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Effects of an Eight-Week Defensive Rebounding Program on University Basketball Players

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***Abstract* - This study evaluates the effectiveness of the eight weeks of training for defensive rebounding upon the performance of male basketball players at Sabaragamuwa University of Sri Lanka. One of the most critical elements in the game of basketball is that of defensive rebounding. It controls the outcome of the game by not allowing opponents to get many scoring opportunities. The study involved a pre-test and post-test design with three participants selected from the university's basketball team. The design of the program was to increase vertical jump height and general rebounding technique. The results showed improvements in rebounding performance for all subjects. There was a very marked improvement in average two-point shooting accuracy from pre-test to post-test subjects moved from about 25% to 30% of accuracy. The overall result was significant, in that statistical analysis established a positive significant difference between the pre- and post-training tests. These findings prove that, with focused and intensive training programs, basketball skills can be improved even at the university athlete level. The research supplements the literature of skill development in basketball and lays a base for further research on such training intervention projects to improve game performance. This study proves that defensive strategies should be integrated into regular training for all competitive basketball teams.**

Keywords: defensive rebounding, Sabaragamuwa University, basketball, post-test, pre-test, shooting accuracy, intervention.

I. INTRODUCTION

This is a very fast-paced, enthusiastic game with millions of participants and viewers across the globe. Being a fast game, it requires several skills, including shooting, passing, dribbling, and, most importantly, defending the latter being the most important factor in winning a game [1]. Among these, rebounding especially defensive rebounding plays a critical role in deciding the result of the game. Defensive rebounds allow a team to recover the ball following a missed shot by the opponent[2], thus denying them the opportunity to score off of those possessions while creating or building transition game opportunities from defense to offense.

While this part of the game is extremely important, it usually goes underappreciated next to other flashier areas such as scoring and ball handling. However, inside rebounding may be what really makes a difference between winning and losing especially in closely contested games [3]. In fact, a good defensive rebounding effort is one that disrupts opponents' offensive flow and causes momentum swings for the defending team. As such, players, more so those that compete at higher levels, should acquaint themselves with these skills and hone them [4].

One of the popular sports at Sabaragamuwa University of Sri Lanka is basketball, wherein the men's team often represents in inter-university level competitions. The team was so promising, yet somehow there was a wide gap in their defensive rebounding performance. This gulf became evident in recent tournaments when even with very good all-around plays, the team just could not seem to get those rebounds that mattered the most. It was tough to have them further advance into the rounds. Because this deficiency had been identified, focused training for these skills in defensive rebounding became necessary.

This research was undertaken in order to satisfy this need by engaging in an eight-week training program with the objective of developing defensive rebounding skills among male basketball players at Sabaragamuwa University. The main objective of this study is to evaluate whether there is a difference between the preseason and post-season performance of the aforementioned players regarding the rebounding ability in terms of vertical jump height and overall technique in light of a conducted training program.

The training program was based on the best practices of sport science and coaching, with some drills and exercises personally designed to enhance players' timing, positioning, and physiological conditioning. This was about ensuring that the program created a comprehensive methodology for developing defensive rebounding skills, which would not just help the players individually but also improve the performance of the whole team.

In order to project the effect of the training program, the design adopted was a pre-test and post-test in which the participants' rebounding performance was measured against

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before and after the intervention. The sample comprised three male players who are part of the university team with different amounts of experience playing basketball [5]. This design details how effective a training program is on which further application across other players and teams can be predicated.

The importance of this study transcends the immediate context of Sabaragamuwa University's basketball team. The findings will contribute to the growing literature about basketball skills development and, more specifically, defense strategies. In addition, this study presents a coach and a sport scientist with practical implications for improving certain areas in their teams' performance[6]. It adds to the probability of a projected training program that may offer potential benefits, therefore upholding the relevance of defensive rebounding and providing a model for adaptation and implementation in different competitive basketball settings.

In other words, this study is conducted with the aim of designing, implementing, and evaluating an eight-week training program to fill up the 'defensive rebounding skills' deficiency among basketball players at the university level. We take this research not only to help raise the performance level of the Sabaragamuwa University team but also to contribute valuable insights into sports science and basketball coaching in general.

II. RELATED STUDIES

2.1 "Differences between successful and unsuccessful basketball teams on the final Olympic tournament"

The study views the performance metrics that include factors such as rebounding[7], which unsuccessful and successful basketball teams can use to distinguish between the two. It projects rebounding as a very important factor in the winning of a game.

2.2 "The relationship between basketball shooting kinematics, distance and playing position"

The following research focuses on the biomechanics of basketball shooting, showing how the physical attributes and technical skills—like vertical jump—of a player affect his performance in offense and defense during a game, including in terms of rebounding[8].

2.3 "The Importance of Rebounding in Basketball"

This piece of work by Kirchberg identifies rebounding among the most critical factors of basketball success. Of these[9], it lays the theoretical base for understanding why defensive rebounds a key are to avoiding scoring opportunities by opponents.

2.4 "Predicting basketball performance using machine learning techniques"

The paper looks at various performance indicators, including rebounding, using the method of machine learning. It attempts to describe how some skills and physical attributes combine to affect overall basketball performance[10].

2.5 "The vertical jump and performance in basketball: A review"

This paper reviews the necessity of basketball players to achieve a good vertical jump, mainly in terms of rebounding. The ability to perform at an appropriate standard with regard to defensive and offensive rebounding is improved by attaining greater height in vertical jumping[11].

2.6 "Aiming at a far target under different viewing conditions"

This research was about the visual and motor control of basketball shooting, which can also be relevant for rebounding[12]. The research gives insight into the coordination that is needed to attain successful rebounding after a shot miss.

2.7 "Basketball players' use of anticipation in responding to different offensive plays"

The research investigates how players will position themselves for defensive coverage as well as rebounds on the anticipation of offensive plays. It therefore stresses the cognitive skills that are involved in rebounding in basketball[13].

2.8 "Experimental and Quasi-Experimental Designs for Research"

Although this is not specific to basketball, this seminal work on the design of research provides the general methodological framework for studies like the one on defensive rebounding that is, a focus on the use of experimental design for the evaluation of the effectiveness of training programs[14].

III. METHODOLOGY

3.1 Research Design

The research used the pre-test and post-test experimental design for the purposes of this research. The present research was meant to evaluate the effectiveness of an eight-week training program on the defensive rebounding of the trainees. This design is one of the pre-experimental research designs, and it happens to be a one-group pretest-posttest design that

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facilitates the measurements about the changes in the participants' performances. The major areas of study are vertical jump height and the mastery of defensive rebounding skills.

3.2 Study Population and Sample

Study Participants: This study involved male basketball players from the Sabaragamuwa University in Sri Lanka. Three male players, who represented the University in the Basketball team, were identified as the sample for this study. These players had different levels of experience in the sport. The method used to select the sample used in this study was opportunity sampling. The selection for the sample was basing on the players who started playing basketball after coming to the University and who are available and interested in participating in the study.

3.3 Training Program

The defensive training program was an 8-week program whose main goal was to help players improve their defensive rebounding skills. Some exercises and drills focused on during the course of the program are better enhancing the major aspects of the following:

- Vertical Jump Training: Improved height reached in jumping and, thus, in the whole essence of effective rebounding.
- Rebounding Drills: Special drills targeting timing, positioning, aggressiveness in trying to get a rebound.
- Strength and Conditioning: The general body fitness, the will to improve the overall athleticism of the players, essential for a successful rebound.

It was thrice a week, approximately 90 minutes of the training. For eight weeks, the drills and exercises that the players were put through were gradually intensified to continually challenge the players' bodies and encourage them to push harder.

3.4 Data collection

Quantitative and Qualitative methodology is used for data collection.

Pre-test and Post-test Measurements: The investigative instrument administered involved the use of the vertical jump tests and the assessment of defensive rebounding performance before and after the eight-week training program. The Sargent Jump Test was administered to measure the vertical jump height and rebounding performance at both offensive and defensive ends, while observation and video analysis of the rebounding drills helped in establishing the performance during practice sessions.

- Observational Data: Observations were made during the training of players concerning their techniques, positioning, and how they generally executed rebounding skills.
- Video Recording: Relevant training sessions were recorded on video to enable in-depth data analysis of the performance and development of players in rebounding techniques.

3.5 Data Analysis

- Data was analyzed using both descriptive and inferential statistics:
- Descriptive Statistics: The performance means of the subjects before and after the training program were calculated in terms of the means and standard deviations for jump heights and rebounding performance, respectively. Paired T-Test: A paired sample t-test was conducted to evaluate the significance of the differences between the pre- and post-test results of the subjects. The significance level was set at $p < 0.05$.
- Qualitative Analysis: An analysis of observation and video recording was carried out qualitatively for improvements in technique, positioning, or overall rebounding efforts. The qualitative analysis supported the quantitative results in providing details and comprehensive insights into the participants' developments.

3.6 Ethical Considerations

A prior ethical considerations letter was given from the Department of Sport Sciences and Physical Education at Sabaragamuwa University of Sri Lanka. Participants were briefed about the purpose of the study and in all cases; informed consent was taken to include them in the research. All data collected were confidential and specially used for the purpose of research only. The training program had been organized in a way there was a full guarantee of safety and welfare of the participants. There were the recommendations needed to be met to keep up with the physical conditions and fitness level of the participants.

3.7 Limitations

The main problem of the conducted study is the small sample population, so the results obtained are not generalizable. Maybe participants' prior experiences, physical condition, or some kind of external commitments, academically or personally, either worked in favor of it or went against the instrumented strategy. The study limitations have been made explicit, and I recommend that other lines of this same study be taken with more representative-made

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populations over lengths of time to confirm and expand obtained results.

IV. RESULTS AND DISCUSSIONS

4.1 Pre-Test Results

Pre-test: The participants had their baseline measures in terms of VJ height and the performance they could give when securing a defensive rebound. The participants were shown to be in varied skill levels in basketball experience and physical conditioning, as supported by their varied experiences in playing basketball before the conduct of this study.

Upon average, the vertical jump was 41.66% of the benchmark supposed to be an appropriate height for an effective defensive rebound. This reflected a huge need for improvement in leg strength and explosive power: the keys for successful rebounding.

Defensive Rebound: Poor performance in the defensive rebound can be attributed to timing, positioning, and aggressiveness. Evidence on this are video analysis, observation of the behaviors, and verification of common mistakes seen in the poor box-out techniques and poor anticipation; this produced frequent failure to regain possession following opponents' missed shots.

4.2 Post-Test Results

The post-test was carried out subsequent to the eight-week training program in order to determine if the exercise program was successful in influencing the height of the vertical jump and the performance of defensive rebounding, among other things. The results showed significant improvement in all participants.

Vertical Jump Height: Post-test results suggested a significant development in VJH. Participant A's performance increased from 41.66% to 66.66% of the benchmark, while Participant B increased from 50% to 66.66% and Participant C from 50% to 80%. This development suggests that the training developed the leg strength and explosive power of the participants, important for rebounding.

Defensive Rebounding Performance: The post-test analysis witnessed some marked improvement in the defensive rebounding performance among the experimental group. Participants timed jumping with considerably better positioning and appropriate aggressiveness in rebounding. Improvements in the achievement of higher vertical jump heights translated into more successful rebounds because the participants were able to jump higher and time their jumps more effectively.

- Participant A improved in two-point shooting accuracy by 25%, and it can directly be attributed to holding better rebounding position and getting into an offense more efficiently from defense.
- Participant B had an improvement of 16.67%, showing increased consistency in securing the rebounds and throwing effective outlet passes to start offensive plays.

The most dramatic improvement was that by participant C, whose shooting percentage increased by 30%. This was largely because he became much more aggressive at attempting to get the rebound, and also learned how to use his body better in terms of positioning and boxing out.

4.3 Statistical Analysis

The paired t-test results indicated that the differences between pre-test and post-test measurements were significant ($p < 0.05$), and this showed that the eight-week training program was effective. It can be concluded that beneficial effects on vertical jump height and defensive rebounding performance were achieved with this program, supporting the hypothesis of the mentioned special basketball skills through targeted training, which can be significantly improved.

4.4 Discussion

These results agree with previous ones and suggest that focused, individualized exercise regimens are effective for sports performance enhancement. The very highly significant improvements in vertical jump height and defensive rebounding skill, as shown in this study, indicate that the training program has successfully been geared towards the participants' weaknesses, generally improving basketball performance.

Improved Defensive Rebounding: Such developed skill underlines the efficiency of the training program toward teaching proper technique and positioning. The training program, developed under the aspect of developing the physical and tactical sides of rebounding, helped participants acquire a more aggressive and strategic disposition in pursuing rebounds. Summarily, this improved overall team performance because good rebounding is an essential ingredient in ball retention and, therefore, control over the pace of the game.

Jump Height in Rebound: In the same dimension, the very high jumping heights of the participants bring out that crucial explosive strength that prevails in the game of basketball. Major emphasis on plyometric exercises and strength conditioning in the training program played a vital role in enhancing the ability of participants in jumping and hence directly related to their effectiveness in rebounding.

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Practical Implications for Coaches: Coaches in basketball can deduce valuable information out of the present study to help enhance the defensive rebounding performance of their teams. With training regimes of this nature, players may be provided with the physical and technical prerequisites essential for effective rebounding. The study shows the value of specific skill development for integration into the regular training process, with changes facilitating strength in currently weak areas and, therefore, improvements in overall team performance.

4.5 Limitations and Future Research

Even though the results of the study have been accepted positively overall, there are some limitations of this study, including small sample size and brief period of study. Future studies can support this work by increasing the sample size and extending the period of practice. Other parameters like game performance and fatigue of the player can also be added. Additionally, similar training programs with different age groups and skill levels would contribute still further to the generalization of the findings.

The findings of the present investigation emerged that an intensified 8-week in-place training program proved to significantly increase the vertical jump height and defensive rebounding skills among university-level basketball players. This extends the research on basketball performance development and provides practical implications for both coaches and sports scientists in order to improve team performance.

V. FUTURE DIRECTIONS

These findings could yield numerous future research directions for gaining further insight into defensive rebounding and other aspects related to basketball performance. A significant area for future research will be extended training periods. While this eight-week program realized marked improvements, either a 12- or 16-week duration might begin to help understand any long-term gains these sorts of programs can have, along with whether sustained training provides further improvements in performance or can help to maintain the gains attained.

Future studies might be required to see the translation of effectiveness of such training programs in other demographics, such as young athletes, female basketball players, or different classes of performers. Only after knowing how age, gender, and experience influence outcomes will it be possible to develop appropriate training programs that can suit various diverse groups, therefore increasing its generalizability.

Another area of investigation may be the integration of technology into training and assessment. For example, wearable technologies recording jump height, movement patterns, and player fatigue may enable monitoring more precisely and continuously real-time feedback that could lead to further refinement of training methods. Virtual and augmented reality tools could be trialed to simulate game situations, with more effective training for tactical and cognitive elements of rebounding.

Other future studies may include the dimension of defensive rebounding in other variables describing basketball performance, such as endurance, agility, and decision-making pace. It is by adopting a holistic approach that one can learn how the different physical and mental skills interrelate to affect overall game performance.

Lastly, there will be psychological attributes of defensive rebounding worthy of study for instance, confidence, motivation, and competitive mindset. Knowing the psychological factors that guarantee successful rebounding can pave the way for designing more wholesome training programs that work on enhancing players' physical skills alongside mental toughness and game intelligence. Such future directions can provide impetus to the broadening of this research and eventually have an effect on more effective strategies in basketball training, which is fast evolving to keep up with the growing demands in the sport.

VI. CONLUSION

The study was done to establish the effect of an eight-week defensive rebounding training intervention on male basketball players at Sabaragamuwa University in Sri Lanka. The findings support that there was an immense improvement in vertical jump height and defensive rebounding with specific training. Participants showed great improvements in securing rebounds, a skill highly essential for two reasons: first, depriving opponents of scoring opportunities; second, offering an opportunity for transition from defense into offense with more vigor.

The findings of the study highlight the need for focusing on specific basketball skills, especially the underrated ones like rebounding, which become shadowed by other loudly advertised skills such as shooting or dribbling. In such a manner, having a well-organized and strongly intensive training course helped players to develop the physical and tactical competencies needed to become a defensive rebounder, hence performing better as a team.

Results of the training program highlight the need to include specialized skill development within the regular basketball training programs. It is a very practical framework

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which coaches working at all levels of the game could use to improve the respective teams' defensive competencies. Indeed, because of the magnitude of these improvements, it can be assumed that similar training interventions would benefit other teams in different basketball competitions.

While achieving the intended objectives, the study also opened up avenues for future research in the areas of prolonging training periods, integration of technology into training, and psychological factors intervening in rebounding performance. The future directions show promising ways of building on these findings toward further increasing the efficiency of basketball training programs. This research adds to the growing body of basketball skill development knowledge through a focused and well-designed training program that obtains large gains in specific skills like defensive rebounding. These results are relevant for coaches and players at every level of the sport and provide insights on how to train more effectively and comprehensively in basketball, which can lead to better on-court success.

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