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The Influence Of Stress And Skill-Focused Training On Coordinative Abilities In Volleyball Players: A Comparative Analysis

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Abstract

This study investigated the effects of a targeted training program on key performance metrics compared to a control group. The primary objective was to evaluate pre- and post-test differences in orientation ability, skill performance, and physical attributes. Data analysis revealed significant improvements in the training group, with notable reductions in mean values and standard deviations across various parameters. For instance, orientation ability showed a 7.93% improvement, with a mean difference of 1.034 ($t=6.956$, $\mathbf{p}=0.000$). Similarly, skill-related metrics demonstrated substantial gains, such as a 28.19% enhancement in performance scores ($t=6.559$, $\mathbf{p}=0.000$). In contrast, the control group exhibited minimal or statistically insignificant changes across the same variables, confirming the efficacy of the intervention. The findings highlight the role of systematic training programs in optimizing performance metrics, including reaction time, coordination, and task-specific skills. Statistical analysis, employing paired t-tests and percentage change evaluations, underscores the program's significant impact compared to natural progression in a non-intervention scenario. This study contributes to the growing evidence supporting structured training regimens for skill enhancement and physical performance improvement, with implications for educational, athletic, and professional domains.

Keywords: Training efficacy, orientation ability, skill performance, physical attributes, statistical analysis, structured training, control group comparison, performance enhancement, pre- and post-test evaluation.

1. INTRODUCTION

Volleyball, a dynamic sport blending physical prowess, mental acuity, and refined coordination, demands players to harmonize sensory inputs with precise motor responses. This critical skill, referred to as coordinative ability, is fundamental to achieving excellence on the court (Silva et al., 2014). Whether delivering a powerful spike or reacting swiftly to a defensive play, volleyball requires an intricate interplay between the mind and body (Madaminov, 2021). Originating in 1895 as "mintonette," volleyball was created by William G. Morgan, a YMCA physical education instructor, who sought to merge elements of basketball, tennis, and handball into a single indoor activity (Klucka & Hendricks, 2020). Over time, the sport evolved into a global phenomenon, supported by the establishment of the Fédération Internationale de Volleyball (FIVB) in 1947 and its inclusion in the 1964 Tokyo Olympics (Mobley, 2013; Parks, 2016).

Today, volleyball is celebrated for its inclusivity, with formats such as beach volleyball and sitting volleyball expanding its appeal across diverse populations. The sport's unique demands on coordination, strength, and adaptability make it a valuable context for exploring the interplay of psychological and physical factors on athletic performance. This study focuses on the comparative impact of stress and skill-focused training on the coordinative abilities of volleyball players, aiming to provide insights into optimizing training strategies for enhanced performance.

The phenomenon of beach volleyball, although highly visible, is still in its early stages. Beach volleyball has introduced the sport to a completely new market (Palao and Valades, 2014). Since the first FIVB World Tour event a little over ten years ago, it has achieved significant success in terms of spectators and television viewership, particularly at the 2000 Sydney and 1996 Atlanta Olympic Games (Haxton, 2000). The Fédération Internationale de Volleyball, commonly known as the FIVB, is the governing body responsible for organizing all international volleyball competitions (Vuorinen, 2018). Its headquarters are in Lausanne, Switzerland, and the current president is Ary Graça. Established in April 1947 in France, the FIVB is the primary organization for conducting volleyball competitions in association with the International Olympic Committee (IOC) (Fabian, 2020). The FIVB organizes the World Championships and Olympic Games, including the qualification tournaments based on continental competitions. This organization is responsible for allocating competition venues, determining player line-ups, and setting replacement regulations, among other duties (Chappelet et al., 2012).

1.1 Volleyball in India

Volleyball in India has a rich history and has seen significant development over the years, though it remains under the radar compared to sports like cricket. During the early 20th century, volleyball was introduced to India by the Y.M.C.A. It quickly gained popularity, particularly in rural areas and educational institutions. By 1951, the Volleyball Federation of India (VFI) was established, which became the governing body responsible for the sport's development and organization at all levels (Gaurav and Sıngh, 2014). Indian teams have exhibited praiseworthy accomplishments in global events like the Asian Games and South Asian Games, achieving numerous medals and showcasing the nation's sporting process. The scholarly literature

on volleyball in India offers a comprehensive examination of its growth, obstacles, and socio-cultural influence. The VFI, affiliated with both the Asian Volleyball Confederation (AVC) and the FIVB, oversees the sport's administration in India. It organizes national championships for both men and women, and age-group competitions to nurture young talent. The VFI also coordinates India's participation in international tournaments. 7 India's volleyball teams have had notable successes in regional competitions. The Indian men's team clinched gold at the Asian Games in both 1955 and 1962, while the women's team secured a bronze medal at the Asian Championship in 1983. India has also showcased strong performances in the South Asian Games, consistently securing medals in both men's and women's categories (Kumar et al., 2016).

1.2 Training Methods and Development

Effective training methods are essential for developing the technical, physical, and mental attributes required for success in volleyball. Training modalities encompass a wide range of activities, including skill-based drills, strength and conditioning exercises, agility and speed training, tactical simulations, and mental preparation techniques (Nešić et al., 2020). Studies conducted by Pliauga et al. (2016) and Sheppard et al. (2018) have explored the effectiveness of different training interventions in volleyball, emphasizing the importance of periodization, specificity, progression, and individualization in optimizing performance outcomes and minimizing the risk of injuries.

1.3 Statement of Aim

The Impact of Stress and skill-focused training on coordinative ability of volleyball players: A comparative study.

1.4 Need and Scope of the Study

The need for the study "The Impact of Stress and Skill-Focused Training on Coordinative Ability of Volleyball Players: A Comparative Study" arises from the crucial role that coordinative ability plays in enhancing volleyball performance and 32 the adverse effects that stress can have on athletes. This research aims to provide a comprehensive analysis of how stress and different skill-focused training methods influence the coordination skills essential for effective gameplay. By examining the interplay between stress levels and targeted training, the study seeks to develop optimized training regimens that not only improve technical skills but also equip players with better stress management techniques, thus enhancing overall performance and reducing injury risks. The scope of the study includes a comparative analysis of various training methods on volleyball players of different skill levels, incorporating both psychological assessments and physiological measurements to quantify stress and its impact on coordination. By adopting a rigorous methodological approach, the study will generate practical recommendations for coaches and athletes, potentially benefiting not only volleyball players but also athletes in other sports where coordination is key. The findings are expected to contribute to the development of holistic training programs that address both the physical and psychological dimensions of athlete development, promoting well-rounded and resilient players capable of maintaining high performance under pressure.

1.5 Objectives

1. Baseline Assessment: Evaluate the current coordinative ability of volleyball players using standardized tests.

2. Measurement: Quantify stress levels using validated psychological scales including questionnaire.

3. Skill focused Training: Implement a structured program targeting specific coordinative skills.

4. Post Training Assessment: Measure changes in coordinative ability after skill-focused training.

5. Correlation Analysis: Investigate the relationship between stress levels and coordinative ability.

2. LITERATURE REVIEW

S.No.	Study	Key Findings	Research Gap
1	Tilak Kumar BS (2019)	Significant differences in coordination skills (orientation, balance, differentiation, and reactivity) among male volleyball players from two universities.	Limited focus on external factors influencing coordination, such as stress or training environment.
2	Hrysomallis (2011)	Balance training improves stability and agility in sports like volleyball. Exercises like single-leg stands and dynamic balance drills enhance performance.	Lack of comprehensive integration of balance training with skill-focused programs for enhanced performance.
3	Sheppard and Young (2006)	Reaction time, quickness, and agility are critical for volleyball; plyometrics and agility drills significantly improve these abilities.	Limited exploration of how reaction time and agility training influence coordinative abilities under stress.
4	Montagne et al. (1999)	Spatial orientation skills and perception of affordances enhance performance; drills simulating real-game scenarios improve perceptual-motor skills.	Insufficient research on how affordance-based training impacts different performance levels across players.
5	Hanton, Fletcher, & Coughlan (2005)	Stress impairs motor coordination, decision-making, and overall performance.	Limited focus on interventions to mitigate stress impact on volleyball players' performance.
6	Vranda et al. (2011)	Indian athletes, including volleyball players, experience stress from	Lack of targeted solutions or stress-management programs specific to

		competition pressure, training load, and personal expectations, reducing coordination.	volleyball.
7	Davids, Button, & Bennett (2008)	Skill-focused training enhances abilities like agility, speed, and coordination through tailored drills.	Absence of long-term studies evaluating the sustained impact of skill-focused training on volleyball performance.
8	Sharma and Chaubey (2013)	Skill-focused training improved spiking, blocking, and setting abilities, enhancing coordination and overall performance of Indian volleyball players.	Lack of evaluation for combined effect of skill-focused training and stress management on performance.
9	Grgantov Z et al. (2018)	Differences in attack and counterattack efficiency between winning and losing teams; set plays are crucial for victory.	Limited assessment of how coordinative abilities influence offensive and counterattack efficiency.
10	Sharma and Koley (2010)	Players with superior physical fitness demonstrated better performance, focusing on strength, speed, agility, and endurance.	Lack of focus on integrating fitness training with skill-focused and coordinative ability programs for comprehensive improvement.

This table highlights key findings from various studies and identifies research gaps, emphasizing the need for integrated approaches combining stress management, skill-focused training, and coordinative ability enhancement to optimize volleyball performance.

3. METHODOLOGY

It encompasses subject and variable selection, experimental design, criteria measures, test reliability, data reliability, pilot study, training plan, test administration, data collection, and statistical methods for data analysis.

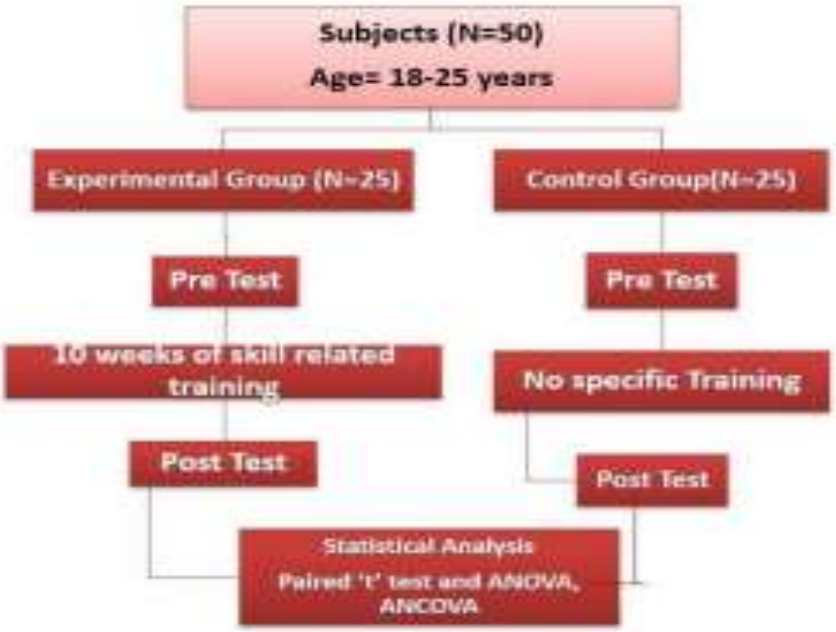

Figure 3.1: Experimental Design of the research

3.1 Selection of Participants and Subjects

To achieve the investigation's objective of assessing volleyball players' coordination abilities under the influence of stress and skill-focused training, a sample of fifty male volleyball players aged between 18 and 25 was selected as participants. These players were chosen from Lamrin Tech. Skill University, 53 located in Ropar, Punjab, India. Sample size: 50 volleyball players Age Range: 18-25 years Inclusion Criteria: Players with at least 1 year of competitive volleyball experience Exclusion Criteria: Players with recent injuries or medical conditions affecting physical performance Participants were selected from Lamrin Tech. Skill University, using purposive sampling. The players were randomly assigned to either the experimental group or the control group, with 25 players in each group. Intervention Experimental Group: Combined stress management and skill-focused training Control Group: Continued with their regular training routines without additional skill-focused interventions.

Figure 3.2: Mentoring and skill assessment in progress during volleyball training given by scholar

3.2 Selection of Variables

Dependent Variable

Orientation Ability (OA), Differentiation Ability (DA), Reaction Ability (RA), Balance Ability (BA), andRhythmic Ability (RHA) were the coordinative ability variables selected for this study. The following skill-related variables were chosen for this study:

1. Serving
2. Spiking/attacking
3. Underarm Passing/Dig
4. Upper hand/forearm passing

Control Group:

Standard volleyball training without specific stress management or skill-focused drills.

Independent Variables

For the investigation, the subsequent independent variable was chosen i.e. Skill related and stress related volleyball training.

3.3 Experimental Design

For the study, a static group comparison design was employed. An experimental pretest/post-test design was used, featuring two groups: an experimental group receiving stress management and skill-focused training, and a control group receiving regular training.

Coordinative Ability and Skill Assessment Tests

Table 3.1 Coordinative Ability Assessment Tests

Variable	Test Item
Orientation Ability	Numbered Medicine Ball Run Test
Differentiation Ability	Backward Medicine Ball Throw Test
Reaction Ability	Ball Reaction Exercise Test
Balance Ability	Long Nose Balance Test
Rhythm Ability	Given Rhythm Test

Table 3.2 Skill Assessment Tests

Variable	Test Item
Serving	Russel-Lange Volleyball Test
Spiking/Attacking	Brady Volleyball Test
Dig Passing	Helman Volleyball (forearm) Test
Pass/Fingering	Helman Volleyball Test
Rhythm Ability	Given Rhythm Test

4. ANALYSIS AND INTERPRETATION

The examination of alterations in chosen coordinative ability and skill performance, as well as the influence of stress on volleyball athletes. The investigation is designed to identify the coordinative ability, involving a total of 50 volleyball players selected from Lamrin University, Ropar, Punjab, India. The participants were divided into two groups: Group I as the control group and Group II as the training group, with each group comprising 25 players. The training group underwent a 10-week training program, four days a week, while the control group did not receive any specialized training. The study focused on variables related to coordinative ability, such as orientation ability, differentiation ability, reaction ability, balance ability, and rhythm ability. Various criterion measures were used to assess these abilities, including the numbered medicine ball run test, backward medicine ball throws test, ball reaction exercise test, long nose balance test, and a rhythm test. The training protocol for the experimental group included physical, skill, and tactical preparations over a period of 10 weeks, whereas the control group did not engage in specific training activities. Stress management was evaluated using the Perceived Stress Scale to analyze its impact on the

players' performance. Statistical analysis involved the use of analysis of covariance (ANCOVA), ANOVA to compare coordinative abilities between groups and assess the effects of stress and skill-focused training. Significance of changes before and after the tests was determined through paired 't' tests.

4.1 Orientation Ability Test

Table 4.1: Pre-, Post-Mean, Standard Deviation on Orientation Ability of Training and Control Groups

Group	Test	Mean	Standard Deviation	Mean Difference	't'	Sig (2-tailed)	Percentage of Changes
Training	Pre	15.187	2.752	1.034	6.956	0.000	7.93%
	Post	13.328	2.189				
Control	Pre	16.971	2.107	0.005	0.119	0.900	0.02%
	Post	16.176	2.001				

Table-4.1 illustrates the descriptive statistical data gathered for the training and control groups regarding orientation ability. The mean values before and after the tests for the training group were 15.187 ± 2.752 and 13.328 ± 2.189, respectively, while for the control group, they were 16.971 ± 2.107 and 16.176 ± 2.001. Subsequently, additional data were collected and subjected to statistical analyses to identify any significant differences between the pre and post-training data.

4.2 Differentiation Ability Test

Table 4.2: Pre, Post, Mean, Standard Deviation of Training and Controls Groupson Differentiation Ability

Group	Test	Mean	Standard Deviation	Mean Difference	't'	Sig (2-tailed)	Percentage of Changes
Training	Pre	5.89	2.87	5.100	13.694	0.000	82.3%
	Post	11.09	2.13				
Control	Pre	6.87	2.12	0.0500	0.285	0.818	0.78%
	Post	6.98	2.09				

4.3 Balancing Ability Test

Table 4.3: Pre, Post Mean Standard Deviation of Training and Control Groups on Balancing Ability

Group	Test	Mean	Standard Deviation	Mean Difference	't'	Sig (2-tailed)	Percentage of Changes
Training	Pre	16.451	2.01	2.471	15.019	0.000	15.01%
	Post	13.901	1.95				
Control	Pre	16.021	1.99	0.0231	1.011	0.197	0.05%

Table-4.3 illustrates the descriptive statistical data gathered for the training and control groups regarding their balancing ability. The mean values of the training group pre and post tests were 16.451 ± 2.01 and 13.901 ± 1.95 respectively, while for the control group, the values were 16.021 ± 1.99 and 16.001 ± 1.87. Subsequently, the data collected underwent statistical analysis to identify any 92 significant differences between the pre and post training results. A dependent't' test was conducted on the collected data to ascertain any critical changes between the pre and post training outcomes. The results from the training group yielded values of 15.019 and 1.011, surpassing the critical value of 2.093 for a significance level of 0.05 with 19 degrees of freedom.

4.4 Rhythmic Ability Test

Table 4.4: Pre, Post Mean Standard Deviation of Training and Control Groups on Rhythmic Ability

Group	Test	Mean	Standard Deviation	Mean Difference	't'	Sig (2-tailed)	Percentage of Changes
Training	Pre	0.1562	0.2398	0.0912	2.917	0.009	63.13%
	Post	0.0782	0.690				
Control	Pre	0.1456	0.135	0.0017	0.613	0.501	1.97%
	Post	0.1300	1.129				

Table-4.4 illustrates the descriptive statistical data that was gathered for both the training and control groups regarding rhythmic ability. The mean values before and after the tests for the training group were 0.1562 ± 0.2398 and 0.0782 ±0.690 respectively, while for the control group, the values were 0.1456 ± 0.135 94 and 0.1300 ± 0.129. Subsequently, the collected data underwent statistical analysis to identify any significant

differences between the pre and post-training data. Utilizing a dependent 't' test, the data were evaluated to ascertain any critical changes between the pre and post-training data.

4.5 Reaction Ability Test

Table 4.5: Pre, Post Mean Standard Deviation of Training and Control Groups on Reaction Ability

Group	Test	Mean	Standard Deviation	Mean Difference	't'	Sig (2-tailed)	Percentage of Changes
Training	Pre	178.120	45.1237	51.674	6.559	0.000	28.19%
	Post	117.005	18.829				
Control	Pre	175.521	42.091	0.6400	0.709	0.418	0.34%
	Post	174.633	41.784				

Table-4.5 illustrates the descriptive statistical data obtained for the training and control groups in terms of reaction ability. The mean values before and after the test for the training group were 178.120 ± 45.1237 and 117.05 ± 18.829, respectively. Correspondingly, for the control group, the values were 175.521 ± 42.091 and 174.633 ± 41.784. Subsequently, the collected data underwent statistical analysis to identify any significant differences between the pre-test and post-test results.

5. CONCLUSION & SUGGESTION

5.1 Conclusion

The results revealed that the overall coordination abilities were significantly enhanced in the training group compared to the control group following a 10-week period of skill-related volleyball training. The comparison between the training group's pretest and posttest results showed a notable enhancement in various coordination abilities including orientation, differentiation, balance, rhythm, and reaction. The analysis of the pretest and posttest results within the training group demonstrated a substantial advancement in skill performance encompassing attacking, serving, overhead passing, and underarm passing abilities. Stress levels were assessed through the utilization of a Sphygmomanometer, while psychological aspects were evaluated using a standardized questionnaire, specifically the Sports Competitive Anxiety Test (SCAT) devised by Martens (1990) and the Perceived Stress Scale. It was noted that Group B, which did not 114 undergo skill- focused training, exhibited a detrimental effect on the coordinative abilities of volleyball players, whereas those undergoing skill-focused training showcased a positive influence on their abilities. The comparative study demonstrated that skill-focused training significantly improves the coordinative ability of volleyball players over a 10-week period. Players who underwent skill-focused training showed marked enhancements in timing, sequencing and spatial orientation, leading to more consistent and precise

execution of volleyball techniques. In contrast, the control group exhibited only marginal improvements. These findings underscore the importance of incorporating skill-focused training into volleyball practice regimens to optimize performance.

5.2 Suggestions or Recommendations

• Implement mental training programs that include relaxation techniques, mindfulness, and stress reduction strategies to help athletes manage stress effectively.

• Conduct regular assessments of stress levels among players and provide individualized support to those exhibiting high stress to prevent negative impacts on coordination.

• Incorporate stress-inducing scenarios in training sessions to simulate game conditions and help players adapt to performing under pressure.

• A comparable investigation could be carried out on various types of games and sports.

• A comparable investigation could be carried out on members of the Indian volleyball squad in order to evaluate their proficiency in the selected variables.

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