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*by* Ardi Nusri

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## Development of Physical Exercise E-book and Management of Diet in Football Athletes

**Ardi Nusri**  
Universitas Negeri Medan, Indonesia

**Esi Emilia**  
Universitas Negeri Medan, Indonesia

**Tyas Permatasari**  
Universitas Negeri Medan, Indonesia

**Yatty Destani Sandy**  
Universitas Negeri Medan, Indonesia

**Caca Pratiwi**  
Universitas Negeri Medan, Indonesia

**Erni Rukmana**  
Universitas Negeri Medan, Indonesia

**Latifah Rahman Nurfazriah**  
Universitas Negeri Medan, Indonesia

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## Development of Physical Exercise E-book and Management of Diet in Football Athletes

Ardi Nusri, Esi Emilia, Tyas Permatasari, Yatty Destani Sandy, Caca Pratiwi, Erni Rukmana, Latifah Rahman Nurfazriah

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### Abstract

This research was carried out at the Sports Science Study Program, Faculty of Sports Science, Medan State University, and the Surrounding Medan Football Association (PSMS). The respondents in this study were ten athletes and four football coaches. The model that will be used is a Four-D (4D) model consisting of four (4) stages, namely, Define (defining), Design (design), Develop (development), and Disseminate (deployment). The results showed that most (> 95%) of respondents needed an E-Book on physical exercise and diet management for football athletes. They agreed that all physical training materials in the indicators mentioned must be in the E-book. The validation results of the material show that the material presented in the e-book is very suitable (3.67) with what is needed today and is ideal for use. The results of validation of the media show that this e-book media is included in the category of very suitable both for the completeness of presentation and the feasibility of graphics and can be used as an electronic medium for football sports. The readability test results received an average assessment of 3.75, meaning that the e-book can be declared very legible and suitable for use. The results of the different tests showed significant differences in the years before and after being given the intervention of physical training and diet E-books for Football Athletes. Athletes' knowledge has increased, with an average knowledge increase score of 19.4 points. Suggestions for future improvement and development of e-books are like adding more exciting images and multiplying case examples.

### Introduction

Football is the most popular sport in the world (Owoeye, et al. 2014). Ghozali et al. 2017 stated that, almost all corners of the world have both professional and amateur football leagues, football clubs compete to have great players to navigate the competition in professional leagues, these clubs also have football academies to create players - great player. The Indonesian Football Association (PSSI) as the parent organization of football sports in Indonesia also establishes tiered football coaching in accordance with the existing competition targets. In addition,

PSSI cooperates with the Ministry of National Education (Diknas) to establish football coaching trainings in the regions and it is hoped that players will be born from this coaching.

Athletes should perform optimally in team sports such as football, volleyball, basketball where players are required to maximize their technique, tactics and physical abilities. Bangsbo (2016) states that successful performance with football is highly dependent on psychological factors, technical and tactical skills, and physiological abilities of an individual. Tomoliyus (2016) states that achieving goals in sports or achievements is an accumulation of physical qualities, techniques, tactics, and psychological maturity of athletes who are prepared systematically through the correct coaching process. Traditionally, the majority of football players have been attached to the fact that football consists of 4 components, namely technique, tactics, physical and mental (Danurwindo, et al., 2017; Scheunemann 2012).

<sup>3</sup> The physical component is one of the most important factors in the game of football. Therefore physical exercise should be a concern for football coaching. In modern times like today, the formation of physical conditions in football must follow developments. Training methods and forms must be adapted to different types of players. Exercises can be made with a combination of technical and tactical aspects with a combination of more complex variations of the exercise.

In addition to the aspect of physical exercise in supporting the achievements of athletes, nutritional aspects are also needed. Apart from physical exercise and adequate rest, nutritional aspects have an important hope in producing achievements in football athletes. Nutrition is one of the important factors to support achievement in sports. Complete nutritional intake and the right portions will make the exercise performed better and body functions will also be maximized. <sup>2</sup> Every athlete must pay attention to the fulfillment of their nutritional intake, especially the balance between energy intake and expenditure, both in the phases before, during, and after training or competing (Kemenkes RI, 2014).

Athletes who get nutritional intake according to individual characteristics and sports will have sufficient nutrition to practice and improve performance. <sup>2</sup> Good performance from athletes will support the acquisition of their best achievements. <sup>2</sup> Improved performance and achievement does not only come from regular exercise, but a balanced and regular intake of nutrients is also another important factor needed to support this. Athletes generally focus on using supplements to improve performance then ignore the importance of balanced nutrition and sports nutrition regulation. Whereas the fulfillment of athlete nutrition should refer to the Sport Nutrition Pyramid (sports nutrition pyramid). This pyramid has been scientifically proven and used by experts and sports nutritionists (Kemenkes RI 2014).

The development of football in the world makes football clubs vying to have great players to navigate the competition in the professional league, these clubs also have a football academy to create great players. In order to optimize performance in team sports such as football, players are required to maximize their technique, tactics and physical abilities. In addition, proper and efficient physical exercise, regulating the nutrition of football players is also important. The collaboration of the two will improve maximum performance so that they can

achieve the expected achievements. Physical exercise guidelines and diet management are needed for athletes and coaches to have guidelines for doing physical exercise optimally and correctly and can meet nutritional needs based on diet management.

## **Method**

### **Location, Time, Type and Stages of Research**

This research was carried out at the Sports Science Study Program, Faculty of Sports Science, Medan State University and the All Medan Football Association (PSMS) Medan, North Sumatra, from June to November 2021. The type of this research is Research and Development, oriented to the product being developed, namely the development of physical exercise e-books and diet management for soccer athletes. The model that will be used is the Four-D (4D) model which consists of four (4) stages, namely:

- Define
- Design
- Develop
- Disseminate

The research steps are described based on these stages.

#### *Define Stage (Defining)*

The define stage begins with analyzing the results of previous research related to physical exercise in soccer athletes, then seeing and observing needs in the field, especially for soccer athletes at PSMS Medan, interviews with athletes and coaches. In addition, it is also looking for study material from references from research on athlete performance by applying nutritional management.

#### *Design Phase (Design)*

The results of the analysis of the literature review material on the needs of coaches and athletes in the field were developed into the design stage. Based on the data obtained, a design was developed in the form of making an e-book containing how to use proper physical exercise techniques, supported by proper diet management. The resulting product is an e-book of physical exercise and diet management for soccer athletes, so that at this stage the design of the product will be carried out.

#### *Develop Stage (Development)*

##### *a. Development Stage*

The e-book that will be made consists of topics of physical exercise and diet management for athletes. The e-book is compiled from the results of the needs analysis at the preliminary stage. The e-Book is compiled in a complete and interesting way according to the needs of the content and material, includes examples and insertion of links to training media in the form of images. In addition, the development of this e-book also includes examples of

menus and food ingredients that are recommended for athletes to consume at every stage of training and football matches.

*b. Validation Stage*

The e-books that have been developed are then validated by <sup>5</sup> experts in their fields, including material experts and media experts as many as 2 people. The feasibility aspects assessed by the validators are: 1) Content suitability, 2) Language feasibility, 3) Supporting materials and media and 4) Up-to-date.

*c. Revision Stage*

Based on the results of the assessment and suggestions of the validators regarding the assessed aspects, a revision of the e-book that has been developed is carried out in accordance with the directions and suggestions, so that later the resulting e-book can be well received and understood by its specific targets, namely athletes and coaches.

*d. Readability Test*

The results of the revised e-book developed will be read by 5 football athletes and 2 coaches. Coaches and athletes who have read the compiled e-book then fill out a questionnaire evaluating the results of the readability test. These results will later be used as a reference for further e-book improvements in order to obtain good and quality e-books.

*Disseminate Stage*

This stage is carried out with the aim of distributing the results of the e-book that has been revised and tested for readability by users. The results of this distribution will see how athletes and football coaches respond to the e-book that has been created.

<sup>3</sup> **Research Population and Sample**

The population in this study were football coaches and athletes who were in the city of Medan. The selection of research samples using purposive random sampling technique, a sampling procedure according to the wishes of the researchers, namely 1) PSMS Medan Senior Soccer Athletes 10 people 2). PSMS Medan Soccer Coach as many as 4 people.

**Data Collection Techniques and Research Instruments**

*a) Data Collection Techniques*

Data was collected by filling out a questionnaire/questionnaire and documentation. Interviews were conducted to dig deeper into information about the needs of soccer athletes and coaches.

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b) *Research Instruments*

The instrument used in this study was a questionnaire containing questions to be answered by respondents regarding the analysis of the needs of athletes and coaches. In addition, a feasibility test evaluation questionnaire will also be given when the last evaluation is carried out.

## Results

### 1. Define

#### a. Previous Study

This research was carried out based on previous studies, the first research namely "The Effect of Active Exercise Recovery on Resting Pulse Rate Recovery after Performing Maximum Exercise on the Unimed FIK Futsal Team (2017)", and the second Research namely "Development of Exercise Models for Physical Conditions of Soccer Sports (Study on Development of Exercise Models) Speed, Agility, Power and Endurance at the Special Preparation Stage for Football Sports for Pasopati Football Academy Players (2019)". Proper and efficient physical exercise is certainly followed by the accuracy of optimal nutritional intake. An athlete cannot achieve the best performance without appropriate nutrition settings for his physical condition. The previous study has designed an ideal physical condition exercise model for football athletes. Accordingly, this research continued with diet adjustments that are suitable for the physical exercise of football athletes.

#### b. Observation of Requirement (Football Athletes and Coaches)

A survey regarding the need for making physical exercise e-books and diet regulations for football athletes has been carried out from July 22 - August 3, 2021. The still high COVID-19 pandemic condition causes all activities to be limited, therefore the survey was conducted using Google forms. According to a survey conducted on 86 respondents (athletes and coaches), most of the respondents (66.3%) have textbooks or other handbooks as a guide in physical training activities for soccer. This shows that respondents do not only rely on the knowledge received during practice, but also have prepared other media as a source of information to help respondents encounter physical football training, and this is consistent with the survey results obtained that 96.5% of respondents turned out to be looking for other materials (books, modules, or sources from the internet) apart from courses to assist respondents in understanding a physical exercise material. The information (books, modules, or internet sources) is evident from the survey (51.2%) that can help respondents learn the sub-materials of physical exercise given in the course.

#### c. Materials Assessment

The study of e-book material for physical exercise includes Anatomy and Physiology, components of the physical conditions needed in football, Energy Systems, Principles of soccer physical exercise, volume and intensity of exercise, stages of training (preparation, matches, transitions), Recovery training, and weight training. These materials are very much needed by football athletes, this can be seen from survey data which states that >95% of

respondents agree that all these materials need to be in the e-book of physical exercise for athletes.

The survey results also found that 95.3% of respondents needed an assessment of nutritional data on football athletes, such as body measurements/anthropometry, body composition measurements, and eating and nutrition history. The tight schedule of training for football athletes causes them to lack information about the assessment of nutritional data. In addition, the survey results also show that almost all athletes (98.8%) are aware of the importance of Nutrition Problems, Nutrition Interventions such as diet planning, calculating nutritional needs, giving strategies, or making menus before and after competing. The provision of proper food and drink to athletes is beneficial to restore the energy that has been expended in training activities or solid matches that absolutely must be considered. The survey results also found that 98.8% of football athletes realized the importance of monitoring and evaluating nutrition to support the performance and fitness of football athletes.

## **2. Design**

This stage is the result of the analysis of literature review materials, the needs of coaches and athletes in the field are developed into the next stage, namely design. Based on the data obtained, a design was developed in the form of making an e-book containing how proper physical exercise is supported by proper diet management. The resulting product is an e-book of physical exercise and diet management for soccer athletes, so that at this stage the design of the product will be carried out.

The following is a physical exercise e-book design and diet management for soccer athletes:

## **3. Development**

### ***a. Stages of Development***

The stage of developing an e-book of physical exercise and diet management for soccer athletes is the result of a needs analysis conducted on soccer athletes. The survey results showed that the survey results from 86 respondents, mostly 66.3% had a guide text book on soccer training activities (physical exercise), but there was 96.5% of respondents looking for other materials to understand and study the material for physical exercise activities. This showed that respondents need other materials even though they had the textbook.

Understanding the material from books and other references obtained by respondents, then followed by physical exercise practicum made the respondents more enthusiastic about participating in the training on physical exercise sub-materials (96.5%) which made the training materials easier to reach (77.9%). Based on the survey results, as many as 95.3% of respondents need alternative teaching materials such as e-books that can be used to learn the concept of physical exercise in an easy and interesting way.

Based on the results of a survey that had been carried out related to the analysis of the need for an e-book on diet management, it can be seen that only 36% of the sample had a book on diet management and 83% of the sample requires information about diet management. The lack of information and the tight training schedule for soccer



athletes cause them not to had the opportunity to obtain information about diet management. Based on the survey, it was shown that all samples agreed to the development of diet management for soccer lights and almost all stated that they needed an e-book on diet management for soccer.

#### b. Validation Stage by Experts

The e-book that has been developed is further validated by experts in their fields, namely material experts (nutritionists and trainers), and media experts. The results of the material expert validation can be seen in Figure 1.

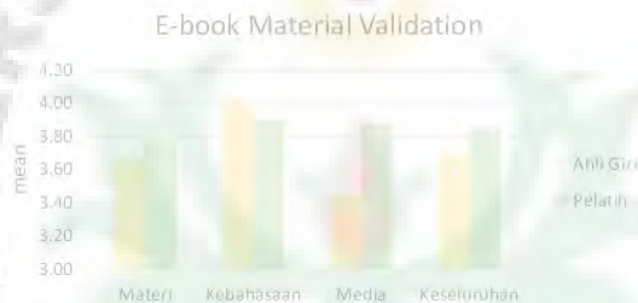


Figure 1. E-book Validation Results by Material Experts

##### 1) Validation by Material Expert (Nutritionist)

Validation related to the material in the e-book was carried out by a nutritionist in the field of football sports who was currently active as a nutritionist at a well-known football club. The results of material validation show that the material presented in the e-book was very appropriate (3.67) with what was currently needed. According to the nutritionist, the language used in describing the material in this e-book was very appropriate (4.00), while the assessment of the media contained in the e-book that facilitates user understanding was in the appropriate category (3.44). The nutritional validation results obtained can be obtained that the resulting e-book was feasible to use. There were several suggestions from nutritionists for the material section, namely adding a discussion related to hydration/fluid status in athletes and in the media section in the form of adding illustrations and being more colorful in the learning media section so that users was easier to understand and make the e-book more interesting when reading.

##### 2) Validation by Material Expert (User/Football Coach)

The material expert who studies the e-book was a football coach who coaches teams at active clubs in Indonesia. The trainer was involved in validating this e-book because it was used as an e-book user. The validation results showed that the material presented in the e-book was very appropriate (3.77) with what is currently needed. In terms of language, the validator also stated that the language used was very appropriate (3.90) and understood by

e-book users. Likewise in terms of media, the validator as a user states that the media used when appropriate (3.88) for user understanding. The results of this validation concluded that from 3 aspects of the assessment (e-book material, language, media) that were reviewed by the trainer as a user, the resulting e-book was in the very suitable category for use (3.85). There are several suggestions for improving the validated e-book, namely consistency in making images in the form of exercises so that the display of image media in e-books becomes even better.

### 3) *Validation by Media Expert*

Media experts contributed to the assessment of the resulting e-book, and the results of the assessment can be seen in Table 3 below. The results obtained indicate that the validation carried out by media experts as a whole is at 3.78 based on 9 (nine) indicators assessed (ease, color. According to media experts, this e-book is in the very appropriate category both for completeness of presentation and feasibility graphics and can be used as an electronic medium for football.

### c. *Stages of Revision*

The results of expert validation and expert validation are revised at this stage. The advice of nutritionists and material experts is combined to improve the e-book that has been validated by a team of experts. Suggestions from nutritionists regarding the material section with the addition of hydration/fluid status material for athletes have been carried out at this stage. Illustration and color media make it easier for soccer athletes to understand the material about athletes' diet management. The validation of media experts gave a high contribution and from these results it can be concluded that the e-book made attracts target fans, namely soccer athletes.

### d. *Readability Test*

The last stage in the development stage is the readability test. The readability test is carried out when the e-book has been revised according to suggestions from material experts and media experts. The readability test was conducted on 12 respondents who were the target users of the e-book, namely football coaches and athletes. The steps in conducting an e-book readability test are starting by giving e-books to coaches and athletes, then coaches and athletes are given time to read the e-book. After the coaches and athletes finished reading the e-book, then the researchers distributed the readability test instrument/questionnaire to be filled in according to the respondent's understanding. The results of the readability test show that the average score given by the respondents to the 8 (eight) indicators assessed is 3.75 and can be stated as very legible. Most of the respondents strongly agree that the e-books that have been compiled can be read well.

## 4. **Disseminate**

The disseminate stage is the final stage of research that aims to share the products that have been developed. This stage begins with conducting a pre-test for respondents, namely coaches and football athletes. The pre-test is

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carried out by providing a google form containing several questions related to the material's content in the e-book, which must be filled in entirely by the respondent.

After the pre-test, the next step is distributing the e-book to coaches and athletes to read and learn. Respondents were given three months to read and understand the contents of the e-book that the research team had compiled. Monitoring is carried out during the 3-month e-book reading test period by contacting respondents weekly via chat or telephone. The last step is to do a post-test, namely by giving respondents a google form to fill in completely. The content of the questions on the post-test is the same as that shared at the pre-test time. This is done to be able to see the differences that occur.

Table 1. Changes in Knowledge Scores before and after Physical Exercise and Diet E-Book Trials in Football

	Athletes	
	Mean ± SD	P-value
Before the intervention	56.66±10.84	p < 0.05*
After the Intervention	76.08±14.31	
Knowledge Score Changes	19.4±17.78	

After the pre-test and post-test data were obtained, data analysis was carried out using a statistical paired sample t-test. The analysis results showed a significant difference ( $p < 0.05$ ) in knowledge before being given an e-book with after being given an e-book. This indicates substantial differences from the results of the e-book trial, about three months after the first trial. The average score of knowledge related to physical exercise and diet in football athletes before being given an e-book intervention was  $56.66 \pm 10.84$  points. After being offered, the intervention experienced an increase in knowledge with an average of  $76.08 \pm 14.31$  points. The difference in the average knowledge score was  $19.4 \pm 17.78$ . This is in line with research conducted on endurance athletes in comparisons among groups that received nutrition education through the application experienced an increase in knowledge with an average increase of  $7.3 \pm 6.0$  points (Heikkila et al. 2019).

## Discussion

Knowledge of physical exercise and diet regulation of football athletes was developed in the form of an e book that can help athletes. The collaboration between the two will improve maximum performance for soccer athletes until they can achieve the expected performances. According to Rahman (2020) the knowledge possessed by athletes and soccer coaches on the physique and technique of football will determine the quality and ability of the football player. Furthermore, respondents from the survey assert that 95.3% needed alternative teaching materials such as an e-book that could be used to learn the concept of physical exercise easily and interestingly.

In the survey of dietary regulation e-book needs, only 36% of respondents had books on diet regulation, and the rest still did not have a diet regulation handbook. Diet regulation books are important for football athletes to add insight into regulating athletes' food intake so that the nutritional needs of athletes are fulfilled. Food regulation for athletes is an important factor in achieving optimal performance (Syafrizar & Welis, 2009). Adequate balanced

nutrition foods play an important role for an athlete to achieve optimal performance. Based on this, the survey results show that 100% of respondents want the nutritional knowledge of football athletes to be developed in the form of an e-book to make it easier to learn and access the concept of physical exercise and diet regulation for football athletes.

The study of e-book material for diet regulation includes sports grouping according to the metabolic system, assessment of nutritional data in football athletes (data collection and data analysis instruments), diagnosis/nutrition problems in football athletes, nutritional interventions in football athletes, monitoring and evaluation of nutrition in football athletes. Survey data shows that almost all athletes (96.5%) are aware of the importance of grouping sports according to the metabolic system. During exercise, 3 energy metabolism pathways can be used by the body to produce ATP, namely hydrolysis of phosphocreatine (PCr), anaerobic glycolysis of glucose and burning of stored carbohydrates, fats and proteins. In football, the energy system used is aerobic and anaerobic because soccer athletes need a lot of energy. If the intensity is longer, then the source of energy from muscle glycogen is reduced, then there will be the use of blood glucose and free fatty acids. The importance of energy needs in football athletes is also very influential on the fitness of athletes.

E-book media was a combination of media to produce and deliver material that combines several forms of media so that the material was easier and more interesting (Giri, & Rana, 2022; Hamasaiid, 2021; Kaban, 2021; Rosida et al, 2016). The results of the analysis of the need for e-books will be carried out with the development of e-books on the topic of physical exercise and diet management for athletes. The e-book was compiled from the results of the needs analysis at the preliminary stage. E-Books was compiled in a complete and interesting manner according to the needs of the content and materials, including examples and insertion of links to training media in the form of images and videos. In addition, the development of this e-book also includes examples of menus and food ingredients that was recommended for athletes to consume at every stage of training and football matches. Diet management books was important for soccer athletes to increase their knowledge about managing food so that they get nutrients according to their needs. Food regulation for athletes is an important factor in achieving optimal performance (Syafrizar & Welis, 2009).

The use of e-books provides many conveniences in learning, namely being able to save paper, being able to study anytime and anywhere, easy to carry everywhere, and can be accessed easily both online and offline (Andini, 2021). This is also in line with research which states that students who learn to use e-books can increase their motivation to learn and develop their academic achievements compared to students who learn to use textbooks (Ebied, 2015). Therefore, it is hoped that this e-book can be a solution for active independent learning not only for coaches and athletes but also for students.

### **Conclusion**

- a. Most (> 95%) of respondents need a physical exercise e-book and diet management for football athletes and agree that all physical training materials in the mentioned indicators need to be in the e-book.
- b. The validation results show that the material presented in the e-book is very suitable (3.67) with what is

needed today and is ideal for use.

- c. The results of validation of the media show that this e-book media is included in the category of very suitable both for the completeness of presentation and the feasibility of graphics and can be used as an electronic medium for football sports.
- d. The readability test results get an average assessment of 3.75, meaning that the e-book can be declared very legible and suitable for use.
- e. The results of the different tests showed that there were significant differences in the years before and after the intervention of physical training and diet e-books for Football Athletes
- f. The knowledge of athletes has increased with an average score of increasing knowledge by 19.4 points.

Based on the research results, several suggestions were obtained for the future improvement and development of e-books, such as adding more exciting images and multiplying case examples.

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#### Author Information


##### **Ardi Nusri**

 <https://orcid.org/0000-0002-0248-3478>  
Universitas Negeri Medan  
Jl. Willem Iskandar Ps. V, Medan  
Indonesia  
Contact e-mail: [ardi.nusri@unimed.ac.id](mailto:ardi.nusri@unimed.ac.id)


##### **Esi Emilia**

 <https://orcid.org/0000-0003-1998-3329>  
Universitas Negeri Medan  
Jl. Willem Iskandar Ps. V, Medan  
Indonesia


##### **Tyas Permatasari**

 <https://orcid.org/0000-0002-9401-9137>  
Universitas Negeri Medan  
Jl. Willem Iskandar Ps. V, Medan  
Indonesia


##### **Yatty Destani Sandy**

 <https://orcid.org/0000-0002-9527-3698>  
Universitas Negeri Medan  
Jl. Willem Iskandar Ps. V, Medan  
Indonesia


##### **Caca Pratiwi**

 <https://orcid.org/0000-0003-4781-2850>  
Universitas Negeri Medan  
Jl. Willem Iskandar Ps. V, Medan  
Indonesia

##### **Erni Rukmana**

 <https://orcid.org/0000-0002-9442-8010>  
Universitas Negeri Medan  
Jl. Willem Iskandar Ps. V, Medan  
Indonesia

##### **Latifah Rahman Nuriazriah**

 <https://orcid.org/0000-0003-1415-8477>  
Universitas Negeri Medan  
Jl. Willem Iskandar Ps. V, Medan  
Indonesia

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