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Poonam Singh

Research Scholar, Department of
Physical Education, BU, Bhopal,
Madhya Pradesh, India

Dr. Alok Mishra

Associate Professor and HOD,
Department of Physical
Education, BU, Bhopal, Madhya
Pradesh, India

Analysis of physiological and psychological components of basketball players: A review

Poonam Singh and Dr. Alok Mishra

Abstract

The present research paper aims to substantially review recent developments in basketball game-related research work. It creates understanding and provides new innovative ideas in the field of sports-related research. The study also helps to explore the analysis methods of players in terms of physiological, anthropometric measurements, and psychological aspects by discussing the findings presented in the recent research papers. The present paper focuses on conducted on basketball players based on published work. The basketball game is constantly evolving, with many research papers published annually. In this paper, the last ten years of research updates on the basketball game reviewed and presented a well-referenced overview of the game's current state related to optimizing training and affecting components of player performance during competition. A high level of physical fitness is required to succeed in national and international events and to achieve excellent athletic performance, therefore more research work is done based on physical fitness components. Upgrading knowledge of strategy performance and team competition success is a key goal of sports science. The research in the relevant area will provide feedback to coaches and players for further improvement.

Keywords: Basketball, physiological variables, psychological variables

Introduction

Basketball is a game of numerous expert moves, including dribbling, passing, laying up, shooting toward the hoop, rebounding, and faking, among others. However, these abilities should be strengthened with physical and physiological factors like anthropometric measurements, body composition, etc. Several anaerobic motor components are necessary for optimal performance in basketball. For the length of the competition, these elements—strength, speed, flexibility, agility, and cardio-vascular endurance must be repeated with performance upgradation. A high level of physical fitness is required to succeed in national and international events and to achieve excellent athletic performance. Upgrading the knowledge of strategy performance and team competition success is a key goal of sports science. The research in the relevant area will provide feedback to coaches and players for further improvement.

The basketball game is constantly evolving, with many research papers published annually. In this paper, the research work of the last 10 years on the basketball game reviewed and presented a well-referenced overview of the games' current state related to optimizing training and affecting components of player performance during competition. This paper provides an overview of

1. The assessment of physiological, anthropological, and motor components variables on a player's excellent performance.
2. Analyzing psychological variables of basketball players.

Physiological variables related study

Ambre, (2012) ^[1] conducted a study to assess elite basketball players' cardio-respiratory functions and skills ability with the selected exercise training program. Subjects were divided into two groups and the experiment was conducted in three phases (pre, training, and post-test). The result revealed that the exercise group showed significant superiority over the control group in improving cardiovascular endurance.

Corresponding Author:

Poonam Singh

Research Scholar, Department of
Physical Education, BU, Bhopal,
Madhya Pradesh, India

No significant effect was seen in the exercise and control groups' diastolic pressure.

Ghosh & Thakur, (2014)^[7] studied anxiety and resting heart rate, inter-related Psycho- Physiological variables of the players. The purpose of the study was to investigate the relationship that existed between the resting pulse rate and anxiety profile of football, volleyball, and basketball game players. Sports competitive anxiety test (SCAT) was employed for all the subjects. Heart rate was measured by Pulse Palpitation. The Pulse rate was measured by counting the beats in a set period. The result showed no significant relationship between the selected three Ball game players' resting heart rate and anxiety profile.

Anthropological Variables

Sharma, (2013)^[16] conducted a study on 225 female basketball players from various groups to identify the difference in body composition and coordinative parameters between all three groups (All India inter-university, Inter-college, and Under-19 school teams). To identify the difference, t-test, and one-way ANOVA was used. LSD post hoc test was applied. The result of the study indicated that all three groups differed in their physiological body composition and coordinative parameters.

Assessment of Motor components

Trikha & Sharma, (2013)^[19] compared the assessment of motor ability and physiological variables of Basketball, Handball, and Netball team players. The standing broad jump, medicine ball put, and pulse rate test were used to measure explosive leg strength, arm strength, and resting plus rate. Data analysis revealed that handball players were better in explosive leg strength, arm strength, and resting plus rate than basketball and netball players.

Bayazit, (2014)^[4] investigated the effect of basketball basic skills training on female children's gross motor skills development. Locomotors manipulative and balancing pieces of training in basketball basic test tested for 90 minutes for 12 weeks. It is suggested that a similar program can be developed by physical education teachers and sports teachers at elementary schools for students to upgrade their sports performance.

Mitra, *et al.*, (2015)^[13] conducted a study to compare the speed and agility of forty male inner and outer-position state basketball players. 20 m dash run and Illinois agility test were used to measure the motor components of players. The result showed that the inner position players were significantly taller than the outer position players whereas the outer position players were more agile and had more speed than the inner players but not statistically significant.

Chowdhury, *et al.*, (2015)^[5] conducted a study to analyze the selected Motor Fitness Components (Speed and agility) between Basketball and Kho-Kho players. Thirty male university-level players were selected randomly as a sample. The age of the subject ranged from 20-25 years. To measure Speed 20 m dash run and for Agility Illinois Test tools were used. Descriptive Statistics and independent t-tests were used to calculate the data. The result showed that there was a significant difference in agility between Basketball and Kho-Kho players but no significant difference was found in speed between Basketball and Kho-Kho players.

Kaur, (2015)^[11] evaluated the degree of components among Basketball and Korfball girls' players of Haryana. A sample of 50 players has been taken (25 in basketball & 25 in korfball). The age of the subjects ranged between 10 to 15

years. The researcher measured two variables Explosive power of legs and flexibility. Mean and standard deviation were calculated and the significance of the difference between the mean & applied t-test. The result of the study revealed that significantly higher strength was found in Basketball girls' players than the Korfball players.

Moselhy, (2020)^[14] examined the effect of Speed, Agility, and Quickness (SAQ) training with and without a ball on all types of dribble skills for junior Female Basketball players. A test used for pre-and post-measurement: 5m, 20m sprint test, and Illinois Agility test with and without the ball. The result showed that there weren't statistically significant differences between the experimental and control groups concerning Speed, Agility, and Quickness without a ball. Furthermore, there were statistically significant differences between the experimental and control groups concerning dribble agility and skills being more effective for the post-measurement of the experimental group. The study reveals that the SAQ training has an effective impact on the performance of all types of dribble skills for junior female basketball players.

Rukadikar, *et al.*, (2020)^[15] conducted a study to see the role of Muscular Strength and Flexibility in Cricket, Football, and Basketball players. A total of ninety players participants (30 players from each game) from State, University, and National players were selected as subjects from the sports academy. To measure muscular strength Shoulder Elevation test and Flexibility modified Sit & Reach test (back flexibility, ankle flexibility) were used. The result of the study concluded that there was a statistically significant gap in handgrip power & elbow cricketers' back flexibility between Basketball players and Football players. Further, there was a highly significant difference in leg & back strength, and ankle flexibility in Football players than in cricket players and Basketball players.

Indicators of player's performance

Garcia, *et al.* (2013)^[8] focused on identified indicators of basketball performance that best discriminate between a winner and a loser in the regular season. 306 regular and 17 playoff seasons opted for the study. To explore the performance indicators in the regular season, the winning team dominated in assists, defensive rebounds, and successful two and three points field goals. However, in playoff games, the winning team's superiority was only in defensive rebounding. The result indicates that the winning and losing teams played differently in regular and playoff games.

Setiaji, *et al.* (2017)^[18] tested the difference between the effect of DI (Direct training) and TGFU (teaching video games for information) on basketball players. The statistics retrieval is conducted with GPAI (Game Performance Assessment Instrument). Speculation trying out studies was conducted primarily based on facts analysis and interpretation of variance evaluation. The result showed that the interaction between the learning approach and the level of interest in basketball is very meaningful. The findings suggested that there was a significant difference between the effects of DI & TGFU. It was also reported that there was a significant difference in basketball outcomes between students' interests. The result also supported that there was a significant interaction effect between the learning approach and interest in basketball games.

Gomez, *et al.*, (2016)^[9] identified the situational variables and technical-tactical variables that allow for discrimination of home and away teams during the fourth quarter of close NBA games. Forty-eight men's NBA close game players were

selected as a sample during the 2013-14 regular season. The result of the study showed that the home team obtained higher values in block 1, penetration, and 2 or >2 defensive players. The technical and tactical variables were found as significant and can be used when improving the ball possession effectiveness.

Alkitani, *et al.*, (2018)^[3] investigated to identify the effect of the SAQ exercises training on the level of physical fitness and skill full performance levels of basketball players. They used Pre & Post-test measurements and analyzed data. This study's results indicated that 8 weeks of SAQ exercise training was effective in improving physical fitness levels and skill performance in basketball players. SAQ training showed an improvement in muscle strength & some skill performance.

Psychological variables

Khan, *et al.*, (2015)^[12] in a study compared the aggression and mental toughness of men & women Basketball players in all-India universities. One hundred (50 men & 50 women) Basketball players were randomly selected as the subjects. The aggression inventory (Srivastava, 1984)^[21] and the Mental toughness questionnaire (Goldberg, 1995)^[22] were used to collect players' responses on aggression & mental toughness. Findings concluded that there was no significant difference between men & women All India Inter University Level Basketball players in their aggression as well as mental toughness. It was also revealed that All India Intervarsity basketball players, whether men or women, required a similar level of aggression and mental toughness as they involved themselves in various competitions.

Jiteshwar, *et al.*, (2013)^[10], compared the sports-related achievement motivation between male & female school basketball players. Using stratified random sampling, the researcher has taken 40 male & 40 female basketball players. The age of players ranged from 14-17 years. The data was collected on all the subjects by administering the M L Kamlesh sports achievement questionnaire. Independent t-test statistical technique used. The finding of the study did not indicate any significant difference between males & females in sports achievement and motivational levels.

Singh, *et al.*, (2015)^[17] compared the achievement Motivation among different levels of basketball players. Sixty male basketball players from various colleges, districts, and universities aged 20-28 were selected from Punjab. They were further divided into three groups i.e., Inter-College, State & Inter-University (20 Players from each group). Data were collected by using the Achievement Motivation Questionnaire. The one-way analysis of variance (ANOVA) was applied to assess the inter-group differences among male basketball players. The result showed statistically significant differences among male basketball players in Achievement Motivation levels.

Research gaps, Status, and Future trends

To improve male basketball players' performance, the combination of physiological, anthropometric, motor components, and psychological variables is essential the research has been conducted on male players but very little research was done related to female basketball players therefore an overview of many literature surveys and much more research work would be conducted for the current scenario, status, and upgradation of female players related understanding.

Conclusion: The above research through light on the

importance of psychological and physiological components in determining the sports performance of basketball players. The findings of the study can be used by coaches and physical education professionals to develop strategies to enrich the psychological and physiological attributes of the players.

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