

THE EFFECT OF ROUTINE DYNAMIC WARM-UP MODIFICATION ON SPEED, AGILITY, AND MUSCLE ENDURANCE IN AMATEUR FEMALE FOOTBALL ATHLETES

Eggy Nur Arfiansyah¹, Rintania Rahma Putri²

¹Department of Sports Science, Faculty of Sports and Health Sciences, Yogyakarta State University, Yogyakarta, Indonesia

²Department of Sports Science, Faculty of Sports Sciences, State University of Malang, Malang, Indonesia

Abstract

Football prioritizes physical aspects such as speed, agility, strength, flexibility, and muscle endurance. With women's growing interest in football in Indonesia, it is becoming increasingly clear that an excellent physical condition is necessary. Therefore, good physical condition will also impact the risk of injury and, most importantly, performance on the field. Thus, the main aim of this study was to evaluate the effects of Dynamic Warm-Up modification for six weeks on several physical performances, such as (running, change of direction speed, and muscle endurance) in female amateur soccer players. This prospective study involved a modified routine dynamic warm-up program intervention, three times a week warming up before the training session with details of the intervention implementation time, namely 18 times, excluding the initial and final tests. At the start, the players demonstrated dexterity and tests of speed, agility, and muscle endurance, and the test was carried out again at the end of the program intervention. The results show that the significance value of the 30 m Sprint test is $0.083 > 0.05$, meaning there is no program influence on the speed component. Furthermore, the significance value of the Illinois Agility test is $1,000 > 0.05$, meaning the program does not influence the agility component. Then, the significance value of the wall sit test is $0.083 > 0.05$, meaning that the program does not influence the agility component. This study concluded that modifying the dynamic warm-up routine could not improve physical performance, namely speed, agility, and muscle endurance in female soccer players.

Keywords: *dynamic warm-up, football, women, speed, agility, muscle endurance*

THEORETICAL BACKGROUND

Football is the most popular sport in the world (ARLIANI et al., 2011). With 265 million active players recorded according to the Big Count of the Federation Internationale De Football Association (FIFA). Football is a leading sport worldwide in terms of participation and industry. Events such as the Women's World Cup are also inseparable from the development of women's football in the current era. In Indonesia, the sport of soccer is still considered popular today. Over the last few years, many women have become the center of attention with the entry of the Women's National Team to the 2022 Asian Cup finals. Women's interest in football has been channeled through extracurricular



activities, clubs, and football communities, which has become a new trend in society, particularly in Batu City.

Interest and motivation influence and significant value for women in choosing the sport of football on the Batu City Women's Persikoba team (ANITA et al., 2020). However, not in line with interest and motivation, women's football in Batu City has yet to achieve achievements in various events or levels of football competition. The Persikoba women's team's latest achievement was qualifying only in the knockout round or phase of the Pertiwi Cup regional East Java Indonesia. Thus, increasing the performance and skills of playing football is necessary, especially for female football athletes in Batu City.

Soccer prioritizes physical aspects such as speed, agility, strength, and flexibility. These physical components can be related to the performance of female soccer athletes during matches (GONÇALVES et al., 2021). Data from physical condition test results show that the overall level of physical fitness of female football athletes is still in the adequate category (IRWAN-ALLSABAH, 2022). On the other hand, data shows that 50% of the speed levels of female players are still in the medium category (ALLSABAH et al., 2019). This indicates an inadequate level of physical components of player speed and agility. With women's growing interest in football in Indonesia, it is becoming increasingly clear that an excellent physical condition is necessary. Therefore, good physical condition will also impact the risk of injury and, most importantly, performance on the field.

Football is a team sport that involves a wide range of physical demands, including short and long sprints, jumping, quick changes of direction, agility, tackling, and kicking a ball (HAYCRAFT et al., 2017; SEYEDI et al., 2023). Therefore, it has become a significant focus for researchers and practitioners who aim to formulate appropriate training techniques and methods to improve physical performance. (AMMANN et al., 2023; MIGUEL et al., 2021; TORRES-RONDA et al., 2022). In this context, developing an effective warm-up program, which prepares football players for the challenges on this field, is essential (FORT-VANMEERHAEGHE et al., 2016).

Physical trainers have developed many warm-up protocols to improve motor performance and kinesthetic perception (BISHOP, 2003), alleviate muscle damage (CHEN et al. et al., 2018), and minimize the risk of injury in sports training (EMERY- MEEUWISSE, 2010), as well as the effects of long-term training on physical performance (ALIPASALI et al., 2019). Therefore, the main aim of this study was to evaluate the effects of Dynamic Warm Up modification for six weeks on several physical performances, such as (running, change of direction speed, and muscle endurance) in female amateur soccer players and to find out whether the program This can be considered as a football player's proper warm-up routine during the training period.

METHODS

This prospective study involved a modified routine dynamic warm-up program intervention, each three times a week warming up before training sessions. Furthermore, it includes basic warm-up soccer drills, running, cutting movements, and static stretching



without any particular injury prevention approach. This intervention was given to amateur female soccer players aged 18-20. It lasted for two months (February to April), with details of the intervention implementation time being 18 times apart from the initial and final tests. At the start, the players demonstrated dexterity, and speed, agility, and muscle endurance tests were repeated at the intervention's end.

PERFORMANCE TEST

We selected the Illinois Agility test (IA), the 30 m Sprint test (S), and the Wall Sit (WS) tests to evaluate physical performance in athletes. Within-subject and between-subject differences in pre- vs post-tests were considered as the impact of the intervention on those parameters. IA appears on a rectangular track 10×5 m. Players start in a prone position, run towards the barrier at 10 m maximum speed, return, and perform a zigzag around four barriers, each 3.3 m apart. The test ends with another straight run to the end of the rectangle. Players run a track length of 30 m for S after the start signal. For WS, it is done with a squat movement where the player's back touches the wall and is done with how long and how resistant the player is in doing it. The best time was recorded for consideration in analyzing each subject who performed the test on three occasions.

DATA ANALYSIS

For the influence test parameters, Shapiro-Wilk and Levene's tests were applied to verify the normality of data and homogeneity of data variance. Paired-Sample T-test analysis was used to determine differences in speed, agility, and muscle endurance variables after the intervention. Appropriate effect sizes were determined by calculating the analyzed data using SPSS version 26 software, and the level of significance for all variables was set at $p= 0.05$.

RESULTS

This research is about the effect of the routine dynamic warm-up modification program on the speed, agility, and muscle endurance of female soccer athletes in the age range (18-20 years) using a sample of 24 people who are members of the Persikoba Putri team. After the training period, the results showed no significant difference in physical performance in female soccer players ($p\leq 0.05$). Sample characteristics can be seen in Table 1, while the test results and whether there is an influence from the program can be seen in Table 2.



Table 1: Sample Characteristics

| Variable | Mean | Standard Deviation |
|-------------|--------|--------------------|
| Age (years) | 19,04 | 0,7 |
| Height (cm) | 154,04 | 4,4 |
| Weight (kg) | 50 | 5,1 |

Based on the table above, it can be seen that the characteristics of the sample can be described, namely from the data of the entire sample, which consists of 24 people with an average age of 19.04 ± 0.7 years. Then, the sample had an average height of 154.04 ± 4.4 cm and a weight of 50 ± 5.1 kg.

Table 2: Test results before and after intervention

| Test | Pre-Test | Post-Test | Std. Error Mean | P-Value |
|------------------------|----------------|----------------|-----------------|---------|
| Sprint 30 m (min) | $5,34 \pm 0,3$ | $5,32 \pm 0,3$ | 0,01 | 0,083 |
| Illinois Agility (min) | $19,2 \pm 0,9$ | $19,2 \pm 0,9$ | 0,01 | 1.000 |
| Wall sit (sec) | $75,5 \pm 2,8$ | $75,4 \pm 2,8$ | 0,137 | 0.083 |

Based on Table 2, it can be seen that the significance value of the 30 m Sprint test is $0.083 > 0.05$, meaning there is no program influence on the speed component. Furthermore, the significance value of the Illinois Agility test is $1,000 > 0.05$, meaning the program does not influence the agility component. Then, the significance value of the wall sit test is $0.083 > 0.05$, meaning that the program does not influence the agility component.

DISCUSSION

The research results indicated that the dynamic warm-up modification program could not improve speed, agility, and muscle endurance. This allows it to affect other components apart from speed, agility, and muscle endurance. Following research conducted by (TAYLOR - TURKI-BELKHIRIA, 2012), a routine warm-up for eight weeks has neither a positive nor a negative impact on sprint performance. In light of those results, flexibility training does not improve sprint performance and suggests that increased flexibility associated with chronic stretching has little effect on performance.

Previous investigations of acute findings reported significant improvements in sprint performance after dynamic warm-up treatment in men and women who are highly



trained in different sports (FLETCHER-ANNESS, 2007; TURKI et al., 2012). These findings suggest that the stimulus imposed on muscles by acute stretching may differ from the long-term effects of dynamic stretching concerning motor performance (TAYLOR - TURKI-BELKHIRIA, 2012). Therefore, it is possible that synchronous dynamic heating does not produce identical acute neuromuscular and mechanical responses but most likely has sound long-term effects. Then, it affects speed and agility during warm-up and does not interfere with running performance.

This aligns with the results of Wong et al. (2011), which found that incorporating a static warm-up into a daily warm-up routine for three consecutive days had no overall impact on sprint performance and agility. The lack of sprint and agility performance improvement may be related to action specificity (BEHM-CHAOUACHI, 2011). Sprinting and agility require rapid shortening-stretching contraction cycles with very short contact times. Dynamic stretching is performed slowly, smoothly, and continuously without sudden changes in the vertical or horizontal direction and, therefore, will not place a positive emphasis on training (TAYLOR - TURKI-BELKHIRIA, 2012). Dynamic warm-up includes concentric and eccentric actions to increase muscle and core temperature (RACCUGLIA et al., 2016). A typical Dynamic warm-up involves running at varying tempos and dynamic stretches. Dynamic warm-up facilitates players' physiological readiness for training and competition (ANDRADE et al., 2015; CHATZOPOULOS et al., 2014; CHEN et al., 2018). In addition, dynamic warm-up's focus on core stability, balance, and neuromuscular control, as well as hip control and knee alignment that avoids excessive knee valgus during static and dynamic movements, was a feature of the intervention in previous studies (HEIDT et al., 2000; HEWETT et al., 1999; MANDELBAUM et al., 2005; OLSEN et al., 2005). This rationale is justified by data from a study of the mechanisms of anterior cruciate ligament injury (EBSTRUP - BOJSEN-MØLLER, 2000; HEWETT et al., 2005; KROSSHAUG et al., 2007).

The researchers experienced limitations when carrying out the research, including the implementation of the treatment. We did not have control over activities other than football practices and food consumption, which results in athletes needing to be in top condition. Then, the sample size is too small so that we can use a broader sample in the future.

CONCLUSION

This study concluded that modifying the dynamic warm-up routine could not improve physical performance, namely speed, agility, and muscle endurance in female soccer players. This training routine may have an impact on other components, such as training readiness, heart rate and flexibility. Further investigation of female athletes is still necessary; appropriate adaptations may need to be considered. Overall, it is recommended that an investigation may be conducted on the impact of modified dynamic warm-ups on heart rate and flexibility in female soccer players.



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