

Modified Warm-Up Model: A Development Study For Football Players Post Ankle Injury Modelo de calentamiento modificado: Un estudio de desarrollo para jugadores de fútbol tras una lesión de tobillo

*Liza, *Bafirman, *Masrun, *Alimuhammad, **Rahmat Putra Perdana, ***Agung Wahyudi, ****Mikkey Anggara Suganda, *****Didi Suryadi, *****Trisnar Adi Prabowo, *****Makan Sacko

*Universitas Negeri Padang (Indonesia), **Universitas Tanjungpura (Indonesia), ***Universitas Negeri Semarang (Indonesia), ****Universitas Nahdlatul Ulama Cirebon (Indonesia), *****Universitas Negeri Yogyakarta (Indonesia), *****Centre de langues Badalabougou (Mali)

Abstract. Injuries are common among football players, and the risk factors have been well documented in the literature. This is because football is a high-intensity sport that is performed repetitively, such as jumping, running, and touching opponents when tired. This study aimed to develop a warm-up model for football players after an ankle injury. This type of research was R&D using the Borg & Gall method. The trial design included two stages, namely feasibility testing and effectiveness testing. In conducting the feasibility test, 7 football players were selected using purposive sampling, the feasibility test was carried out, then revised and continued to the effectiveness test stage. The effectiveness test was the final stage trial conducted on 15 football players. Based on these results, the development of a warm-up model was declared feasible to be used as a warm-up activity for athletes after an ankle injury. The post-injury ankle warm-up model was effective in reducing pain and improving functional ability, with a percentage effectiveness of pain reduction of 70.57% and a percentage increase in function of 23.24%. Based on the results of the data obtained from the large-scale test and the effectiveness test, it can be concluded that the warm-up model for football players after ankle injury can reduce pain levels and improve functional abilities so that it can be accepted as a warm-up model that can be used to treat ankle injuries. It is also evident that the effectiveness of the pain scale and functional ability both obtained a significance value smaller than 0.05, namely 0.001.

Keywords: Injury Ankle, Sports, Football

Resumen. Las lesiones son comunes entre los jugadores de fútbol y los factores de riesgo han sido bien documentados en la literatura. Esto se debe a que el fútbol es un deporte de alta intensidad que se practica de forma repetitiva, como saltar, correr y tocar a los oponentes cuando están cansados. Este estudio tuvo como objetivo desarrollar un modelo de calentamiento para jugadores de fútbol después de una lesión de tobillo. Este tipo de investigación fue I+D utilizando el método de Borg & Gall. El diseño del ensayo incluyó dos etapas, a saber, pruebas de viabilidad y pruebas de eficacia. Para realizar la prueba de viabilidad, se seleccionaron 7 jugadores de fútbol mediante muestreo intencional, se llevó a cabo la prueba de viabilidad, luego se revisó y se continuó con la etapa de prueba de eficacia. La prueba de eficacia fue la prueba final realizada con 15 jugadores de fútbol. Con base en estos resultados, se declaró factible el desarrollo de un modelo de calentamiento para ser utilizado como actividad de calentamiento para atletas después de una lesión de tobillo. El modelo de calentamiento de tobillo posterior a la lesión fue eficaz para reducir el dolor y mejorar la capacidad funcional, con un porcentaje de efectividad de reducción del dolor del 70,57 % y un porcentaje de aumento de la función del 23,24 %. Con base en los resultados de los datos obtenidos de la prueba a gran escala y la prueba de efectividad, se puede concluir que el modelo de calentamiento para jugadores de fútbol después de una lesión de tobillo puede reducir los niveles de dolor y mejorar las capacidades funcionales, por lo que puede ser aceptado como un modelo de calentamiento que se puede utilizar para tratar lesiones de tobillo. También es evidente que la eficacia de la escala de dolor y la capacidad funcional obtuvieron un valor de significancia inferior a 0,05, es decir, 0,001.

Palabras clave: Lesión de tobillo, Deportes, Fútbol

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Liza

lizaaza@fik.unp.ac.id

Introduction

Exercise is generally defined as a physical activity that is very beneficial for maintaining and improving the quality of a healthy life (Haidara et al., 2023). Exercise done regularly also affects the level of aerobic endurance (Hardinata et al., 2021). One of the sports that requires endurance in every activity is football. Where this sport requires a good aerobic system (Nugroho & Kusuma, 2022). An example of a soccer player using an aerobic energy system is when a soccer player is running (Purba & Setiowati, 2022; Suryadi et al., 2023). The sport of football places high physiological demands on athletes, putting them at high risk for injury due to repetitive high-intensity movements such as jumping, running, and contact with opponents when fatigued (Read et al., 2016; Suryadi, 2023). (Candra, A., & Darwis, 2021) An athlete who performs continuous physical training will

need time for the recovery process. Therefore understanding injury risk factors and their interactions is a key component to preventing future injuries (Van Eetvelde et al., 2021). This is important to note because it will affect performance while on the field. In addition, most football players undergo rehabilitation and sports therapy. Research from (Elliott et al., 2015) found that coaches and players should know how to reduce the incidence of ankle injuries by providing a proper warm-up before training or competing. Following an adverse injury, re-injury is common. So to support total recovery from these injuries, exercise therapy is needed which is packaged in the form of a warm-up. In addition, based on the results of a research journal from (Walls, R et al., 2016) entitled Football Injuries of the Ankle explains that in the world of football, the lower extremities are most commonly injured with ankle injuries accounting for one-third of all injuries. A study confirmed

that ankle sprains were the most common, reported by 63.8% (Amer & Mohamed, 2020). Previous ankle injuries, lack of stretching, lack of warm-up, and not wearing a brace were identified as significant risk factors (Mahesvi et al., 2023). A total of 47.9% of players preferred going to the hospital for treatment, 15.8% opted for physical therapy, and 56% had no prior education on injury prevention (Amer & Mohamed, 2020).

Many studies have investigated different warm-ups and their effects on performance, which can be divided into short duration (0-10 s), medium duration (10 s-5 min), or long duration (more than 5 min) (Bishop, 2003). Studies have manipulated duration 4, 7, and/or 10 intensities to increase muscle temperature, maintain phosphate depots and performance. Other studies have investigated the effects of different rest protocols between warm-up and performance or the content of the warm-up (active vs passive, general vs specific, with or without stretching) (Bishop, 2003; Fradkin & T.R. Zazryn, 2010; Taylor et al., 2013).

Warming up is a procedure used in almost all sports with the aim of gradually adapting the body physically and mentally to enter the core activity and can also improve activity performance (van den Tillaar et al., 2019), as well as to reduce the risk of injury during the activity. Warm-ups are similar in team sports, such as rugby, team handball, and football (Bishop, 2003). This is often a general cardiovascular warm-up and 10-20 minutes of stretching followed by a sport-specific warm-up (Sander et al., 2013; Taylor et al., 2013).

Studies also provide the view that it remains unclear whether a general warm-up from the start, such as jogging for more than 10 minutes, will have a more positive effect on short performances such as sprinting than a short specialized warm-up alone (Gelen, 2010). In contrast, however, (Taylor et al., 2013) showed that using only a general and specific warm-up of about 10 minutes was as good as using a 20-minute warm-up, which included a static or dynamic stretching phase, for repeated sprint performance. They concluded that it would be more practical to complete a short warm-up consisting of a short cardiovascular section followed by a specific high-intensity activity, as this would allow more time to practice the more important skills in football.

Current research suggests that warm-up duration does not affect sprint performance, as shown by the result that a short specific warm-up is as effective as a long specific warm-up for sprinting in football (Roland et al., 2019). In swimming with a 100 m time trial (intermediate performance) there was also no difference in performance after a short warm-up compared to a normal warm-up (Neiva et al., 2015). However, for longer swimming performance, they recommended a longer warm-up with the right intensity (Neiva et al., 2014). In addition, it is possible that too short a specific warm-up may lead to injury. Therefore, in this study, no one experienced injury or injury proneness after performing a short warm-up. As participants performed this type of warm-up only once, it is unknown

whether a short warm-up over a longer period of time would have a negative impact on injury and injury prevention.

This research is important to conduct, to provide knowledge and understanding of physical conditioning needs, which is one of the most relevant aspects of the game (Karcher & Buchheit, 2014). Understanding the importance of physical condition is essential to achieve the highest performance in a game sport (García-Sánchez et al., 2023; Ismoko & Putro, 2023). Coaches must pay attention to each component of physical condition to achieve maximum performance (Côté & Gilbert, 2009). This research is very important to evaluate the success of the coaching and training process that has been carried out (Vavilov et al., 2020).

Materials and Methods

Participant

The trial design included two stages, which were the feasibility test and the effectiveness test. In conducting the feasibility test, 7 football players were selected using purposive sampling, the feasibility test was carried out, then revised and continued to the effectiveness test stage. The effectiveness test was the final stage trial conducted on 15 football players.

The test subjects in this study were football players at the Padang State University Football Association Club or UNP FC in Padang City, West Sumatra Province. In the product feasibility trial, 7 football players were selected and in the effectiveness trial, 15 football players were selected. Subjects were selected using a purposive sampling technique with the characteristics of football players who had experienced ankle injuries with stages of injury (1) subchronic to chronic phase, (2) chronic phase. The minimum age of the subjects was 20 years and the maximum age was 30 years.

Procedure

This type of research was research and development (R&D), which was used to produce certain products and test the effectiveness of these products. Product trials were intended to collect data that could be used as a basis for determining the resulting product. The data obtained from the trial was used to improve and refine the Warm-Up Model for Football Players After Ankle Injury which was the final product of this research. With this trial, the quality of the product developed was truly tested empirically, which was intended to obtain direct feedback from users about the quality of the product developed. Before testing the product, it was first consulted with a material expert, the next trial step is expected to find weaknesses, shortcomings, and errors so as to produce a product that is suitable for use.

Data collection instruments were aimed at obtaining responses from respondents, so quality research instruments were needed. The instrument used to extract data

in this study was an assessment sheet questionnaire. The assessment sheet prepared included two types according to the role and position of the respondent in this development research. The research instrument in the form of an assessment sheet was prepared based on the grids that had been developed. The assessment sheet was in the form of a questionnaire for material experts and a questionnaire for football players.

The research instrument at the effectiveness test stage used the pretest and posttest experimental methods. Instruments at the effectiveness test stage are used to measure the athlete's pain level using the VAS (Visual Analogue Scale) method and measure the athlete's functional ability level using the FAAM (Foot and Ankle) Abilities Measure) method.)

Data analysis

Qualitative data in this study was data obtained through validation from material experts and comments from football players. The data obtained was used to develop a warm-up model for football players after an ankle injury. Furthermore, quantitative data in this study was collected at the validation test stage, small-scale test, and large-scale test using quantitative percentages. Quantitative data in this study were obtained from an assessment questionnaire which was analysed with descriptive statistics in the form of statements. There were five categories of eligibility. The maximum expected value was 100% and the minimum was 0%. The division of eligibility categories is based on (Arikunto, 2009).

Table 1.
Eligibility Categories

No	Score In Percentage	Eligibility Category
1	< 21%	Not really worth it
2	21 – 40%	Not feasible
3	41 – 60%	Decent enough
4	61 – 80%	Worthy
5	81 – 100%	Very Worthy

The effectiveness test was carried out using an experimental method, the treatment was analyzed using a non-parametric paired data difference test, namely the Wilcoxon Signed Ranks Test. The method was that the results obtained from the pre-test would be compared with the results obtained from the post-test. The effectiveness test was carried out pre-test to determine the initial data on pain levels and functional impairment. The pain level instrument used VAS (Visual Analogue Scale) and the functional ability level instrument used FAAM (Foot and Ankle Abilities Measure). Then each was given a product in the form of a warm-up model for football players after ankle injury for 3 weeks with the duration of the meeting 3 times a week. After that, a post-test was conducted with the same test as the pre-test.

Results

The initial product of this warm-up model was aimed to de-

termine that the initial product could be accepted and carried out by the research subjects and had a significant effect on the recovery process of ankle injuries. Before being tested on the subject, the products that had been prepared were first validated by experts, namely sports therapists and health experts.

The experts are (1) Dr. Khairul Amar a health expert (2) Dr. Eva Faridah, a sports therapy expert. Validation was carried out by providing an initial product draft of a written warm-up model after ankle injury accompanied by an evaluation sheet for experts. Based on the evaluation results and input from the experts, the initial product draft was then revised so as to obtain a draft warm-up model that was suitable for testing.

Table 2.
Input data from material experts

Materials Expert	Input to drafts model warmup
Dr. Khairul Amar., M.Or., AIFO	The model developed needs to be explained for post- <i>ankle injury</i> what kind, warm-up purposes, or for exercise therapy. The model must accompanied picture, duration, language improvement, and name in every move.
Dr. Eva Faridah., M.Or	Loading images to make things easier implementation process. Principle exercise must be in accordance principle exercise program is FITT (frequency, intensity, training duration, and time)

Based on Table 2, there are several inputs from experts regarding the design of the post-injury ankle warm-up model, namely the model developed is intended for the post-injury ankle in the chronic phase or the 21-day phase after an ankle injury and its purpose is for exercise therapy and is packaged in the form of special warm-up movements for athletes. Those suffering from post-ankle injuries aim to recover and strengthen in order to minimize the occurrence of re-injury. This exercise model is also given a picture according to the description of the movement so that it is easier to understand in its implementation, the training program must also be based on FITT (frequency, intensity, duration, and type of exercise) because by including a unit of time for each movement it will make it easier to calculate the total time in the design of this warm-up model.

Table 3.
Results Expert Validation Material (Expert Therapy)

No	Classification	Scoring		Ket
		X	Xi	
1	_____	3	5	Enough
2	Completeness warm-up material	3	5	Enough
3	Collapse material in accordance with systematic	4	5	Good
4	Suitability motion with theory therapy exercise	3	5	Enough
5	Clarity material warmup	4	5	Good
6	Adequate duration for warmup	3	5	Enough
7	Adequate repetitions in each movement	3	5	Enough
8	Help process healing injury <i>ankles</i>	4	5	Good
9	Awaken motivation athlete to recover	4	5	Good
10	Easy And easy done by athletes	4	5	Good
11	The facility and tool which used are easy to obtain because it uses tool exercises on football ball	4	5	Good
12	Description of motion in the model warmup easy understand	3	5	Enough

Based on the results of the material expert scale assessment in this case the therapist, in the initial draft of the warm-up model for football players after ankle injury, a

score of 42 out of a maximum score of 60 was obtained with a percentage of 70%. So that in the first validation stage, the material can be categorized as "Feasible". The results can be seen in Table 3.

Table 4. Validation Results Expert Material (Expert Health)

No	Classification	Scoring Ket		
		X	Xi	
1	Accuracy material with objective warmup	4	5	Good
2	Completeness warm-up material	4	5	Good
3	Collapse material in accordance with systematic	4	5	Good
4	Suitability motion with theory therapy exercise	4	5	Good
5	Clarity material warmup	4	5	Good
6	Adequate duration for warmup	3	5	Enough
7	Adequate repetitions in each movement	3	5	Enough
8	Help process healing injury ankles	4	5	Good
9	Awaken motivation athlete to recover	4	5	Good
10	Easy And easy done by athletes	4	5	Good
11	The facility And tool used is easy to obtain because it uses tool exercises on football ball	4	5	Good
12	Description of motion in the model warmup easy understand	3	5	Enough

Based on the results of the material expert scale assessment, in this case, the therapist, on the initial draft of the warm-up model for football players after an ankle injury, a score of 45 out of a maximum score of 60 was obtained with a percentage of 75%. So that in the first validation stage, the material can be categorized as "Feasible". The results can be seen in Table 4.

After obtaining validation from experts and making improvements according to suggestions and input from experts, the researchers then conducted a small-scale trial of the heating design model in North Padang District, Padang City, the sample came from several football clubs in North Padang District namely GP Putra FC 4 people, Ulak Karang FC 2 people and Air Tawar FC 1 person totaling 7 people. Subjects were given an evaluation design sheet along with a Foot and Ankle Ability Measure (FAAM) function ability questionnaire and a Visual Analog Scale (VAS) pain scale. Subjects were instructed to perform warm-up movements according to the procedures in the draft warm-up on the football field when they wanted to play ball, exercise first accompanied by the researcher.

Based on Table 5 of the small-scale trial assessment, it can be seen that from the aspect of convenience, 60% categorized as quite easy, from the aspect of security 62.8% categorized as safe, from the aspect of comfort 68.5% categorized as comfortable and from the aspect of usefulness 80% categorized as useful, so that all data from the small-scale trial questionnaire results are categorized as "WORTHY".

Based on the table above, the large group trial obtained an assessment in terms of convenience of 61.3% which is categorized as easy, in terms of safety of 57.3% which is categorized as quite safe, in terms of comfort of 62.7% categorized as comfortable, in terms of usefulness of 73.7% categorized as useful. So overall the data from the results of the large-scale trial questionnaire is categorized as "Worthy". Results can be seen in table 6.

Table 5. Questionnaire Results Test Try Small Scale

No	Aspect Which assessed	The score which is obtained	Maximum score	Percentage se	Easy
1	Easy	21	35	60	Quite easy
2	Safe	22	35	62.8	Safe
3	Comfortable	24	35	68.5	Comfortable
4	Beneficial	28	34	80	Beneficial

Table 6. Questionnaire Results Test Try Group Big

No	Aspect which is assessed	The score Obtained	Maxim Score al	Percentage	Information
1	Easy	46	75	61.3	Easy
2	Safe	43	75	57.3	Safe
3	Comfortable	47	75	62.7	Comfortable
4	Beneficial	56	75	74.7	Beneficial

The results of the descriptive statistical analysis above show that the average for each item of the 15 research subjects before training is 19.00 on functional ability and 5.20 on the pain scale, while the standard deviation on functional ability is 1.77 and on the pain scale is 1.77. .42. The average results after training on functional ability are 25.00 and on a pain scale of 1.53, while the standard deviation after training on functional ability is 1.690 and on a pain scale is 0.990. Results can be seen in table 7.

Table 7. Data Scale Painful And Ability Functional Before and After Practice

Results	Items	Amount	Mean	Std. deviation
Before Exercise/ Pretest	Ability Functional	15	18.93	1.77
	Scale Painful	15	5.20	1.42
After practice/ Posttest	Ability functional	15	23.33	1,690
	Scale painful	15	1.53	0,990

After obtaining the results of the data description analysis of functional abilities and pain scales before and after training, then a test was conducted to determine whether the warm-up model was effective or not using the Wilcoxon formula. Based on the table above, the mean before training or pretest is 5.20, and after training or posttest is 1.53. The Ties value indicates that there are samples with the same pretest and posttest values and the result of 0 means that there are no samples with the same value. At the level of significance, the value obtained is 0.001, meaning that the significance value is smaller than 0.005, so Ho is rejected, and Hi is accepted. It can be concluded that the warm-up model after an ankle injury is effective in reducing pain levels. The results can be seen in Table 8.

Table 8. Wilcoxon Test Results for Pain

Measurement	Mean	Ties	Significance	Ket
Before training/ Pretest	5.20			
After training/ Posttest	1.53	0	0.001	Significant

Based on the table above, the average before the pretest exercise is 18.93, and after the posttest exercise is 23.33. The Ties value indicates whether there are samples with the same pretest and posttest values and a result of 0 means that there are no samples with the same value. At the significance level, the value obtained is 0.001, meaning that the significance value is smaller than 0.005, so Ho is

rejected, and H_1 is accepted. It can be concluded that the warm-up model after ankle injury is effective in improving functional ability. The results can be seen in Table 9.

Table 9.

Wilcoxon Test Results on Ability Function

Measurement	Mean	Ties	Significance	Ket
Before training/Pretest	18.93			
After training/Posttest	23.33	0	0.001	Significant

Based on table 10, the pain scale obtained a score at the pretest of 5.20 and the posttest of 1.53, resulting in a decrease in pain intensity of 70.57%. For moldability, the pretest score is 18.93 and the posttest score is 23.24%. Based on the results of the data obtained from the large-scale test and effectiveness test, it can be concluded that the warm-up model for football players after ankle injury can reduce pain levels and improve functional abilities so that it can be accepted as a warm-up model that can be used to treat ankle injuries. It is also evident that the effectiveness of the pain scale and functional ability both obtained a significance value smaller than 0.05, namely 0.001.

Table 10.

Product Effectiveness Test Results

Aspect	Pretest	Posttest	Enhancement/ Decline	Information
Scale Painful	5.20	1.53	70.57 %	Decreases, the lower n is scored the better the pain intensity
Function Capabilities	18.93	23.33	23.24 %	Increase, the higher it is scoring the better the functional ability

Discussion

At the beginning of the development of a warm-up model for football athletes after an ankle injury, it was designed and produced into a product in the form of a guidebook and also a video tutorial in the form of a compact Disc (CD). The resulting product was then evaluated by sports therapists and health experts. The last stage was the validation and distribution stage of the CD product in the form of a warm-up model. This stage was conducted in a small-scale trial to measure user responses and assessments after warming up, targeting athletes after ankle injuries. In implementing the warm-up model, what should be done is to coordinate with the coach who organizes the training schedule so that there is good collaboration between the researcher as a developer and the coach (Herman et al., 2012).

This study aimed to determine the problems associated with the management of ankle injuries in football players in Padang Utara Sub-district, Padang City. Researchers conducted observations at 7 football clubs in 3 sub-districts in North Padang District by conducting direct interviews with football players. The results of the data obtained from football athletes show that the most common injury is ankle injury. The average athlete who had experienced an ankle injury complained that they were more prone to re-injury and also after exercise the injured leg sometimes felt painful. This warm-up model was packaged in an easy, cheap, safe,

and fun way because the movements in this warm-up use football techniques, football equipment, and facilities so that athletes who experience post-injury ankle injuries can arrive earlier on the football field. Understanding injury prevention is important for coaches and physical trainers in football to learn. Based on the results of scientific research analyzed regarding injury prevention programs for adult male footballers, this study identified common points of understanding and made recommendations that should be considered in designing injury prevention strategies (Pérez-Gómez et al., 2022).

Based on the scientific research analyzed in our review, several recommendations can be made to reduce injuries among adult male football players: (1) incorporate a 15-20 minute dynamic warm-up program into the training regimen (FIFA 11+ or 11 program), (2) perform 2-3 sets with 5-12 repetitions of eccentric exercises such as NHE, and (3) perform balance, mobility, and strength exercises at least twice a week during football training sessions. This study is relevant to research conducted by (Emery et al., 2021) regarding the Neuromuscular Exercise Warm-Up Program "SHRed Injuries Basketball" Decreased Ankle and Knee Injury Rates by 36% in Youth Basketball. The results of this study were to evaluate the effectiveness of the neuromuscular training warm-up prevention program, Surveillance in High Schools and Community Sports to Reduce Basketball Injuries (SHRed), to reduce all ankle and knee injuries in youth basketball players. The research difference in this study is that neuromuscular warm-up exercises are recommended as a minimum standard of training for injury prevention in youth basketball.

The results of further research conducted by (Khasanah et al., 2023) regarding the contribution of the prone basic muscle strength plank test to anticipate the risk of ankle injuries in football players. The results of this study indicate that exercise routines for core muscle strengthening should be recommended at primary school age. These programs should be centralized and circulated early in the long-term athlete training model to prevent the risk of ankle injuries in football school students. The results showed that the prediction of core muscle strength can anticipate the risk of ankle injury (Sumantri et al., 2023). Most players admit to using stretching exercises regularly for injury prevention; stretching exercises are commonly used for warm-up or cool-down routines (Ebben et al., 2005), and are useful for improving muscle flexibility (Morse et al., 2008; Nakamura et al., 2012, 2013), and for the prevention of sports-related injuries (Kiani et al., 2010), reporting that sport-specific warm-ups, including dynamic stretching, can prevent injuries. In another study, it was reported that stretching exercises for specific muscles and joints for specific activities can increase the effectiveness of the pre-exercise activity (Worrell & Perrin, 1992). The results of these studies are in line with the results of this study, namely players who perform stretching exercises before playing have a lower risk of ankle sprains. Warm-up exercises play an important role in the prevention of ankle sprains and their effects are

well-recognized (Imai et al., 2018). Warming up is one of the most commonly recommended preventive measures for sports injuries. Warming up, along with stretching exercises, increases the flexibility of lower extremity joints, including the ankle. The combination of warm-up, strength, and balance training with stretching has a significant effect in preventing knee and ankle injuries (Wedderkopp et al., 2003). These findings strongly support the results of our study stating that more players have ankle injuries due to poor performance in warm-up exercises. A study reported that ankle stabilizers are effective in reducing the occurrence of ankle injuries and should be worn whenever there is a risk of ankle injury (Mahesvi et al., 2023; Owoeye et al., 2018). However, it is not recommended to play with unhealed injuries assuming that plaster and bandages will have a strong preventive effect (Verhagen & Bay, 2010). The results of this study recognize that the use of an ankle brace reduces the incidence of ankle sprain injuries, as well as the incidence of recurrence of ankle sprain injuries.

Conclusion

Based on the results obtained and reinforced by expert statements and trials, it can be concluded that the development of an exercise therapy warm-up model for post-injury football players is suitable for use. This warm-up model has been tested for safety, ease, comfort, and usefulness. In addition, the post-injury ankle warm-up model is effective in reducing pain and increasing functional ability, with a percentage of the effectiveness of reducing pain by 70.57% and a percentage of increasing function by 23.24%. The results of this study indicate that the therapist's validation of the material contained in the warm-up is in the appropriate category. This development research produces a product, namely a guidebook and also a video tutorial in CD form aimed at football athletes after ankle injuries. Future research recommendations can implement a warm-up model combined with massage therapy for post-injury football players.

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Conflict of interest

Not conflicts of interest to declare.

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Datos de los autores/as y traductor/a:

Liza	lizaaza@fik.unp.ac.id	Autor/a-Traductor/a
Bafirman	bafirman@fik.unp.ac.id	Autor/a
Masrum	masrun@fik.unp.ac.id	Autor/a
Alimuddin	alimuddin@fik.unp.ac.id	Autor/a
Rahmat Putra Perdana	rahmatputraperdana@fkip.untan.ac.id	Autor/a
Agung Wahyudi	agungwahyudi@mail.unnes.ac.id	Autor/a
Mikkey Anggara Suganda	mikkey-anggara-suganda@unucirebon.ac.id	Autor/a
Didi Suryadi	didisurya1902@gmail.com	Autor/a
Trisnar Adi Prabowo	trisnaradi.2022@student.uny.ac.id	Autor/a
Makan Sacko	maquennsie@yahoo.fr	Autor/a