years. The anthropometric measurement consisting of age, height and weight were obtained. The protocol of the Physical Fitness tests for the pre and post data collection were: Vertical jump (in centimeters for the Back Dynamometer (Kilograms to measure the back strength), 30 (Max. number to measure arms and shoulder strength), Bent Knee Sit-ups (Max. number in 30 seconds to measure muscular endurance), Chin-ups on horizontal bar (Seconds to measure agility and coordination), 6000 meters run (Minutes to measure endurance), Sit and Reach test (cm to measure flexibility), Bridge up (Distance\length of the bridge in cm to measure trunk flexibility) and Shoulder rotation (shoulder rotation index, calculated by dividing grip width in cm with shoulder width in cm). The technical tests which were evaluated were passing, spiking and service. Each of the subject performed the skill tests five times and the maximum marks allotted for the test was 15 (3 marks for each trail). The training protocol consisted of 90 minutes per session, five days a week for a period of six weeks. The experimental was subjected to specific study training while the control group participated in normal training program. The schedule of training was composed of: 1) Warming up – 10 minutes 2) Stretching and flexibility exercises- 10 minutes 3) Trampoline and Tumbling exercises – 30 minutes 4) Gymnastic Apparatus work – 20 minutes 5) Specific conditioning exercises- 15 minutes 6) Cool down- 5 minutes. The statistical tool to analyze the data for the study was paired T-Test to find the significant difference in various components between the pre and post-test training scores of the experimental group and between the pre training and scores after 6 weeks of training in case of the control group.

Results

The results related to the variables of the study are presented in the following tables below:

| S No | Variables                  | Mean ± SD  | Mean ± SD  | Mean Difference | SEMD  | T-Value |
|------|---------------------------|------------|------------|-----------------|-------|---------|
|      |                           | Experimental | Control |          |       |         |
|      |                           | (N=12)      | (N=15)    |                 |       |         |
| 1    | Age(yr)                   | 28.1 ± 4.43 | 27.8 ± 2.98 | 0.4          | 1.43  | 0.28 NS |
| 2    | Height(cm)                | 176.78 ± 5.05 | 173.62 ± 4.99 | 3.16     | 1.94  | 1.63 NS |
| 3    | Weight(kg)                | 66.73 ± 6.05 | 62.74 ± 6.72 | 3.99      | 2.49  | 1.60 NS |

Table 1: Variables involved in the study (*NS = not significant).

Table 1 clearly indicates that there exists no significant difference in the anthropometric measurements of age, height and weight between the experimental and control group as the T-Values observed were 0.28, 1.63 and 1.60 respectively. This gives a clear credence that the selected groups are similar in their physical characteristics.
observed that the training protocol has brought improvements in the performance of Vertical jump, push-ups, sit-ups, and gymnastic oriented training program on the physical fitness variables. It has been found by Nelson et al. [9] that the component of power can be accomplished by tumbling and flexibility exercises. Further, investigations by Hakkinen et al. [10] and Ylinen et al. [11] have shown that stretching is effective as strengthening exercises. The nature of repeated floor jumping exercises apart from vaulting horse and trampoline modalities are explosive and help in arriving at mastering specific movements in various sports. Their administration in the study resulted in significant improvements in the performance of vertical jump in the experimental group as compared to control group.

Parallel bar exercises has been traditionally recognized as the most important in causing changes in the shoulder, chest and arm muscles resulting in the improving the shoulder strength [12]. There was a very high significant improvement in the experimental group in the arms and shoulder strength than the control group. There was an insignificant difference with regard to the pulling ability measured by chin-ups, Back strength, 30 M sprint and 6000 M run with the t-values being 2.08, 1.77, 1.28 and 0.80 respectively.

Table 2: Pre and post T-test values of control group (n=15) and experimental group (n=12) for the physical fitness variables (x=P<0.05; xx=P<0.01).

| S No. | Variable (Skills) | Group     | Pre-Test | Post-Test | Mean | SED | T-Value |
|-------|-------------------|-----------|----------|-----------|------|-----|---------|
| 1     | Passing (Time)    | Control   | 7.8 ± 2.96 | 9.53 ± 2.21 | 1.73 | 0.94 | 1.84    |
| 2     | Spiking (Max. No) | Control   | 9.6 ± 2.14 | 8.47 ± 2.62 | 1.13 | 0.78 | 1.45    |
| 3     | Service (Max. No) | Control   | 8.13 ± 2.53 | 9.76 ± 2.46 | 1.63 | 0.74 | 2.20    |
|       |                   | Experimental | 7.92 ± 2.98 | 10.42 ± 3.06 | 2.5  | 0.69 | 3.62    |

Table 3: Pre and post test T-values of control group (n=15) and experimental group (n=12) for the skills test scores (X P<0.05; xx P<0.01).

| S No. | Variable (Skills) | Group     | Pre-Test | Post-Test | Mean | SED | T-Value |
|-------|-------------------|-----------|----------|-----------|------|-----|---------|
| 7     | Boomerang (sec)   | Experimental | 4.62     | 4.53      | 0.09 | 0.07 | 1.28    |
|       |                   | Control   | 18.22    | 17.3      | 0.92 | 0.51 | 1.8     |
| 8     | 6000M run (sec)   | Experimental | 16.83     | 15.42     | 1.41 | 0.35 | 4.02    |
|       |                   | Control   | 28.29    | 27.99     | 0.3  | 0.22 | 1.5     |
| 9     | Sit and Reach (cm)| Experimental | 24.81     | 25.13     | 0.32 | 0.4  | 0.8     |
|       |                   | Control   | 17.33    | 15.99     | 1.4  | 1.03 | 1.35    |
| 10    | Bridge up (cm)    | Experimental | 15.08     | 18.33     | 3.25 | 0.7  | 4.64    |
|       |                   | Control   | 63.6     | 63.47     | 0.13 | 0.92 | 0.14    |
| 11    | Shoulder rotation (Index value) | Experimental | 1.85     | 1.88      | 0.03 | 0.06 | 0.5     |
|       |                   | Control   | 2.13     | 2.06      | 0.03 | 0.03 | 2.33    |

Discussion

The main purpose of the study was to find out the effect of gymnastic oriented training program on the physical fitness and the level of technical performance of Volleyball players. It has been found by Nelson et al. [9] that the component of power can be accomplished by tumbling and flexibility exercises. Further, investigations by Hakkinen et al. [10] and Ylinen et al. [11] have shown that stretching is effective as strengthening exercises. The nature of repeated floor
corroborated with the study of George and Paschalis who had achieved significant results with flexibility exercise and they found that the specific gymnastic oriented training improved the stretchability of muscles and ligaments [6].

The modified boomerang test is a specific test which measures the agility and the coordinative ability [13]. When this test was utilized for the subjects of the experimental group in the study there were outstanding improvements in their agility, coordinative abilities and also the kinesthetic sense. This shows that the tumbling, trampoline and the gymnastics activities have strong relationship with the variables mentioned above.

Conclusion

It was concluded that the gymnastic oriented exercise program did not have any effect on the anthropometric measurements of the volleyball players. It was also concluded that the experimental group had significant effect on almost all variables under study except the shoulder strength, back strength, speed and endurance.

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