Training Load of Para-Swimming Athletes on Preparation Phase: National Champion Vs. Not

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ABSTRACT

The success of implementing the training program is supported by the role of the trainer in formulating a strategy for changing the training load in the training program, which aims to push the limits of adaptation and avoid overtraining, injury, and detraining. The study aimed to compare the internal training load of a group of para-swimming athletes who received medals vs. those who did not. The research method used in this study was a retrospective cohort (historical cohort). The research data used in this study is secondary data (historical data), which consists of collecting data on weight training swimming athletes for 13 weeks, and data provided by coaches and athletes during the training program. Subjects consisted of seven para-swimming athletes. The data analysis technique used is the mean, standard deviation, and different tests using Mann-Whitney. The results showed that there was a significant difference in the session rate of exertion (sRPE) between the two groups (p<0.000), and there was a significant difference in the Arbitrary Unit (AU) between the two groups (p<0.000), and there was no e. the difference in exercise duration between the two groups (p>0.000). In conclusion, swimming athletes who do not get medals have a much higher internal training load than those who get awards.

Keywords: *Athletes, Disability, Para Swimming, Rating of Perceived Exertion, Training Load*

INTRODUCTION

The role of exercise periodization occupies the most crucial position in helping athletes achieve maximum performance. The coach systematically develops the training program by paying attention to and considering the training load (TL) setting and each athlete's recovery strategy, which helps push the limits of training adaptation and avoid the harmful effects of training. The negative impacts include overtraining, injury, and detraining [1]. Monitoring the training load is a reference for coaches to develop correct and appropriate training programs for athletes. The success of implementing the training program is closely related to monitoring the training load carried out by the trainer. Therefore, monitoring the training load must be done, especially in the achievement sports environment. The smooth monitoring of the training load is supported by the professionalization of the trainer, support for sports science, and technological developments [2].

Monitoring the training load has a multi-dimensional nature, meaning that the implementation of monitoring the training load is carried out by combining training variables, which are divided into two, namely monitoring internal loads and external loads [3]. External training load monitoring includes monitoring the training load measured using distance, speed, exercise volume, power output, duration, and so on [4]. While the measurement of internal training load is measured using heart rate, biological, psychological stress, rate of exertion session (sRPE), and so on [5].

Previous research has stated that monitoring the training load is important, especially in the achievement sports environment. The application of a training load that is too heavy without paying attention to a good recovery strategy can trigger negative impacts, such as the occurrence of overtraining conditions. In contrast, applying a training load that is too light without applying the principle of progressive overload training can trigger detraining conditions [1]. Based on these conditions, proper manipulation of the training load is needed to produce maximum training results for athletes [6]. Conventionally, training load monitoring is measured using measurement variables such as strength, speed, repetitions, acceleration, and global positioning system parameters. These monitoring variables are called external training load monitoring [2]. At the same time, other studies focus on monitoring the internal training load, including measurements of heart rate, lactic acid, oxygen consumption, energy assessment (RPE), and RPE sessions (sRPE) [8].

Monitoring the training load can be carried out by utilizing equipment and technology, including heart rate monitors, GPS, and smartphone applications. This equipment is considered a contemporary measuring instrument and requires costs ranging significantly from hundreds to millions of rupiah depending on the number of athletes used [9]. Based on this, several previous studies provide recommendations for more straightforward exercise load monitoring. The measurement of the training load that is considered simple and easy to do is the measurement using the RPE. Internal load monitoring using the RPE method was assessed as a valid, reliable, non-invasive, and accessible measurement [10]. Several previous studies used internal training load (TL) monitoring using a measuring instrument in the form of lactic acid and heart rate monitoring, a very commonly used measuring instrument [11]. Meanwhile, this study uses internal training load measurement parameters such as sRPE. An sRPE measurement method is a measuring tool that uses an objective measure of training load (time), which interacts with subjective load (RPE), resulting in an exercise load index in arbitrary units (AU) [12].

Previous research has stated that there is a discrepancy between the training program planned by the coach and that given to athletes who have the potential for adverse outcomes to occur in the training program that has been prepared [15]. Trainers need to pay attention to the interpretation of the sRPE data because if there is an error in the interpretation of the sRPE data, it can result in errors in the control and planning of other training programs [11]. The interpretation of the measurement of the training load in the exercise program is carried out correctly to balance strength and recovery strategies to produce positive exercise adaptations as a result of the training stimulus [16]. The interpretation of the training load is a challenge for the trainer because the results of monitoring the training load are used as a reference in preparing a good training program to produce a good training stimulus [17].

Monitoring the training load plays a significant role in planning and preparing exercise programs [16]. First, the training load assesses athletes trained as planned or as expected. Based on this, collaboration between coaching and creativity is needed that is carried out in harmony [18]. Based on this, it is vital to monitor the athlete's perception of effort and the implementation of the exercise program [17]. Furthermore, the training load monitors the athlete's response to the training program. Finally, the training load is used to regulate exercise stimulation to increase the effectiveness of the exercise to minimize the occurrence of exercise maladaptation [19].

Monitoring the training load is used as a daily control tool using athletes' and coaches' feedback. Daily control aims to improve the athlete's physical performance and prevent the risk of injury and the adverse effects of the given training [20]. One of the efforts made is to manipulate the training load on an exercise program that is structured to harmonize with the planned load. The trainer must be careful in implementing the measurement using the sRPE. The sRPE method is measured subjectively to measure the internal load of the training program that is structured and run and can serve as a tool to optimize the training process [21]. Therefore, this study aims to prove a difference between the training load felt by medal-winning athletes and athletes who did not win medals.

This study aims to identify TL monitoring practices in athletes and is the first to explore these concepts in an integrated manner in this population. Furthermore, this survey explores whether there is a difference in training load between the medal-winning and non-medalist groups. Therefore, secondary data on training load is required for data analysis. Based on this, data collection in the field requires the contribution of a swimming coach who is responsible for monitoring TL data collection.

METHODS

This study uses a retrospective cohort research method (historical cohort). This study design examines the risk factors and impact of interventions that have occurred in the past and before the start of the study. Therefore, the data in this study were obtained through historical records. The research data analyzed is secondary data (historical data), a collection of data on the athlete's training load for 13 weeks. During the data collection process, the contribution of coaches and athletes is needed.

The data collected include sRPE, AU, and duration of athlete training. The research subjects used were para-swimming athletes consisting of seven athletes. The purpose of the study was to prove that there was a difference in the internal training load between the para-swimming athletes who received medals and the para-swimming athletes who did not get medals. Technical analysis of the data used is the mean, standard deviation, and different tests using Mann-Whitney.

RESULT

Table 1. Descriptive data of the training load of para-swimming athletes who won medals

	Min	Max	Mean & SD
sRPE	6,78	8,27	7,755 ± 0,591
AU	466,39	678,98	588,422 ± 81,089
Duration of training (minutes)	61,4	82,17	72,859 ± 7,914

The minimum, maximum, mean, and standard deviation of the training load for the group of para-swimming athletes who won medals on table one. The RPE scale ranges from 0 to 10 (0 being no power and 10 being maximum effort).

Table 2. Descriptive data of training load of non-medal para-swimming athletes

	Min	Max	Mean & SD
sRPE	8,35	8,76	8,552 ± 0,293
AU	683,36	692,2	687,780 ± 6,250
Duration of training (minutes)	77,92	80,14	79,030 ± 1,569

Based on table two, a set of training load data is explained by the group of para-swimming athletes who did not get medals. When compared to the average training load in the medal-winning para-swimming group, as shown in table 1, the non-medal para-swimming athlete group had a higher average training load.

Table 3. The difference test between groups A and B

	Group		P
	Group A	Group B	
sRPE	7,755 ± 0,591	8,552 ± 0,293	0,00
AU	588,422 ± 81,089	687,780 ± 6,250	0,00
Duration of training (minutes)	72,859 ± 7,914	79,030 ± 1,569	2,00

Table three shows data on the average difference in training load between groups of para-swimming athletes group who got a medal (group A) and the para-swimming athlete group who did not get a medal (group B) showed data on the difference in average training load. The training load data collected included sRPE, AU, and exercise duration data. The table explains that the average training load in the para-swimming athlete group who did not get a medal (group B) was higher than the para-swimming athlete group who got a medal (group B). The table also explains that after a different test using the Mann-Whitney test. It is said that there is a difference in sRPE between group A and group B ($p<0.000$), there is a difference in AU between group A and group B ($p<0.000$), and there was no difference in exercise duration between groups A and B ($p>0.000$).

DISCUSSION

An increase in the professionalism of athletes in achievement sports correlates with an increase in the training load in terms of intensity and volume. Therefore, athletes' achievement success is closely related to preparing a careful training program. The successful implementation of the training program is supported by the role of the trainer in formulating a strategy for changing the training load in the training program, which aims to push the limits of adaptation and avoid overtraining, injury, and detraining [22].

Previous research has shown that a high training load without a good recovery strategy can lead to unwanted adverse effects. In contrast, the training load that does not pay attention to the principle of progressive overload training does not produce the necessary adaptation (detraining) [23].

Facts show that achievement is not only caused by internal training load interpretation factors (sRPE). The athlete's experience in the sport that is occupied and the flying hours possessed by the athlete determine the athlete's achievement [24]. In addition, each athlete's technical skills, technical efficiency, athlete psychology, and athlete's recovery strategy can affect physiological responses. Facts on the ground show that the average sRPE value in para-swimming athletes who did not get medals was more significant than the average sRPE value in the group of para-swimming athletes who got medals. This was due to the para-swimming athletes who got medals had better experience and flying hours than the para-swimming athletes who did not get medals. In addition, the para-swimming athletes who got medals had a better physical level than the para-swimming athletes who did not get medals.

So it can be concluded that a trainer not only quantifies the internal training load (sRPE) but needs to pay attention to other factors. Previous research has shown that monitoring of technical skills (biomechanics) in athletes is also necessary. The research subjects are para-swimming athletes with special body conditions [26]. Thus the measurement of internal training load (sRPE) must also consider biomechanical factors [27]. Previous studies have shown that the use of internal loads (sRPE) in combination with specific external loads in the preparation of an exercise program increased training outcomes from week to week in swimmer training compared to using internal loads (sRPE) alone [24]. Based on this, it is recommended that coaches consider factors other than internal load monitoring in developing a strategy for changing training programs [28].

Furthermore, using more complex external load measures in this study may not be necessary; therefore, we suggest that coaches use simple measures to measure external loads, such as biomechanical elements possessed by athletes. In addition, it is advisable to measure other internal loads, such as the athlete's psychological recovery and recovery strategy. Internal loads such as SRPE are used to monitor exercise stress more optimally and individually in swimmers [27].

Previous studies have suggested optimizing swimming performance involves physical, physiological, and biomechanical changes [28]. Therefore, the success of an exercise program in achieving an athlete's achievement is not only supported by monitoring the internal training load but also by monitoring the external training costs. The relationship between training load and performance in sports has been studied for decades. The critical point of performance optimization is the prescription of training by the coach, physical trainer, or athlete. Programming involves various exercise modalities (i.e., the type of exercise regarding the physical quality that needs to be done), and the training load is adjusted [7]. The training load is usually separated into external loads determined by the athlete's work, regardless of the internal characteristics and internal loads that follow the psycho-physiological stresses imposed on the athlete in response to external loads.

Based on the description that has been described, it can be concluded that monitoring the internal training load (sRPE) is not the only determinant of an athlete's success in achieving athlete achievement. Monitoring the training load, particularly the internal training load (SRPE), can be used as a measuring tool to monitor ongoing programs aimed at determining recovery strategies and preventive measures to prevent overtraining and detraining [29].

CONCLUSION

This study concludes that there is a difference in the internal training load (sRPE) between the athletes in the para-swimming group who received medals and the para-swimming athlete group who did not get a medal. Furthermore, the para-swimming athletes who did not get medals had a higher internal training load than those who got medals.

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