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# Physiology in Volleyball in the Last 10 years: A Systematic Literature Review

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**Abstract:** The purpose of this study is to see how physiological components affect basic skills in the game of volleyball. This research focuses on the bottom passing technique for the last ten years. Exercise physiology is a field of science that studies how the body responds to exercise and physical activity. Therefore, it is very important to create a successful exercise program. Basic skills such as bottom passing in volleyball rely on physiological and technical understanding. The results of the analysis showed that physi-ological components such as muscle strength, durability, and coordination greatly affect the efficacy of the passing technique. In addition, this study emphasizes the role of biomechanics and physiological adaptation to exercise in improving athletes' perfor-mance. Therefore, to improve performance on the field, coaches and athletes are advised to consider physiological aspects when creating a training program. It is hoped that these findings will provide new information about the advancement of science in the field of sports and about more effective volleyball training methods.

**Keywords:** Physiological; Exercise; Volleyball

## 1. Introduction

Physiology is one of the branches of biological sciences that studies humans which is useful in various fields such as health and sports, in the field of sports achievements are supported by a variety of sciences that support and complement each other. One of these sciences is sports physiology (1). In each sport, athletes will be accompanied by a coach, who not only provides training in terms of skills but also must know scientific fields such as Physiology in order to provide the right training program (2)The game of Volleyball is one of the sports that many people are interested in, including the people of Indonesia, In the game of Volleyball there are several basic techniques, namely Service consisting of Upper Service, Lower Service, Floating Service, and Jumping Service, then Passing consisting of Upper Passing, Lower Passing One Hand, and Lower Passing Two Hand, there is also Smash consisting of Open Smash, Quick Smash and Semi Smash, and the last one is Blocking (3).

In the last ten years, research on physiology in volleyball has shown that basic skills such as bottom passing depend not only on technique, but also on a good understanding of the underlying physiological aspects. For example, the motion analysis of the lower passing skill shows that coordination between muscle and joint work is essential to achieve effectiveness in the game (4). Research by (5) emphasized the importance of anatomical and biomechanical aspects in developing good passing techniques, which contribute to the team's success in the match. Furthermore, understanding how the body adapts to

exercise is also the focus of research. A study by (6) shows that exercises designed based on physiological principles can significantly improve athlete performance. Thus, coaches and athletes need to pay attention to physiological factors when designing training programs to ensure that athletes can train safely and effectively.

This literature review aims to explore the various studies that have been conducted in the field of sports physiology related to volleyball over the past decade. The main focus of this review is to identify how physiological aspects affect basic skills in the game of volleyball, as well as their implications for athlete training and development. By understanding the relationship between physiology and game technique, it is hoped that it can provide better insights for coaches and athletes in improving their performance on the field.

## 2. Materials and methods

### *2.1. Determination of Research Questions*

With the use of the SLR Method, a systematic review and identification of journals can be carried out, which in each process follows the steps or protocols that have been set. The first step in systematically analyzing the literature is to determine a specific research question. To answer the question, "How do physiological aspects affect basic skills in volleyball, especially the bottom passing technique, in the last ten years", literature research was carried out thoroughly using a number of academic databases.

**Table 1**. Search Steps

| No. | Search Steps | Description |
|---|---|---|
| 1 | Database Used | Searches are conducted on academic databases, including: Google Schoolar, Sinta |
| 2 | Keywords Used | "Physiology of volleyball", "Bottom passing skills", "Physiological adaptations in sports", "Biomechanics of volleyball", "Training and performance of volleyball athletes" |
| 3 | Publication Time Range | The search is limited to publications published between 2014 and 2024 to ensure the relevance and up-to-date of the information. |

### *2.2. Literature Selection*

Papers After conducting a search, the studies found were selected based on inclusion and exclusion criteria (7), The Effect of Carioca Exercise on Football Athlete Skills Here is a table that combines inclusion and exclusion criteria in literature selection for a systematic literature review on physiology in the game of volleyball:

**Table 2**. Literature Section

| No | Heading | Criterion | Description |
|---|---|---|---|
| 1 | Motion Analysis of Bottom Passing Skills in Volleyball Games | Inclusion | This study analyzes lower passing skills in terms of anatomy, physiology, and biomechanics. |

| | | | |
|---|---|---|---|
| 2 | Survey of Physical Condition and Basic Volleyball Technical Skills at Bravo Women's Club | Inclusion | Although it focuses on physical conditioning, the study also examines basic skills in volleyball. |
| 3 | The Effect of Carioca Exercise on Football Athlete Skills | Inclusion | Despite the focus on soccer, the study follows inclusion criteria relevant to sports techniques. |
| 4 | Physical Condition of Senior Pekanbaru City Senior Men's Volleyball Athletes | Exclusion | Focus on physical condition in general, not discuss basic skills in a physiological context. |
| 5 | Physiological Characteristics of Doubles Badminton Athletes | Exclusion | Although it discusses physiological aspects, it is not relevant to the game of volleyball. |
| 6 | Analysis of Volleyball Bottom Passing Skills in Students | Exclusion | Focus on extracurricular students, not in accordance with the inclusion criteria for professional athletes. |

The table above shows the results of the literature selection based on inclusion and exclusion criteria, and shows how each study improved or decreased understanding of the physiology of the game of volleyball.

Criteria Inclusion: Studies looking at physiological aspects in the game of volleyball, studies that looked at basic skills, especially bottom passing, articles published in peer-reviewed journals from 2014 to 2024.

Exclusion Criteria: Studies that are not related to the research topic or question, articles that are not available in English or Indonesian, non-peer-reviewed publications such as news articles or blogs.

### *2.3. Quality Assessment*

Each selected study is assessed for quality using appropriate assessment tools (8), such as the Critical Assessment Skills Programme (CASP) for qualitative studies and the Cochrane bias risk tool for quantitative studies. The purpose of this assessment is to evaluate the validity of the methodology and reliability of the research results.

### *2.4. Data Collection*

Data from the selected studies were collected and recorded with a focus on the research methodology (9), The main findings related to physiology and lower passing skills, practical implications of the research results.

### *2.5. Data Analysis*

The data that has been collected are analyzed descriptively and thematically (10), The purpose of this analysis is to identify new trends in sports physiology research related to volleyball as well as to find patterns, similarities, and differences between previously conducted studies.

### *2.6 Results Reporting*

The results of this systematic literature review are compiled in a structured format (11), includes: Introduction, Methods, Results, Discussion, Conclusion.

The report presents key findings as well as recommendations for further training practices and research in the field of sports physiology in volleyball. By following the steps above, it is hoped that this review can make a significant contribution to the development of science in the field of sports, especially in improving the performance of volleyball athletes through a deep understanding of physiological aspects.

## 3. Results and Discussion

The results of this systematic literature review include important findings about the influence of physiological components on the basic skills of volleyball, especially the bottom passing technique. Here is a summary of the findings:

### **3.1** *The Influence of Physiology on Lower Passing Skills*

Based on the analysis of the literature, there is strong evidence that physiological elements such as coordination, muscle strength, and endurance significantly affect volleyball underpass skills. A study by Sriwahyuningsi (2020) shows that athletes with better muscle strength have better passing performance (4). This study emphasizes that improving the ability to pass down is very important through strength training.

### *3.2 Physiological Adaptation to Exercise*

Research by Sihombing (2024) sees that exercises based on physiological principles can improve athletes' body adaptations, helping them perform better in basic skills (6). Athletes who participated in a structured training program showed significant improvements in endurance and muscle strength, which contributed to better bottom passing technique.

### *3.3 Coordination and Biomechanics*

Study by Kavitha Mukun (2020) highlights how important it is for muscular systems and joints to function together for the bottom passing technique (12). This study shows that the strength and flexibility of the main muscles involved greatly affect the biomechanics of movement when passing. Passing is more efficient and accurate by athletes who understand the biomechanics of movement.

### *3.4 The Role of the Cardiovascular and Respiratory Systems*

Some studies also emphasize the role of the cardiovascular and respiratory systems in volleyball performance. Research by (Rustiawan & Rohendi, 2021) shows that good aerobic ability can improve athletes' endurance during games, allowing them to maintain a high level of performance over a longer period of time. Athletes with good cardiovascular ability also tend to recover faster from strenuous training.

### *3.5 Practical Implications for Training*

The results of this review show that coaches and athletes must understand the physiological aspects when they create training plans. To improve bottom passing skills, coaches are advised to incorporate strength and endurance training into their training plans. They must also pay attention to the biomechanical

aspects of movement to optimize passing techniques. Improving athletes' endurance through cardiovascular training programs.

### *3.6 Research Limitations*

Many studies still have limitations. These include inconsistent methods, small sample sizes, and a lack of consideration for psychological or environmental factors that could affect the results.

## 4. Conclusions

Overall, improving basic volleyball skills requires a deep understanding of the physiology of the sport. Research conducted thoroughly in this review literature shows that improving muscle strength, endurance, coordination, and understanding of biomechanics should be the main focus in volleyball training programs. Athletes can reduce the risk of injury during training and matches by following proper physiological protocols. To find out how other physiological elements relate to volleyball techniques more comprehensively, more research is needed.

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