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Research Article

Analysis Of The Relationship Of Warm-Up To Core Training Sessions In Age Group III Swimming Athletes

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Abstract:
This study aims to analyze and find the relationship between warm-up and core training sessions in age group III swimming athletes. The research method used is the qualitative method. The research scene is a training session that is the main source of information, and the data sources are 2 coaches and 8 athletes from Jaya Kapuas Swimming Club and Bintang Khatulistiwa Swimmer Team in Pontianak city, with a total of 1 male athlete and 7 female athletes. The research instruments used were interviews, observation, documentation, and field notes. The data analysis technique used was descriptive qualitative. The results of this study are based on the results of data analysis of indicators of distance, force, and volume of exercise associated with expert recommendations, on average the warm-up session is categorized as less, and the core exercise is categorized as more. Specifically, the results of the triangulation of force indicators in both sessions show that each training component affects the training process, so it can be concluded that there is a relationship between warm-up and core training. The relationship between the warm-up session and this training session performed on swimming athletes can be seen from the comparison of distance and style indicators in each session.

Keywords: Athlete, Core Training, Swimming, Warm-up

1. INTRODUCTION

The determination of intensity definitely requires other considerations to provide training programs for swimming athletes, such as the athlete's physical condition, training components, age group, and training achievement targets. The purpose of planning a thoughtful training program is of course so that athletes are able to perform optimally in training and during competition. So that the coach continuously needs to pay attention and develop the training program given to athletes, so as to minimize errors in giving training loads. Deviations in training coordination are risky for swimmers, so proper planning is needed in implementing the training program. Another thing that needs to be considered is the training load of the warm-up session and core training.

Sports are physical activities carried out in certain intensities and rules to improve body fitness and can be used as a competition in achieving achievements both at the national and international levels. Swimming is one of the sports that accommodates athletes to improve skills and realize achievements in the field of sports. The swimming training coaching process requires coordination and readiness of most limbs in the body. Basically, the body is ready to do sports activities when it has warmed up. Thus, before swimming it is required to warm up so that the body condition is ready during the core sports training session and avoid injury. The importance of warming up as one of the main factors before exercise, of course, needs to be prepared and carried out a series of movements in accordance with the sport and elements of physical fitness (Seran & Segi, 2019). Warming up is the initial stage before core training, with a correct and interesting warm-up, the core training will be structured and fun, and vice versa, if the warm-up is not interesting, the core training is also unpleasant. (Susanto et al., 2021). Research (Rezki et al., 2022) states that warm-up is mandatory before starting sports activities within a predetermined training period. (Andiana, 2019) state that the warm-up done before entering core training is not in accordance with the recommendations, thus triggering injury.

Previous research that has been done is only focused on the effect of warm-up as a factor in preventing the risk of injury during training. However, research (H.

P. Neiva et al., 2015); (Silva et al., 2018); (Kyranoudis et al., 2018); (Rejioğlu et al., 2020) states that the warm-up performed before entering the training phase has a positive effect on swimmer performance. So that it breaks the perspective of a warm-up that has no effect on swimmer performance. Factors that cause injury are excessive training intensity, lack of warm-up, imbalance, wrong training techniques, and weakness of muscles, tendons and ligaments. Research from (Frikha et al., 2015); (Räisänen et al., 2021); (De Arruda et al., 2020) shows that the duration of the warm-up is 10-15 minutes and of course it can be arranged in such a way as to create a warm-up model in order to create a pleasant warm-up atmosphere and encourage the spirit of training in athletes. Based on research (Dalamitros et al., 2018); (H. P. Neiva et al., 2015); (Riera et al., 2021); (Abbes et al., 2018); (Abbes et al., 2021) that the standard warm-up in swimming is at a distance of 1000-2000 meters. However, in general, the warm-up that is often used is a distance of 1200 meters and can be created with its own modifications from each coach in the training process with a predetermined duration.

Swimming training is certainly in demand by various age groups with different training goals, which can aim to maintain health and also to improve skills and achieve achievements. Therefore, it is necessary to pay attention to the planning of training programs at a certain intensity during the training session. In warm-up and cool-down sessions have the same intensity recommendations, each in the range of 12%-15%, then for core training intensity for endurance training around 50%-60%, and speed training in the range of 8%-12%. The determination of intensity definitely requires other considerations to provide training programs for swimming athletes, such as the athlete's physical condition, training components, age group, and training achievement targets. The purpose of planning a thoughtful training program is of course so that athletes are able to perform optimally in training and during competition. So that the coach continuously needs to pay attention and develop the training program given to athletes, so as to minimize errors in giving training loads. Deviations in training coordination are risky for swimmers, so proper planning is needed in implementing the training program for each session. And another thing that needs to be considered is the training load of the warm-up session and core training.

Based on the previous exposure statement, it shows the important role of warming up before training so that injury does not occur. Likewise in swimming, warming up is important because the initial physical warm-up helps prevent the risk of triceps surae muscle cramps in swimming athletes (Baskoro et al., 2018). Warming up also affects the level of maximum strength in swimmers. However, it still has to be proven by interpreting the relationship between warm-ups performed with core exercises. Because based on several phenomena found in the field during training, especially warm-up sessions are often less attention to the implementation process by coaches and athletes, warm-up indicators during training are also still not considered, it even appears that the warm-up is done only as a formality before doing training activities. Based on the existing problems, research on warm-up needs to be done. So the researchers conducted research on "Analysis of the Relationship of Warm-Up to Core Training Sessions in Age Group III Swimming Athletes".

2. MATERIAL AND METHOD

The type of research used in this study is qualitative research through qualitative methods because there are many sources of data and results in the form of descriptions in this study. In this study, the research scene used as a source of information is a training session (training stage), then the research data source is obtained from 2 coaches and 8 age group III athletes (1 male athlete and 7 female athletes) at the Jaya Kapuas Swimming *Club* and Bintang Khatulistiwa *Swimmer Team* swimming clubs in Pontianak. The research was conducted during 8 swimming training meetings during the observation period. The research was conducted starting with conducting informant interviews, then making observations and making field notes and taking documentation. Data collection techniques in this study used non-test techniques in data collection which were carried out in 4 ways, namely by means of observation (observation), open *interviews*, documentation, and field notes. The research instruments used in this research are non-test research instruments in the form of observation sheets, (open) interview lists, documentation lists, and field notes lists. The data that has been collected needs to be processed first.

Data processing is carried out in such a way as to get factual conclusions to answer the problems in the study. The data analysis method used in this research is the Miles and Huberman model data analysis (Sugiyono, 2020), in which the first step of data analysis is to reduce the data so that it can provide a clearer picture and make it easier to collect data, then the second step is presenting data (*display* data) which aims to make it easier to understand phenomena or events during the research process, as well as planning actions that must be taken next based

on the understanding obtained from the research data, and the third and final step of data analysis is to verify the conclusions obtained during the research. In this study, to check the validity of the data using the triangulation method, so that there are no differences between the reality that occurs in the research subject and the results presented (Sugiyono, 2018:189). The triangulation used is source triangulation, and triangulation of data collection techniques. Source triangulation is done to test the credibility of the data by checking the data has been obtained from three data sources, namely sourced from training sessions, coaches, athletes. While triangulation of data collection techniques is the number of data collection techniques used in this study, namely interviews, observation, documentation, and field notes.

3. RESULT AND DISCUSSION

1.1 Result

The data collection process was carried out at two swimming clubs in Pontinak City, namely Jaya Kapuas Swimming Club which took place from July 10, 2023 to July 18, 2023, and at the Bintang Khatulistiwa Swimmer Team club on July 24, 2023 to August 03, 2023. The research data obtained are in the form of interviews, observations, documentation, and field notes. The description of the data presented includes age groups, data acquisition results of warm-up sessions, data acquisition results of core training sessions, training volume, and achievement of training components.

Data collection conducted regarding the age grouping of training presented at the swimming club is age group III with an age range of 11-12 years. There are 8 athletes consisting of 1 male athlete and 7 female athletes. Overall athletes in age group III the average athlete is in the age range of 12 years. Based on the results of the data obtained, it shows that the two clubs have implemented the division of training age groups according to the provisions of each coach. Referring to the results of research on specialization obtained data that each athlete has a specialization style, from 4 swimming styles the average athlete has more specialization styles in short distance numbers. The explanation of the specialization of each athlete shows that the coach has applied one of the training principles, namely the principle of specialization but the time of application has not been confirmed according to the age group of training of each athlete.

Table 1. Warm-up Session Data Acquisition Results

Percentage of Total Distance of Warm-up Sessions per Week			
Finding in the Field			
Age Group	**Exercise Distance (meters)**	**Percentage**	**Category**
12 years	13565,6	34%	More
12 years	3938,4	10%	Less
12 years	4157,2	11%	Less
12 years	1312,8	4%	Less
11 years	3117,9	8%	Less
12 years	4649,5	12%	As per
12 years	1750,4	5%	Less
12 years	875,	2,18%	Less

Based on the acquisition of results data regarding warm-up in table 1, it shows that athletes in age group III as a whole have an average wet warm-up volume of 4171 meters, and the percentage of warm-up intensity achievement with an average of 10%, so it is in the deficient category. The acquisition of research results from the analysis of interview data, training sessions, observations, and field notes that have been carried out states that warm-up is divided into 2 types of warm-up which are continuously observed, namely dry warm-up and wet warm- up. From the research results it is known that the coach has implemented the initial stages of training through warm-up sessions. On average, all athletes carry out both types of warm-up sessions that have been described, specifically related to observation indicators, data collection regarding warm-ups refers to indicators of motion parts, and distance in the warm-up process. Based on the data obtained, it shows that warm-up as one of the training principles has been applied during the training process. However, the suitability of the warm-up indicators needs to be confirmed, as shown in Table 2.

Table 2. Warm-up Session Data Triangulation Results

Indicator	Tools Data Collection	Data Source	Obtained Data	Description
- Distance - Movement - Style - Volume	Interview	Coach	Warming up is always done before carrying out swimming training in a duration of approximately 15-30 minutes. There are 2 types of warm-ups that athletes do, namely dry warm-ups consisting of 3 sub- types and wet warm-ups with a distance of 400-1500 meters of free style or following each athlete's specialization.	
		Athlete	Warm-up activities are always done as directed by the coach.	
	Documentation	Training Session	In this session, it is not clearly stated about the reference of how many dry warm-up movements, but the wet warm-up is carried out according to the specified distance and the wet warm-up is carried out according to the specified distance arranged by the trainer.	All data obtained is confirmed by the data collection tools (interviews, documentation, observations, and field notes) and data sources, namely coaches, athletes, training sessions.
	Observation	Researcher	Based on the results of observations of each warm-up activity, of course, with a variety of movements of 5 sub types of warm-up and different distances different every meeting.	
	Field notes	Researcher	Based on the researcher's field notes, the warm-up includes dry which has sub types, namely jogging, static stretching, dynamic stretching, *proprioceptive neuromuscular facilitation* (PNF), and *body weight* exercises. Wet warm-up consists of general warm-up and special warm-up. Based on the data obtained from the results regarding wet warm-ups, it shows that age group III as a whole has an average warm-up distance per week of 4171 meters. So that the volume that ters.	

Table 3. Results of Core Training Session Data Acquisition

Percentage Total Training Distance per Week			
Findings in the Field			
Age Group	**Exercise Distance (meters)**	**Percentage**	**Category**
12 years	28695,62	144%	More
12 years	8642,6	43,21%	More
12 years	9216,95	46,08%	More
12 years	3938,4	20%	Less
11 years	7767,4	39%	Accordant
12 years	7384,5	37%	Accordant
12 years	3227,3	16,13%	Less
12 years	1641	13%	Less

The data obtained regarding core training sessions based on table 4, core training based on observation indicators, namely distance, style, and volume specifically through data collection tools from documentation, observation and notes include core training in general in freestyle swimming, breaststroke, butterfly style, and backstroke, and specifically, namely dressing style, swimming style combination, and specialization style. The grouping of core exercises in the data results are distinguished based on three things, namely distance, style, and the use of swimming aids. Referring to the results of core training data shows that core training sessions have been applied to the swimming training process at both clubs. However, if reviewed based on the observation indicators, it has not been clearly confirmed that it is in accordance with the reference to the provision of core training programs in the applied training. The results of research on core training based on observation indicators, namely age group, training distance, and percentage of intensity of achievement of training distance per week in table 3, it is known that overall in age group III has an average core training distance of around 8814.22 meters, with an average percentage of intensity of core training achievement of 44%.

Table 1. Core Training Session Data Triangulation Results

Indicator	Tools Data Collection	Data Source	Obtained Data	Description
- Distance - Style - Volume	Interview	Coach	Core exercises that are enforced according to the exercise which has been compiled coach. Regarding the program print-out not yet available. For training distance varies with each meeting.	The data obtained has not been corroborated by the indicators of distance, force and volume as indicated by the data sources, namely coaches and athletes with training sessions, as well as based on observations and field notes.
		Athlete	Core training is done every meeting by following program exercise program which have determined by the coach.	
	Documentation	Training Session	This session does not include clearly reference the provision of core training load. Core training done with program practice which compiled and directed by the coach.	
	Observation	Researcher	Based on the results of observations of core exercises performed by athletes are divided into 2. Namely 4 forms of general core training and 3 forms of special core training.	
	Field notes	Researcher	Based on field notes, core training is divided into 7 forms of training (4 forms of general training and 3 forms of special training) consisting of freestyle core training (L.I.G1), breaststroke (L.I.G2), butterfly style (L.I.G3), backstroke (L.I.G4), dressing style (L.I.G5), style combination (L.I.K.G), specialization style (L.I.S). The total distance of core training per week reaches 70513,77 meters which when averaged reaches a distance of 8814,22 meters.	

Table 2. Exercise Volume

AG	Sessions	Findings in the Field		Recomendation		Achievement Category
		Discovery distance	Percentage	Recommendation Distance	Percentage	
III	Warm up	4171 m	10%	6000 m	12-15%	Less
	Exercise	8814,22 m	44%	8000 m	40%	More

Based on table 5 regarding the volume of training based on the observation indicators, namely the distance and percentage of findings in the field with recommendations, overall the average volume of warm-up in AG.III is around 4171 meters, with an average percentage of 10% so that it is in the category of less than the recommendations that should reach 6000 meters. Meanwhile, the volume of core training with an average volume per week of around 8814.22 meters and recorded more than the recommendation which should be 8000 meters. From these results, it shows that the coach has implemented the training component, namely the volume of training even though the record of the load given is more than recommended. The relationship of the warm-up session to the core training session is obtained from the consideration between style, warm-up distance, core training, and training volume. Based on the observation indicator, namely style, *linearly* the warm-up session activities and core exercises performed by athletes are related. However, from the description of the achievement of the training components based on the findings, the percentage of achievement in the field with expert recommendations can be categorized as a whole in the warm-up session is in the less category, while for the core training session it turns out to be in the category more than the recommendations used as a comparison.

1.2 Discussion

Following the triangulation of the research data, it was determined that the division of training age groups is known. Additionally, the findings in the field regarding age group III (AG.III) revealed that there are eight athletes. With regard to gender, one male and seven female athletes were identified. The division of training groups based on age typically comprises five age groups and additional categories for senior age groups (Bompa & Haff, 2009, p.36). The division of age groups is carried out in reference to the PRSI in 1970, which implemented the Age Group Program. The age groups are as follows: AG.IV for those aged ≤ 10 years, AG.III for those aged 11-12 years, and AG.II for those aged The aforementioned age groups are as follows: 13-14 years (AG.IV), 15-17 years (AG.III), and ≥ 18 years (senior group), as stated in (Martinus et al., 2021). The age group division must be taken into account during the training process, particularly in order to encourage and facilitate athlete achievement. The optimal age range for initiating early sports coaching is 8-10 years old.

This conclusion is based on a pyramid system classification of age, which delineates three stages of sports coaching, namely: a. Preparatory stage (12-15 years); b. Formation stage (16-18 years); and c. Specialization stage (19 years). It is therefore evident that age grouping is a crucial aspect to consider prior to implementing an exercise program, particularly in the context of competitive sports such as swimming. It is of paramount importance to ensure that the age grouping of athletes is taken into account to ensure that the program aligns with their abilities, physical and psychological conditions. By paying attention to the age grouping of athletes, it is anticipated that during training, each athlete will be able to adapt to the training program provided by the coach. The findings of the research demonstrate that the implementation of warm-up routines has occurred during the training phase. The athletes from both clubs identified five distinct types of dry warm-up movements during the fieldwork observations. Similarly, the wet warm-up comprises a variety of movements. The findings of the research on the distance covered by athletes during the warm-up period revealed that the average distance for each age group of athletes, specifically AG.III, was approximately 4171 meters with an intensity level of 10%.

The warm-up is divided into five distinct categories, each with its own specific warm-up distance. Particularly noteworthy are the wet warm-up sessions, which are tailored to each age group. The percentage of the total distance dedicated to warm-up activities is to be approximately 12-15% of the total training distance per week for warm-up sessions. The application of the percentage of warm-up distance is contingent upon the total training distance per week for athletes, stratified by age group and ongoing training category. The determination of the percentage of warm-up distance has been considered in accordance with the recommendations for warm-up intensity that have been described. Based on the percentage of achievement of warm-up sessions in the field of 10%, a linear increase does not reach the recommended percentage, which is 15%. Therefore, it can be concluded that there is a shortage of approximately 5% obtained from the comparison of warm-up intensity in the findings in the field with the recommendations that should be.

Prior to initiating a training regimen, it is imperative to undertake a warm-up period. This serves to mitigate the risk of injury. The implementation of a warm-up regimen prior to the commencement of exercise or physical activity has been demonstrated to exert a beneficial physiological and metabolic influence on performance outcomes (Türkmen et al., 2022). Such an increase is evident in both swimming performance and performance following the completion of a warm-up routine, as evidenced by studies conducted by (McGowan et al., 2015); (Kafkas *et al*., 2019). The act of warming up before engaging in either training or competition has the potential to facilitate the transition of the body from a state of rest to one of activity (Rezki *et al*., 2022). The commencement of exercise activities with a warm-up has been demonstrated to exert a beneficial influence on body temperature, heart rate, and VO2Max. However, the performance of warm-up activities has also been shown to result in adverse effects, including an increase in fatigue and an elevation in blood lactate concentration (Czelusniak et al., 2021). In consideration of the type of heating, in-water heating is more efficacious than dry heating in improving performance (Kaya *et al*., 2017). The results of the field research, as presented in Table 1, indicate the implementation of warm-ups by both clubs. Based on the research findings, it can be posited that the average percentage of warm-ups conducted in age group III falls below the recommended threshold. Warming up is an essential component of any physical activity regimen. Accordingly, it is essential for coaches to adhere to the prescribed warm-up regimen and to monitor the intensity of each session. This is crucial for preventing the adverse effects that may otherwise result from inadequate preparation. Furthermore, coaches must ascertain the appropriate intensity of each warm-up, aiming to mitigate fatigue while optimizing lactate concentration in the blood. It is therefore incumbent on coaches to implement a guaranteed warm-up protocol that is in line with the expert recommendations, so as to achieve the desired outcomes of the training session.

The results of the research indicate that both clubs have incorporated core training exercises into their fitness routines. These training programs employ varying methodologies and are designed to target specific muscle groups. The training program that is being applied has been determined to be at the end-1 level, which is equivalent to basic endurance. The presentation of research results indicates that the average distance covered in core training for age group III is 8814.22 meters, representing a percentage of 44% of the total distance covered. In consideration of the field findings and recommendations regarding core training volume, it can be concluded that the coach's prescribed core training regimen for AG.III athletes exceeds the recommended intensity by 4%, exceeding the optimal intensity threshold of 40%. A discussion of the total training distance according to training reveals that there are five groupings of training distances, with consideration of the age of the athletes. The percentage of core training dosage based on the endurance level used as a reference recommendation is at endurance level-1 (basic endurance). The implementation of a regular core training program has been demonstrated to have a beneficial impact on swimming performance and muscle endurance, thereby facilitating enhancements in the overall performance of swimmers (Khiyami *et al*., 2022). The necessity of prioritizing core training at an early age is evident; it allows athletes to engage in a training program that aligns with their fundamental competencies and physical capabilities. The provision of core training programs should adhere to a number of training principles. One such principle is the principle of variation, which can be employed as a means of reducing athlete boredom during training. This can be achieved by introducing variations to the training model used. The results of the discussion in Table 2 regarding core training applied by the coach can be concluded as follows: the average distance of core training applied to age group III is more than 814.22 meters, which is above the recommended distance of 8000 meters. In addition, the exercises prescribed for athletes must also consider their individual abilities (Yunus, 2019).

The findings of the discourse on the correlation between the warm-up session and the core training session are derived from an evaluation of the distance and the criteria for accomplishing various training components. The aforementioned discussion pertains to a number of components, including warm-up distance, core training distance, and training volume. The presentation will be organized according to each training component, with a description of the achievement of the training components based on the findings, recommendations, percentage of achievement, and categories. In light of the findings

pertaining to the correlation between warm-up and core training sessions, it becomes evident that their integration into the training regimen evinces a discernible link. This implies that each session, whether warm-up or core training, is underpinned by a distinct objective. The discussion demonstrates that the warm-up intensity is 10% (8 athletes), with a recorded deficit of 5%, indicating that it falls below the recommended threshold of 15%. The intensity of core training in age group III was recorded at 44% (8 athletes), indicating an excess of 4% or more and thus falling into the category of training intensity that exceeds the recommended threshold of 40%. The relationship between these two sessions is informed by the findings in the field, which indicate that the distance, intensity, volume, and style of specialization for each athlete are taken into consideration. While the record in the warm-up category shows that athletes from KU.III exceed the recommended training intensity, the indicator of the warm-up session associated with core training is the process and continuity of each training session, which is based on the kinds of styles and movements from both sessions. All training components should be correlated in a way that ensures the training applied aligns with the recommended practices and the specific needs of athletes. Such a training regimen will facilitate the achievement of optimal training goals by the athletes. The discussion of the relationship between warm-up and core training sessions based on the analysis of the continuity of motion has implications for swimming clubs, as it allows coaches to plan more optimally the training program given to each athlete. Further research could focus more on the relevance of the entire training program to athlete achievement, with the aim of optimizing the provision of training loads that are in accordance with the characteristics of each athlete.

4. CONCLUSION

The overall average training component is connected to the age group and the specialization style of each athlete, as well as to the relationship between the warm-up session and the core training session. Based on these factors, it can be concluded that the two sessions are related. A review of the literature reveals that the status of intensity achievement in the field demonstrates similarities between the warm-up and core training sessions. These similarities are evident in the findings that both sessions are categorized as experiencing a mismatch of the recommended intensity. A discrepancy of 1829 meters was observed in a distance of 4171 meters, indicating an intensity of 10% that is 5% below the recommended intensity of 15%. The core training session spanned a distance of 8814.22 meters, with a recorded excess of 814.22 meters beyond the expected 8000 meters. This indicates an intensity level approximately 44% higher than the recommended intensity, representing a 4% deviation.

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