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## Effect of Volleyball Specific Resistance Training and Skill Training Packages on the Development of Flexibility and Muscular Strength and Endurance on the Higher Secondary Level School Boys

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### **Abstract:**

*The purpose of the study was to analyze the effect of volleyball specific training and skill training programme on the development of flexibility and muscular strength and endurance on the Higher Secondary Level School boys of Kolar District, Karnataka. Eight male volleyball players of Kolar District, Karnataka were selected as subject for the present study. All the subjects were in good health and they participated in regular volleyball practice. The age of the subjects ranged between 15 and 17 years. Eighty male volleyball players of Kolar district were divided into four equal groups on the basis of random method. The four groups were assigned as experimental group 1 (Volleyball Specific Resistance Training with Skill Training, experimental groups 2 (Volleyball Specific Resistance Training without Skill training, experimental group 3 (General Resistance Training without Skill Training and one control group. Experimental groups underwent specific resistance and skill training programme for a period of twelve weeks and the control group did not practise any specific training programme. The level of significance to test the obtained 't' value was fixed at 0.05 level of confidence which was considered to be adequate for the purpose of the study. The ANCOVA statistical technique was used to find the mean difference between the groups on physical variables of flexibility and muscular strength and endurance. The results of the study revealed a significant group  $\times$  test interaction ( $p < 0.05$ ). Follow-up analyses indicated that while group differences in physical variables existed among the three groups of the pre-test. In the post test all the experimental groups were found to have significantly ( $p < 0.05$ ) better performance on the physical variables than the control group. The findings of the present study suggest that volleyball specific resistance training with skill training improved the physical variables on flexibility and muscular strength and endurance of higher secondary level school boys of Kolar district, Karnataka.*

**Keywords:** VSRWST-Volleyball Specific Resistance Training with Skill Training group, VSRWOST- Volleyball Specific Resistance Training Without Skill Training group, GRTWOST- General Resistance Training Without Skill Training, CG-Control Group, flexibility, muscular strength and endurance.

### **1. Introduction**

Volleyball is a very attractive, interesting, complex and dynamic sport, with a constant quick transfer of action from one half of the court to the other, in which the teams attempt to achieve victory by scoring a greater number of points, achieved by successful spikes and 'scheming' on the part of the opposing team. Physical development and improvement of motor skills are significant components that can be influenced through programmed physical practice (Bompa, 2005). Technical-tactical demands in the large number of sport disciplines include frequent direction changes in frontal, and sagittal planes, as well as different types of jumps, and among them are jumps characteristic for certain sport discipline (Nešić, 2008). These features demand adequate preparedness, and high technical, and tactical ability, as well as basic, and specific physical ability, considering the large number of jumping techniques, in dependence of sport discipline specify (Zatsiorsky & Kraemer, 2006). Modern volleyball shows an increasingly expressed connection with science, opening new paths and views on volleyball practice (Ivanović, Dopsaj, Nešić, & Stanković, 2010). Given the fact that basic volleyball

elements include whole series of motorical actions in order for them to be performed right, at the same time efficient, it is understandable, and completely justified to expect that training exercise conducted for the improvement of those elements will benefit the motorical skills as well (Nešić, Sikimić, Ilić, & Stojanović, 2011). Modern volleyball play demands the players to have a high level of general motor skills, as well as specific skills for volleyball play and certain player positions (Martinović et al., 2011). The players need to be prepared to perform each technical-tactical element perfectly. Maximum attention needs to be devoted to the phase of learning, adoption or perfect performance of these elements, so that they are performed in a proper, fast, strong, precise manner. Having in mind the gradual and methodical progress in training process, it is necessary to find the adequate “shortest route” from volleyball beginner to volleyball player who possesses the whole set of volleyball skills and knowledge which he can use (Jurko, Nešić, & Stojanović, 2013). Therefore, the phases of teaching the main elements of volleyball technique in junior competition categories (as well as volleyball schools), will never cease to be a primary imperative – an essential part in the process of “creating” a high-quality volleyball player (Nešić, 2005). A well-structured volleyball training program requires explosive power, vertical jump height, stamina and speed and agility around the court. Skill training alone, such as practising spikes, won't develop the physical traits necessary to play to the athlete's full potential (Gabbett T Et al 2006). Power in the legs is needed to jump explosively off the ground in order to spike, block, set and dive (Smith DJ 1992, Fleck SJ, 1985). The repetitive nature of jumping movements makes power endurance an important outcome of training and the length of games and sets places a significant demand on strength endurance (Bompa,1999). Power and strength endurance are more important than aerobic endurance (Smith DJ 1992, Fleck SJ, 1985). A well-designed volleyball training program will also help to reduce the incidence and severity of injury in volleyball players (Stasinopoulos D, 2004, Young MA, 2005 & Bahr R 1997).

### 1.1. Need for the Study

For a Volleyball player to be successful on the court, proper specific fitness has to be given during the trainings as required for the Volleyball game specifically. When those requirements are fulfilled, the athlete will reach his maximum performance with his potential skill level. Hence it is necessary to implement a new strategy of volleyball specific resistance training and skill training packages on the development of physical fitness variable and skill performance variables on the higher secondary level school boys.

### 1.2. Statement of the Problem

The main purpose of this study was to find the effect of volleyball specific resistance training and skill training packages on the flexibility and muscular strength and endurance on the higher secondary level school boys.

## 2. Methodology

The methods that was followed in the study are given below as selection of subjects, experimental design, selection of variables and test items, testing protocols etc., Eighty male Volleyball players of inter-school level competitors (age 15-18) were randomly selected from various schools in Kolar district, Karnataka. The study was formulated as pre and post test random group design, in which eighty subjects were divided into 4 groups. The subjects were assigned at random design to one of the four groups, in which the first group (n=20, VSWS group) performed volleyball specific resistance training with skill training, the second one (n=20; VSWOS group) performed volleyball specific resistance training without skill training, the third one (n=20, GRWS group) performed general resistance training without skill training, and the fourth one was the control (n=20; control group).

The following variable were selected for this study like flexibility, muscular strength and endurance. The twelve weeks of training schedule was followed after the pretest and before posttest. Flexibility was measure by sit and reach test and muscular strength and endurance was measured by modified sit ups test. In the present study the data was analyzed by using the Training effects of each group on flexibility and muscular strength and endurance “t” ratio was used to find out mean differences from pre test to post test and compared the significance of the mean differences among the four groups on flexibility and muscular strength and endurance analysis of co-variance.

## 3. Analysis of the Study

| Groups   | Test      | Mean + S. D | Std. Error Mean | M.D  | 't' Ratio |
|----------|-----------|-------------|-----------------|------|-----------|
| VSRTWST  | PRE-TEST  | 22.45±1.73  | 0.31            | 3.10 | 45.02*    |
|          | POST-TEST | 25.55±1.73  |                 |      |           |
| VSRTWOST | PRE-TEST  | 22.30±1.71  | .19             | 2.35 | 12.01*    |
|          | POST-TEST | 24.65±1.46  |                 |      |           |
| GRTWOST  | PRE-TEST  | 22.55±1.70  | 0.68            | 1.10 | 15.98*    |
|          | POST-TEST | 23.65±1.78  |                 |      |           |
| CG       | PRE-TEST  | 22.40±2.32  | 0.068           | 0.10 | 1.45      |
|          | POST-TEST | 22.50±2.25  |                 |      |           |

Table 1: Significance of Mean Gains / Losses between Pre and Post Test of VSRTWST, VSRTWOST, GRTWOST and CG on Flexibility of Higher Secondary Level School Boys of Kolar District, Karnataka

\*Significant at 0.05 levels (2.09)

Table -1 shows the VSRTWST group pre test mean (22.45± S.D 1.73) and post test mean was (25.55± S.D 1.73), the difference between the mean value was 3.10 and the obtained 't' ratio's for pre and post test mean difference in the volleyball specific resistance training with skill training group on flexibility was (45.02) and the VSRTWOST group pre test mean (22.30± S.D 1.71) and post test mean was (24.65± S.D 1.46). The difference between the mean value was 2.35 and the obtained 't' ratio for pre and post test mean difference in the volleyball specific resistance training without skill training group on flexibility was (12.01), the GRTWOST group pre test mean (22.55± S.D 1.70) and post test mean was (23.65± S.D 1.78). The difference between the mean value was 1.10 and the obtained 't' ratio for pre and post test mean difference in the general resistance training without skill training group on flexibility was (15.98), and Control group pre-test mean (22.40± S.D 2.32) and post test mean was (22.50± S.D 2.25). The difference between the mean value was 0.10 and the obtained 't' ratio's for pre and post test mean difference in the control group on flexibility was (1.45) respectively. The obtained 't' ratio was higher than the table value of 2.09 and the degrees of freedom (1, 19). It was found to be statistically significant at 0.05 level of confidence for all the experimental groups and there were no changes in the control group.

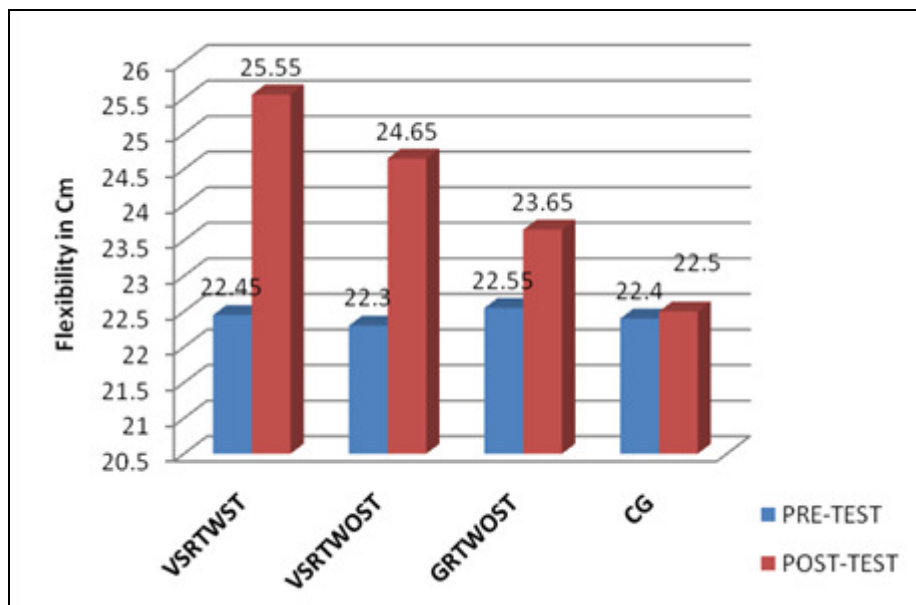


Figure 1: The bar diagram showing the mean value of VSRTWST, VSRTWOST, GRTWOST and CG on Flexibility

| Groups   | Test      | Mean ± S. D | Std. Error Mean | M.D  | 't' Ratio |
|----------|-----------|-------------|-----------------|------|-----------|
| VSRTWST  | PRE-TEST  | 34.80± 1.76 | 0.13            | 3.60 | 26.91*    |
|          | POST-TEST | 38.40± 1.95 |                 |      |           |
| VSRTWOST | PRE-TEST  | 34.95± 3.59 | 0.38            | 2.70 | 7.02*     |
|          | POST-TEST | 37.65± 2.53 |                 |      |           |
| GRTWOST  | PRE-TEST  | 34.75± 1.80 | 0.68            | 1.40 | 12.45*    |
|          | POST-TEST | 36.15± 1.78 |                 |      |           |
| CG       | PRE-TEST  | 34.65± 1.66 | 0.06            | 0.10 | 1.45      |
|          | POST-TEST | 34.80± 1.43 |                 |      |           |

Table 2: Significance of Mean Gains / Losses between Pre and Post Test of VSRTWST, VSRTWOST, GRTWOST and CG on Muscular Strength and Endurance of Higher Secondary Level School Boys of Kolar District, Karnataka  
\*Significant at 0.05 levels (2.09)

Table -2 shows the VSRTWST group pre test mean (34.805± S.D 1.76) and post test mean was (38.40 ± S.D 1.95). The difference between the mean value was 3.60 and the obtained 't' ratio for pre and post test mean difference in the volleyball specific resistance training with skill training group on muscular strength and endurance was (26.91), the VSRTWOST group pre test mean (34.95± S.D 3.59) and post test mean was (37.65± S.D 2.53). The difference between the mean value was 2.70 and the obtained 't' ratio for pre and post test mean difference in the volleyball specific resistance training without skill training group on muscular strength and endurance was (7.02), the GRTWOST group pre test mean (34.75± S.D 1.80) and post test mean was (36.15± S.D 1.78). The difference between the mean value was 1.40 and the obtained 't' ratio for pre and post test mean difference in the general resistance training without skill training group on flexibility was (12.45), and Control group pre-test mean (34.65± S.D 1.66) and post test mean was (34.80± S.D 1.43). The difference between the mean value was 0.10 and the obtained 't' ratio's for pre and post test mean difference in the control group on flexibility was (1.45) respectively. The obtained 't' ratio was higher than the table value of 2.09 and the degrees of freedom (1, 19). It was found to be statistically significant at 0.05 level of confidence for all the experimental groups and there were no changes in the control group.

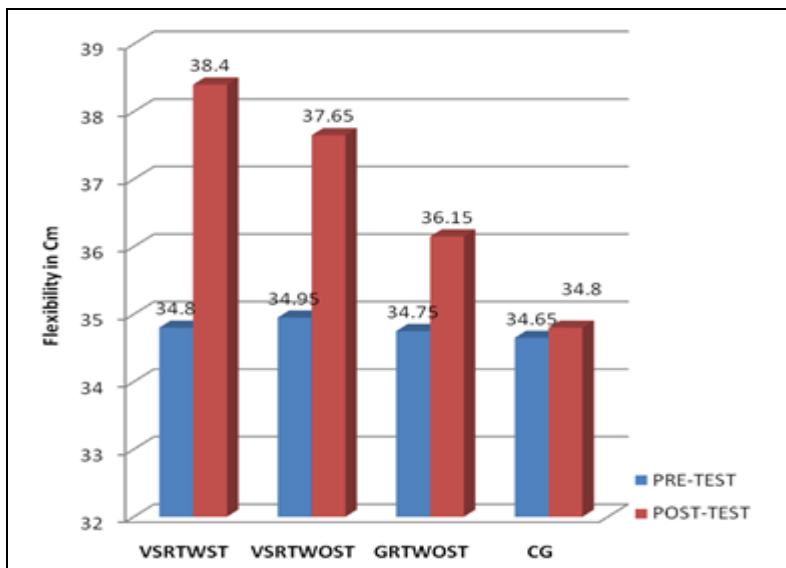


Figure 2: The bar diagram showing the mean value of VSRTWST, VSRTWOST, GRTWOST and CG on Flexibility

| Variables                       | Source of variance | Sum of Squares | df | Mean Square | F    | Sig. |
|---------------------------------|--------------------|----------------|----|-------------|------|------|
| Flexibility                     | Between Groups     | .650           | 3  | .217        | .061 | .980 |
|                                 | Within Groups      | 270.900        | 76 | 3.564       |      |      |
| Muscular Strength and Endurance | Between Groups     | .938           | 3  | .313        | .057 | .982 |
|                                 | Within Groups      | 418.450        | 76 | 5.506       |      |      |

Table 3: Analysis of Variance on Pre Test Means Among VSRTWST, VSRTWOST, GRTWOST and CG on Flexibility, Muscular Strength and Endurance of Higher Secondary Level School Boys of Kolar District, Karnataka

| Variables                       | Source of variance | Sum of Squares | df | Mean Square | F      | Sig. |
|---------------------------------|--------------------|----------------|----|-------------|--------|------|
| Flexibility                     | Between Groups     | 103.338        | 3  | 34.446      | 10.264 | .000 |
|                                 | Within Groups      | 255.050        | 76 | 3.356       |        |      |
| Muscular Strength and Endurance | Between Groups     | 153.900        | 3  | 51.300      | 13.212 | .000 |
|                                 | Within Groups      | 295.100        | 76 | 3.883       |        |      |

Table 4: Analysis of Variance on Post Test Means Among VSRTWST, VSRTWOST, GRTWOST and CG on Flexibility, Muscular Strength and Endurance of Higher Secondary Level School Boys of Kolar District, Karnataka

| Variables                       | Source of variance    | Sum of Squares | df       | Mean Square   | F              |
|---------------------------------|-----------------------|----------------|----------|---------------|----------------|
| <b>Flexibility</b>              | <b>Between Groups</b> | <b>105.716</b> | <b>3</b> | <b>35.239</b> | <b>140.82*</b> |
|                                 | Within Groups         | 18.767         | 75       | .250          |                |
| Muscular Strength and Endurance | Between Groups        | 140.220        | 3        | 46.740        | 73.132*        |
|                                 | Within Groups         | 47.934         | 75       | .639          |                |

Table 5: Analysis of Co-Variance on Adjusted Post Test Means Among VSRTWST, VSRTWOST, GRTWOST and CG on Flexibility, Muscular Strength and Endurance of Higher Secondary Level School Boys of Kolar District, Karnataka

#### 4. Result and Discussion

The result of the study was analysed in terms of the flexibility, muscular strength and endurance physical fitness parameter for three different training group of VSRTWST, VSRTWOST and GRTWOST, over the period of twelve weeks of training. The obtained results favoured the players who practised with concurrent resistance circuit training and endurance training on speed, muscular strength, muscular strength and endurance, aerobic capacity, and agility. The obtained result displays similar effect among the other two training modules. After the completion of 12 weeks of training period the results on physical fitness parameter are discussed below

#### 4.1. Flexibility

The volleyball specific resistance training with skill training, the volleyball specific resistance training without skill training, the general resistance training without skill training significantly improved the flexibility from pre test to post test. The flexibility increased in the volleyball specific resistance training with skill training (VSRTWST) group pre test mean ( $22.45 \pm S.D 1.73$ ) and post test mean was ( $25.55 \pm S.D 1.73$ ). Volleyball specific resistance training without skill training (VSRTWOST) group pre test mean ( $22.30 \pm S.D 1.71$ ) and post test mean was ( $24.65 \pm S.D 1.46$ ). General resistance training without skill training (GRTWOST) group pre test mean ( $22.55 \pm S.D 1.70$ ) and post test mean was ( $23.65 \pm S.D 1.78$ ). Flexibility significantly improved pre test to post test in all three experimental groups with no changes in control group.

The present study demonstrated that an increase in flexibility of 13.80 %, 10.53 % and 4.87 % estimated with sit and reach test for the volleyball specific resistance training without skill training, the volleyball specific resistance training without skill training and the general resistance training without skill training respectively. The volleyball specific resistance training with skill training group improved flexibility (13.80 %) better than the volleyball specific resistance training without skill training group (10.53 %) and the general resistance training without skill training group (4.87 %). Volleyball specific resistance training without skill training improved flexibility (10.53 %) better than the general resistance training without skill training group (4.87 %) and control group. General resistance training without skill training group (4.87 %) improved flexibility better than the control group. The result of the present study are in line with previous study [Chtara M (2005)] finding concluded that the intra-session concurrent endurance and strength training resulted in improvement of flexibility [J.Mikkola , et.al (2007)] found that the concurrent endurance and explosive type strength training improved flexibility .

#### 4.2. Muscular Strength and Endurance

The volleyball specific resistance training with skill training, the volleyball specific resistance training without skill training and the general resistance training without skill training significantly improved the muscular strength and endurance from pre test to post test. The muscular strength and endurance increased in the volleyball specific resistance training with skill training (VSRTWST) group pre test mean ( $34.805 \pm S.D 1.76$ ) and post test mean was ( $38.40 \pm S.D 1.95$ ). Volleyball specific resistance training without skill training (VSRTWOST) group pre test mean ( $34.95 \pm S.D 3.59$ ) and post test mean was ( $37.65 \pm S.D 2.53$ ). General resistance training without skill training (GRTWOST) group pre test mean ( $34.75 \pm S.D 1.80$ ) and post test mean was ( $36.15 \pm S.D 1.78$ ). muscular strength and endurance significantly improved from pre test to post test in all three experimental groups with no changes in control group.

The present study demonstrated that an increase in muscular strength and endurance of 10.34 %, 7.72 % and 4.02 % estimated with modified sit ups test for the volleyball specific resistance training with skill training, the volleyball specific resistance training without skill training, the general resistance training without skill training respectively. The volleyball specific resistance training with skill training improved muscular strength and endurance (10.34 %) better than the volleyball specific resistance training without skill training group (7.72 %), General resistance training without skill training group (4.02 %). Volleyball specific resistance training without skill training group improved muscular strength and endurance 7.72 % better than the general resistance training without skill training group (4.02 %) and control group. General resistance training without skill training group (4.02 %) improved muscular strength and endurance better than the control group. The result of the present study are in line with previous study [Chtara M (2005)] finding concluded that the intra-session concurrent endurance and strength training resulted in a improvement of flexibility [J.Mikkola , et.al (2007)] found that the concurrent endurance and explosive type strength training improved muscular strength and endurance .

### 5. Conclusions

1. It was concluded that volleyball specific training with skill training improved flexibility and muscular strength and endurance of school volleyball players.
2. It was concluded that volleyball specific training without skill training improved flexibility and muscular strength and endurance of school volleyball players.
3. It was concluded that general resistance without skill training improved flexibility and muscular strength and endurance of school volleyball players.
4. It was concluded that volleyball specific training with skill training improved flexibility and muscular strength and endurance better than the volleyball specific training without skill training of school volleyball players.
5. It was concluded that volleyball specific training without skill training improved flexibility and muscular strength and endurance better than the general resistance training without skill training of school volleyball players.

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