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## Experiment on yoga for skills development in elite volleyball players

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### Abstract

Volleyball is a popular team game. Every team aspires to achieve top performance and adopting many scientific training programmes to get success in competitive volleyball. Recent literature reveals that yoga may advantageously be implemented in achieving top performance in sports; hence the present experiment was planned.

The purpose of this experiment was to see the effect of yoga training on improvement of selected skills of elite volleyball players.

A parallel group pre-post-test design was implemented to conduct the experiment. Both experimental (yoga; n1=30) and control (n2=30) subjects, aged 16 to 18 years, were assessed with four volleyball-skills (viz., forearm pass, spike, service and block) at the base line (pretest) and after completion eight weeks of yoga training intervention (posttest). Yoga intervention for ½ hr. a day followed by ½ hr. game practice was imparted in the evening at 5:00 p.m., excluding Saturdays, Sundays and holidays for a total period of 8 weeks under the overall supervision of a yoga expert; whereas the control group was involved in extracurricular activities for same duration followed by the game practice.

The results revealed that experimental (yoga) group had significant superiority over the control group in front pass ( $t=5.98$ ,  $df=58$ ,  $p<0.001$ ); back pass ( $t=4.78$ ,  $df=58$ ,  $p<0.001$ ); service ( $t=6.3$ ,  $df=58$ ,  $p<0.001$ ); spiking ( $t=6.04$ ,  $df=58$ ,  $p<0.001$ ) and blocking ability ( $t=7.54$ ,  $df=58$ ,  $p<0.001$ ).

Thus, the experiment concludes that the training of yoga practices for a period of eight weeks is effective in improving skills needed to achieve success in competitive volleyball.

**Keywords:** Yoga, volleyball, elite players, skills

### Introduction

The character of volleyball game is entirely different than that of other sports discipline. Rotation system is a unique feature that differentiates volleyball from other sports. During game the object of every player team is to send the ball over the net in order to ground it on the opponent's court and to prevent the same effort is done by the opponent. In fact, four main abilities are most important for volleyball players which are 1) Power that refers to the state of applying force; 2) Take-off power is a crucial element in volleyball in which the player attempts to project the body to the highest point in the air to either spike or block. The greater the force applied against the ground, the higher the jump. The height of the jump is directly proportional to leg power; 3) Reactive power refers to the ability to generate force of jumping immediately following landing such as in spike-land-block. This kind of power is also necessary to quickly change the direction of motion during a game. The force necessary to adequately perform a reactive jump depends on the height of the jump, the player's body weight and leg power; and 4) Power-endurance is defined as the ability to develop power consistently throughout a game. The development of power, as expressed by a high vertical jump to spike over the block is essential for any serious volleyball player. However, if one is not capable of duplicating this task some 200 times per game (the average number of spikes and blocks performed by a college player), a player's jumping effectiveness decreases in the latter part of the game.

The volleyball players need to participate in frequent short bouts of high-intensity exercise, followed by periods of low intensity activity (Kunstlinger *et al.*, 1987; Viitasalo *et al.*, 1987)<sup>[13]</sup>. The high intensity activities involved in volleyball match requires players to have well

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developed aerobic and anaerobic alactic (ATP-CP) systems (Polglaze and Dawson, 1992) <sup>[20]</sup>. Additionally, volleyball players require well developed speed, agility, upper-body and lower body muscular power, and maximal aerobic power (Viitasalo *et al.*, 1987).

Further, in the modern volleyball game success depends on the skill like spiking (Mondal and Bhowmick, 2013) <sup>[17]</sup>. In spiking the height of hand and ball is a relevant parameter for success (Tillman, Haas, Brunt and Bennett, 2004) <sup>[25]</sup>. Success in attack is more likely to depend on the higher jumping ability as well as take-off velocity of the player because increasing the jump will increase the open area of opposition court to the attacker (Enoka, 1971; Hussain, Khan and Mohammad, 2011) <sup>[9, 12]</sup> and it also increases the time during which attack is possible. In addition, skill of blocking, in which a player or players jump and extend their hands above and over the net (without touching the net) to block an attack (spike) by the opponent, is crucial to team success (Eom and Schutz, 1992) <sup>[10]</sup>. Likewise, the other skills viz., servicing a ball and setting the ball (front pass and back pass) for spiker also play key role to win.

Although, many scientific training programmes are being practiced and implemented to get success in competitive sports, recently the role of yoga practices in achieving top performance in sports is well documented (Balasubramanian and Pansare, 1991; Bera and Rajapurkar, 1993; Raju *et al.*, 1994) <sup>[2, 4, 22]</sup> which may be included in the training schedule of elite volleyball players. Since several research reports indicate that yoga practices can lead to an added advantage for improving physical fitness (Armstrong & Smedley, 2003; Madanmohan *et al.*, 2003; Raghuraj & Teles, 1997; Telles *et al.*, 1993; Tran *et al.*, 2001) <sup>[1, 15, 21, 24, 26]</sup> and sports skills (Pargaonkar, Joglekar, Dhope & Bera, 2001) <sup>[19]</sup> to exhibit top performance in sports; it was hypothesized that yoga may contribute to improve the skill abilities of elite volleyball players. Therefore, present experiment was planned with a view to see the effect of yoga training on skills of elite volleyball players.

### Method Participants

Sixty elite male volleyball players (n=60), aged 16 to 18 years, from a school located in Sangli District, Maharashtra, were the participants. Purposive sampling technique was employed to locate the elite male volleyball players. The subjects were randomly assigned into experimental group (n=30) and wait list control group (n=30) considering the method of Fisher's random table sampling.

### Ethical Consideration

Signed informed consent was obtained from the participants. Permission from the school authorities and trainers were also obtained prior to start of the experiment. Nevertheless, prior to the experiment, the project protocol was reviewed and approved by the institutional ethical committee of Bharati Vidyapeeth Deemed University College of Physical Education, Pune. The participants of wait list control group were promised to provide yoga training after completion of experimental period.

### Experimental Design

A parallel group pre-post-test design was implemented to conduct the experiment. Both experimental (yoga) and wait-list-control groups were assessed with four skill-variables of volleyball at the base line (pretest) and after completion eight weeks of yoga training intervention (posttest). After baseline

assessment all the participants of experimental group underwent a yoga training ½ hr. daily in the evening followed by ½ hr. of volleyball game practice for a total period of 8 weeks, whereas the participants of control group did not participate in yoga training but were involved in extracurricular activities for ½ hr. and also allowed to practice volleyball game for ½ hr. All the participants of both the groups were post-tested with the selected variables (skills in volleyball).

### Assessment of volleyball skills setting front pass and back pass

To conduct this test, ground marking was done four meter inside from sideline on either side near the center line of a volleyball court. The setter was asked to perform self-toss with volleyball and set the ball in the target area. The target was ring with 30 cm diameter which was placed in front as well as on back. Ten chances were provided i.e. five chances for front and five for back pass. Successful setting passes were counted in point for back as well as front.

### Servicing volleyball

Marking was done 3 meter (3-point) line away from centre line inside the volleyball court. One meter line (4-point) from the end line was marked, 3.28 meters (2-point) line was marked from sideline on both the sides so that the area of 3.28 meters on both right and left side line was made and 2.43 meters zone in the centre was also marked. The tester was standing on the other side of the court. The subjects were instructed to serve the ball. Ten services were provided for each player. Total number of points scored was recorded.

### Spiking

Same marking was done as for service test. The player was instructed to perform spiking from three different zone of 3 meters. Self-spiking was performed in each zone. Points were recorded where the ball landed. Total number of points was recorded.

### Blocking

Three-meter area from each side line of a volleyball court was marked. Blocker was asked to stand at center of the net inside the area of 3 x 3-meter box from the other side of the court. Ten spiking were provided for blocking. Number of successful blocks in ten spiking was counted in points.

### Training intervention

Yoga intervention was conducted for ½ hr. a day in the evening at 5:00 p.m., excluding Saturdays, Sundays and holidays for a total period of 8 weeks under the overall supervision of a yoga expert; whereas the control group did not undergo any yoga training but were involved in extracurricular activities for the said period of ½ hr., excluding Saturdays, Sundays and holidays for a total period of 8 weeks. After training intervention of ½ hr., both the groups were given a gap of 10 minutes to take rest and then they participated in volleyball training/practice session for ½ hr. followed by a 10 minutes of cooling down exercises. Thus, total involvement of work out for both the groups was 80 minutes per day, 5 days in a week, for a total period of 8 weeks.

The experimental group practiced some yoga asanas (postures) and pranayama (breathing techniques). Each asana was maintained for 15-30 seconds initially, and for 1 minute in the later stages. Duration of pranayama was for 2-3 minutes

initially and was gradually increased to 5 minutes. The asanas included for the experimental group were Shavasana, Naukasana, Sarvangasana, Bhujangasana, Dhanurasana, Paschimottanasana, Vajrasana, Bakasana, Chakrasana, Tikonasana, and Vrikshasana, whereas the pranayama practices were Ujjayi, Suryabhedan, and Anulom-Vilom pranayama. Every yoga training session was ended with OM chanting.

### Statistical Analysis

Standard methods were followed for the data extraction for each of the variables. Data analysis was done using statistical software (SPSS i.e., Statistical Package for the Social Sciences, Version 25.0). Data were primarily analyzed using descriptive statistical method and further compared with the

help of 't' test.

### Result and Discussion

Results of within group comparison indicate that after eight weeks of yoga training intervention the experimental (yoga) group showed significant changes in front pass ( $t=6.2$ ,  $df=29$ ,  $p<0.001$ ); back pass ( $t=7.8$ ,  $df=29$ ,  $p<0.001$ ); service ( $t=8.7$ ,  $df=29$ ,  $p<0.001$ ); spiking ( $t=12.8$ ,  $df=29$ ,  $p<0.001$ ) and blocking ability ( $t=11.9$ ,  $df=29$ ,  $p<0.001$ ), whereas the results of control group revealed no significant change in front pass ( $t=0.75$ ,  $df=29$ ,  $p>0.05$ ); back pass ( $t=0.51$ ,  $df=29$ ,  $p>0.05$ ); service ( $t=1.7$ ,  $df=29$ ,  $p>0.05$ ); spiking ( $t=1.4$ ,  $df=29$ ,  $p>0.05$ ) and blocking ability ( $t=0.6$ ,  $df=29$ ,  $p>0.05$ ) respectively (Table 1).

**Table 1:** Descriptive statistics and t-test for within group comparison in Volleyball skills

Variable	Pre Mean $\pm$ SD	Post Mean $\pm$ SD	t value	Sig.
<b>Yoga Group</b>				
Front Pass (Pts.)	05.33 ( $\pm$ 1.29)	07.13 ( $\pm$ 1.16)	06.2	0.001
Back Pass (Pts.)	02.03 ( $\pm$ 1.24)	03.86 ( $\pm$ 1.33)	07.8	0.001
Service (Pts.)	30.30 ( $\pm$ 3.26)	35.03 ( $\pm$ 2.96)	08.7	0.001
Spiking (Pts.)	26.90 ( $\pm$ 2.41)	32.20 ( $\pm$ 2.89)	12.8	0.001
Blocking (Pts.)	04.67 ( $\pm$ 1.69)	07.90 ( $\pm$ 1.25)	11.9	0.001
<b>Control Group</b>				
Front Pass (Pts.)	05.10 ( $\pm$ 1.21)	05.30 ( $\pm$ 1.20)	0.75	0.45
Back Pass (Pts.)	02.16 ( $\pm$ 1.17)	02.26 ( $\pm$ 1.25)	0.51	0.61
Service (Pts.)	29.03 ( $\pm$ 3.41)	29.76 ( $\pm$ 3.48)	1.70	0.08
Spiking (Pts.)	27.10 ( $\pm$ 2.82)	27.73 ( $\pm$ 2.82)	1.40	0.17
Blocking (Pts.)	04.66 ( $\pm$ 1.49)	04.83 ( $\pm$ 1.72)	0.60	0.53

The results between group comparisons revealed that experimental (yoga) group had significant superiority Over the control group in front pass ( $t=5.98$ ,  $df=58$ ,  $p<0.001$ ); back pass ( $t=4.78$ ,  $df=58$ ,  $p<0.001$ ); service ( $t=6.30$ ,  $df=58$ ,  $p<0.001$ ); spiking ( $t=6.04$ ,  $df=58$ ,  $p<0.001$ ) and blocking ability ( $t=7.54$ ,  $df=58$ ,  $p<0.001$ ) (Table 2).

**Table 2:** Descriptive statistics and t-test for between group comparisons in volleyball skills

Variable	Yoga (Post test) Mean $\pm$ SD	Control (Post test) Mean $\pm$ SD	t value	Sig.
Front Pass (Pts.)	7.13 ( $\pm$ 1.16)	5.30 ( $\pm$ 1.20)	5.98	0.001
Back Pass (Pts.)	3.86 ( $\pm$ 1.33)	2.26 ( $\pm$ 1.25)	4.78	0.001
Service (Pts.)	35.03 ( $\pm$ 2.96)	29.76 ( $\pm$ 3.48)	6.30	0.001
Spiking (Pts.)	32.20 ( $\pm$ 2.89)	27.73 ( $\pm$ 2.82)	6.04	0.001
Blocking (Pts.)	7.7 ( $\pm$ 1.25)	4.83 ( $\pm$ 1.72)	7.54	0.001

Literature indicates that forearm pass, spike, service and block are the basic fundamental skills required for team success in volleyball (Slaymaker & Brown, 1970) [23] and every talented player must possess these skills. The coaches and trainers in volleyball employ different training strategies to imbibe and develop these volleyball skills among their players. Although yoga has become very popular among the people around the globe for better health and fitness (Bera, 1993; Govindarajulu, Murugesan & Bera, 2002; Bera, Rajapurkar & Ganguly, 1993; Nandi, S., Adhikari & Bera, 2004; Bera, Chaurasia, Shete & Verma, 2017) [11, 4, 18, 3] and its contribution towards sports is being acknowledged (Pargaonkar, Joglekar, Dhope & Bera, 2001; Waghchoure & Bera, 1999; Lolage & Bera, 2002; Mishra, Tripathy & Bera, 2003;) [19, 28, 14, 16] however, the impact of yoga for skill development in sports especially in volleyball is unknown. Therefore, the present experiment seems to be logical.

Further, the findings of this controlled experiment for eight weeks duration suggest that the yoga training is found effective in improving the technical skills (viz., forearm pass, spike, service and block) needed for exhibiting top performance in volleyball. In fact, yoga might have helped to improve strength and explosive power of arm muscles and associated joints' flexibility that perhaps contributed towards

improvement of the skill abilities in forearm pass, spike, service and block in volleyball. Various investigators reported earlier that these skill abilities in volleyball depend upon one's height of hand, strength of arm and shoulder muscles, explosive power of lower limbs for take-off velocity and abdominal as well as back muscles (Mondal and Bhowmick, 2013; Tillman, Haas, Brunt and Bennett, 2004; Enoka, 1971; Hussain, Khan and Mohammad, 2011) [17, 25, 9]. Moreover, the volleyball players need to have better neuromuscular coordination for better abilities in servicing the ball and attacking skills (Castro *et al.*, 2011; Drikos *et al.*, 2009) [7, 8]. Thus, yoga training as included in this experiment might have contributed to enhance all these attributes and therefore the associated skill abilities have been improved among the elite volleyball players.

### Conclusion

The experiment concludes that the training of yoga practices for a period of eight weeks is effective in improving skills needed to achieve success in competitive volleyball.

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