OLYMPUS
Jurnal Pendidikan Kesehatan dan Rekreasi UNIMA
Vol.06, No. 02,Bulan Desember, Tahun 2025 :Hal 243-249
ISSN : 2774- 6917

DEVELOPMENT OF AN EXERCISE MODEL USING RESISTANCE BANDS FOR POST-SOCCER INJURY RECOVERY

[1] Glady Sukma Perdana, [2] Fredrik Alfrets Makadada
[1,2] Fakultas Ilmu Keolahragaan, Universitas Negeri Manado, Manado, Indonesia
Email: [1]gladyperdana@unima.ac.id [2] fredrikmakadada@unima.ac.id

Diterima:12 -11 -2025 Direvisi : :15 11-2025 Disetujui : :25-11-2025

Abstrak

This study aims to develop a training model product utilizing resistance bands for post-injury rehabilitation in football players, which can be employed by athletes recovering from injuries. The research method applied in this study follows the Research and Development framework, adapting Sugiyono's steps into seven stages: (1) Identifying potential and problems, (2) Collecting information, (3) Designing and creating the initial product, (4) Validating the design, (5) Revising, (6) Finalizing the product, and (7) Product testing. The training program book that employs resistance bands for post-injury recovery was validated by one content expert and one media expert. It was tested with three coaches and twelve sports coaching students, totaling fifteen participants. The data obtained were analyzed descriptively and quantitatively. Quantitative data was derived from questionnaires, which were expressed as percentages to indicate the product's feasibility level.

The results of the development research for the training book using resistance bands in post-injury rehabilitation for football players revealed a content validity score of 88.3% from the content expert, indicating it is feasible. The media expert's validation yielded a score of 85.6%, categorizing it as highly feasible. During product testing, the overall assessment resulted in a score of 86.9%, placing it in the "Highly Feasible" category. Therefore, the developed product of this training manual is deemed appropriate for use. Consequently, the model of training using resistance bands for post-injury recovery in football, packaged as a guideline book, is suitable for use as a learning medium that is easy to understand and can be directly practiced.

Kata Kunci: development, training model, resistance band, rehabilitation, post-injury

1. Introduction

Football stands as the most widely played and celebrated sport across the globe, captivating individuals from childhood through adulthood. The game involves two teams of eleven players, including a goalkeeper, competing to score goals by integrating physical prowess, technical skills, tactical strategies, and psychological resilience. Success in football is not solely determined by technical mastery but also by the synergy among players and their understanding of positional roles (Raya-González & others, 2020).

Optimal performance in football demands a multidimensional approach, encompassing physical conditioning, technical execution, tactical intelligence, and mental strength. Athletes who possess superior physical capabilities, refined technical skills, and robust psychological endurance are more likely to achieve peak performance (Lin & others, 2017; Yamada & others, 2017). However, as a contact sport, football carries a high risk of injury, ranging from minor sprains to severe musculoskeletal trauma. Injury recovery is a critical phase that requires not only appropriate medical intervention but also mental resilience and sustained motivation (O'Keeffe & others, 2019).

Initial injury management often employs the R.I.C.E. method (Rest, Ice, Compression, Elevation) to reduce inflammation and facilitate healing. Following this phase, athletes undergo rehabilitation involving progressive muscle strengthening. Resistance bands elastic tools widely used in rehabilitation and fitness offer a practical solution due to their portability,

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adaptability, and ability to provide graded resistance without bulky equipment (Cowden, 2017; Paz & others, 2023). Despite their advantages, the application of resistance bands in football injury rehabilitation remains limited. There is a notable lack of structured training models, insufficient access to practical equipment, and minimal awareness among athletes and coaches regarding their therapeutic potential (Robles-Palazón & others, 2022).

These gaps highlight the need for a comprehensive and accessible rehabilitation framework. This study aims to develop a structured guidebook featuring resistance band-based training models tailored for football injury recovery. The proposed guide is designed to support coaches, physiotherapists, and athletes**,** both amateur and professional in implementing effective, evidence-based rehabilitation programs (Cevada & others, 2020; Duda & others, 2016).

2. Literature

a. Football Injuries: Definition and Prevalence

Injuries in football are a common concern affecting athletes across all levels, from amateurs to professionals. These injuries may result from direct physical contact, excessive movement, or inadequate physical preparedness. According to (Bahr & Krosshaug, 2005), football-related injuries frequently involve soft tissue damage such as strains of muscles, ligaments, and tendons as well as trauma to hard structures like bones. The severity of these injuries ranges from minor sprains to more serious conditions such as fractures or ligament tears, which often require extended recovery periods.

(Emery & others, 2015) reported that injuries in football predominantly affect the knee, ankle, and hamstring regions. Consequently, effective rehabilitation is essential to restore muscular function and ensure a safe return to play. Without proper recovery protocols, athletes risk prolonged absence and potential reinjury.

b. Rehabilitation Process in Football

The rehabilitation process plays a pivotal role in enabling athletes to resume competitive activity. Inadequate recovery may exacerbate existing injuries and hinder long-term performance. Initial treatment typically involves the R.I.C.E. method (Rest, Ice, Compression, Elevation), which aims to reduce inflammation and initiate healing. Following this phase, targeted rehabilitation exercises focusing on muscle strengthening and mobility restoration are crucial.

(Jørgensen & others, 2016) emphasized that muscle strengthening is a central component of injury rehabilitation. These exercises are designed to restore strength and stability in the affected area, while also enhancing the body's capacity to withstand physical stress upon return to sport.

c. Resistance Bands in Physical Therapy

Resistance bands elastic tools made from synthetic rubber are widely used in rehabilitation and strength training. Their primary advantage lies in their portability and adaptability, allowing athletes to perform resistance-based exercises without the need for bulky gym equipment (Dintiman & Nindl, 2018). In rehabilitation contexts, resistance bands have demonstrated efficacy in improving muscle strength, flexibility, and neuromuscular coordination between injured and healthy tissues.

(Peterson & others, 2017) found that resistance band exercises can reduce muscular tension, enhance balance, and improve joint stability in injured athletes. Moreover, the progressive nature of resistance bands allows for adjustable intensity levels, enabling athletes to begin with low resistance and gradually increase load as recovery progresses (Hoffman et al., 2019).

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d. Strength Training Models for Post-Injury Recovery

Post-injury strength training aims to restore normal muscular function and enhance the body's resilience to physical stress. (Garrison et al., 2020) proposed a three-phase rehabilitation model: passive recovery, strength training, and functional training. During the strength phase, resistance bands serve as an effective tool by providing low-impact resistance that facilitates muscle activation without overloading the recovering body.

(Owens et al., 2021) highlighted that resistance band-based training models can accelerate recovery in football athletes by improving muscular strength and joint stability. This is particularly relevant given that many football injuries stem from muscular imbalances or underdeveloped stabilizing muscles.

e. Advantages of Resistance Band Training in Football Rehabilitation

Resistance bands offer several advantages in the context of football injury rehabilitation. Their ability to deliver effective strength training without excessive strain is especially beneficial during the healing phase. Additionally, they allow for targeted training of vulnerable muscle groups such as the hamstrings and ankles, which are commonly injured in football (Wang et al., 2020).

(LaStayo & others, 2018) demonstrated that resistance band exercises can enhance eccentric muscle strength, a key factor in recovering from muscle and ligament injuries. Eccentric training is particularly effective in rebuilding strength in previously injured tissues, and resistance bands provide a safe and controlled medium for such exercises.

3. Method

This study employed a research and development (R&D) approach aimed at producing a structured training guidebook utilizing resistance bands for post-injury rehabilitation in football athletes. The development framework was adapted from Sugiyono (Sugiyono, 2013), which emphasizes iterative product refinement through expert validation and field testing. The final output is a practical, evidence-informed guide designed to support muscular recovery and functional rehabilitation in football contexts.

The development process followed seven systematic stages, beginning with problem identification and literature review to determine the need for a resistance band-based rehabilitation model. This was followed by product design, which involved drafting the initial structure and content of the guidebook. Expert validation was then conducted to assess the scientific accuracy, pedagogical relevance, and visual clarity of the material. Based on expert feedback, revisions were made prior to limited field testing with selected football athletes and certified coaches. Further refinements were implemented following user feedback, leading to extended field trials and final product revision.

Participants in this study included two categories: expert validators and field trial subjects. The expert validators consisted of a content expert, who evaluated the theoretical and practical relevance of the guidebook, and a media expert, who assessed its visual presentation and instructional clarity. Field trial participants were selected through purposive sampling and included amateur football players and licensed coaches. Their feedback was used to evaluate the guidebook's usability, clarity, and effectiveness in real-world rehabilitation settings.

Data collection was conducted using a triangulated approach, combining semi-structured interviews, direct observation, and structured questionnaires. Interviews were used to explore the rehabilitation needs and expectations of coaches and athletes. Observations were carried out during rehabilitation sessions to assess athlete engagement and response to the training model. Questionnaires were distributed to both experts and field participants to evaluate the guidebook's content, language, and visual design. Each instrument was developed with item grids and validation indicators to ensure comprehensive assessment.

Data analysis employed both quantitative and qualitative methods. Quantitative data from the questionnaires were analyzed using a feasibility scoring formula:

$$\text{RUMUS: } \frac{SH}{SK}$$

Calculated Score (SH)

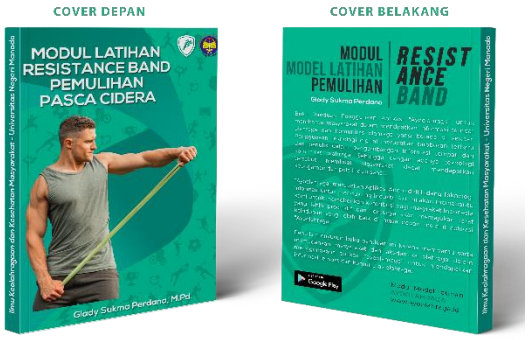
Ideal Score (SK)

The resulting scores were categorized into five levels: highly feasible (81–100%), feasible (61–80%), moderately feasible (41–60%), less feasible (21–40%), and not feasible (<21%). Qualitative data from open-ended responses and expert suggestions were thematically analyzed to identify areas for improvement and guide the refinement of the final product.

4. Result

The development of the resistance band training guidebook for post-injury football rehabilitation was carried out through a structured research and development process. The results are presented in three main phases: expert validation, limited field testing, and extended field trials.

Figure 1. Exercise Model Book Using Resistance Bands After Soccer Injuries



a. Expert Validation

The initial draft of the guidebook was evaluated by two expert validators: a content expert and a media expert. The content expert assessed the scientific accuracy, relevance to rehabilitation principles, and alignment with football-specific injury recovery needs. The media expert evaluated the visual layout, instructional clarity, and overall design aesthetics.

Quantitative analysis of the validation results showed a high level of feasibility. The content expert rated the guidebook at 88.3%, while the media expert provided a score of 85.6%. These scores fall within the “highly feasible” category, indicating that the guidebook met academic and practical standards for rehabilitation use. Qualitative feedback from both experts emphasized the clarity of instructions, the relevance of exercise progression, and the adaptability of the resistance band model to various injury types.

Table 1. Results of Content Expert Validation

No	Aspects Assessed	Calculated Score	Ideal Score	Percentage	Category
1	Eligibility Criteria	53	60	88,30%	Highly Feasible
	Total	**53**	**60**	**88,30%**	**Highly Feasible**

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Table 2. Results of Media Expert Validation

No	Aspects Assessed	Calculated Score	Criteria Score	Percentage	Category
1	Display	34	40	85%	Highly Feasible
2	Grammar	21	25	84%	Highly Feasible
3	Usage	22	25	88%	Highly Feasible
	Total	**77**	**90**	**85,60%**	**Highly Feasible**

b. Limited Field Testing

Following expert validation, the guidebook was tested with a small group of amateur football players and certified coaches. Participants were selected based on purposive sampling and represented individuals with prior experience in injury rehabilitation.

During the limited field testing, participants engaged in guided rehabilitation sessions using the resistance band exercises outlined in the guidebook. Observational data indicated high levels of engagement and ease of implementation. Questionnaire results revealed an average feasibility score of 82.7%, with specific praise for the guidebook's portability, clarity of illustrations, and progressive intensity structure.

Participants noted that the resistance band exercises were effective in activating injured muscle groups without causing excessive strain. Coaches reported that the guidebook could be easily integrated into existing rehabilitation routines and was especially useful in settings with limited access to gym equipment.

Table 3. Results of Limited Field Testing

No	Aspects Assessed	Calculated Score	Criteria Score	Percentage	Category
1	Eligibility Criteria	435	525	82,9%	Highly Feasible
2	Grammar	185	225	82,2%	Highly Feasible
3	Appearance and Usage	372	450	82,7%	Highly Feasible
	Total	**992**	**1200**	**82,7%**	**Highly Feasible**

c. Extended Field Trials

The final phase involved broader implementation of the guidebook across multiple rehabilitation sessions involving a larger sample of athletes recovering from football-related injuries. The extended trials aimed to evaluate the guidebook's long-term usability, adaptability, and impact on recovery outcomes.

Quantitative data from post-trial questionnaires yielded an average feasibility score of 86.9%, reaffirming the guidebook's practical value. Athletes reported improvements in muscle strength, joint stability, and confidence during recovery. Coaches highlighted the guidebook's structured progression and its ability to accommodate varying levels of injury severity.

Qualitative feedback emphasized the importance of the guidebook's modular design, which allowed users to tailor exercises based on individual recovery stages. Suggestions for improvement included adding QR code linked to video demonstrations and expanding the guidebook to include sport-specific functional drills.

Table 4. Results of Field Testing

No	Aspects Assessed	Calculated Score	Criteria Score	Percentage	Category
1	Eligibility Criteria	460	525	87,6%	Highly Feasible
2	Grammar	190	225	84,4%	Highly Feasible
3	Appearance and Usage	395	450	87,8%	Highly Feasible
	Total	**1045**	**1200**	**86,9%**	**Highly Feasible**

5. Discussion

The results confirm that the resistance band guidebook is both scientifically valid and practically feasible for football injury rehabilitation. High feasibility scores from expert validators and field users indicate strong content relevance, instructional clarity, and usability.

These findings align with prior research showing that resistance band exercises effectively improve muscle strength, joint stability, and functional recovery (Hoffman et al., 2019; Owens et al., 2021). The guidebook's progressive structure supports safe rehabilitation, especially in resource-limited settings.

Moreover, modular design allows customization based on injury severity and recovery stage, addressing the gap in accessible, sport-specific rehabilitation tools. This supports evidence from Scopus-indexed studies emphasizing the role of elastic resistance in accelerating recovery and preventing reinjury (LaStayo & others, 2018).

6. Conclusion

This study successfully developed and validated a structured resistance band training guidebook tailored for post-injury rehabilitation in football athletes. Through a systematic research and development process, the guidebook demonstrated high feasibility across expert evaluations and field trials, confirming its scientific validity and practical applicability.

The integration of resistance band exercises into rehabilitation protocols offers a promising solution for enhancing muscular strength, joint stability, and functional recovery, particularly in resource-limited environments. The guidebook's modular design, progressive intensity structure, and instructional clarity make it a valuable tool for coaches, physiotherapists, and athletes seeking effective and accessible rehabilitation strategies.

The findings contribute to the growing body of literature supporting elastic resistance training in sports injury recovery and highlight the need for sport-specific rehabilitation models. Future research should explore the long-term impact of resistance band-based rehabilitation on performance outcomes, reinjury prevention, and psychological readiness to return to play.

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