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Development of a Model For Preparing an Exercise Program to Improve the Physical Condition of Table Tennis Club Athletes in the City of Lubuklinggau Through the Application

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Abstract

This study aims to determine whether the development of an exercise program formulation model can improve the physical fitness of table tennis athletes through valid and practical applications. This research method uses the Borg & Gall model, and data collection uses observation, tests, and questionnaires. The data analysis in this study consisted of an analysis of the validity, practicality, and effectiveness. The findings of this study are the product resulting from the development of an exercise program suitable for mass use. This is reinforced by the results of expert evaluations of table tennis practitioners, the responses of coaches and athletes, as well as physical fitness tests for athletes. The results of the validity state that the product is categorized as very good, with a very high level of practicality for the response of coaches and athletes, and the preparation of an effective training program to improve the physical fitness of athletes.

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INTRODUCTION

According to Haeskel, physical fitness is a set of physical characteristics possessed or achieved by a person related to the ability to carry out physical activity (Prasetio, 2018). Regarding physical fitness, there is a linearity in the level of a person's ability to carry out daily activities (Sriwihajriyah et al., 2012). According to Roji, physical fitness and exercise are related to body mass index numbers used in classifying a person in their fitness category with normal weight, excess and deficiency categories, body mass index is closely related to physical fitness (Mahfud et al., 2020).

Based on the literature described above, the authors conclude that physical fitness is a condition of a healthy body, the functions of the organs of the body are running properly with the outline being in a healthy condition and able to carry out every activity without doing significant fatigue, fit and healthy to be healthy. two different things which can be classified are that healthy people are not necessarily fit but fit people are definitely healthy and able to carry out activities consciously without feeling significant fatigue. Referring to the title that the author is researching, there are several previous studies that have been carried out related to the development of a model for preparing an exercise program to improve physical fitness in table tennis games through applications, namely a study conducted by (Mukhayat, 2001) with the title "Coach's Understanding of Basic Concepts Training in the Special Region of Yogyakarta," the population used are all coaches who are members of the IKA SSB (Football School). Research conducted by (Wayuhi, 2011) entitled "Implementation of Training Program Planning for PSSI Sleman Main Division Competition Club Coaches" the population used was 24

coaches of Sleman main division clubs, all of which were used as research samples.

Reviewing the opinions of experts and the results of observations made by the authors on the exercise routines of athletes at a table tennis club in the city of Lubuklinggau, it was found that problems related to low levels of physical fitness were found. This can be seen from the athlete's stamina which is rapidly decreasing, experiencing fatigue, unable to follow the exercise optimally, the speed of movement is slow or not agile, the joints in the wrists and feet are not flexible, and so on. The problem with the low level of physical fitness of athletes is thought to be due to: (1) the lack of variety in the training program provided by the coach, (2) the athlete lacks information about the goals or benefits of the training provided by the coach, (3) the athlete's dependence on the training provided by the coach, (4) athletes do not increase the portion of exercise independently, and (5) the absence of assistive devices used by the coach during the training process. Observing the problems stated above, the author's idea emerged to conduct research by developing the preparation of an exercise program to improve the athlete's physical fitness, which was then combined with an instrument through the Filit test application. The following will describe the results of the needs analysis obtained by the author in the following table.

Table 1. Results of Needs Analysis

Question	Finding
How is the athlete's physical fitness?	Some athletes show low physical fitness.
What is the impact of athletes who are not fit on their abilities, easily development of their experience fatigue, and achievements?	athletes' physical are less able to develop fitness on the their abilities, easily development of their experience fatigue, and do not perform well.
Do athletes receive improvement training?	Yes, but at a low physical fitness intensity.

Question	Finding
What exercises are given to athletes?	Warm-up exercises, techniques or skills, and duels.
How do athletes respond to their workouts?	Some athletes feel bored, because the training is less varied.
What efforts are being made to improve physical fitness of athletes?	The need for other exercises that support the athlete's skills.
Is an exercise program needed to improve the athlete's physical fitness?	Yes, it takes a more varied training and focus on the physical fitness of the athlete

Based on the findings of previous studies, the results of observations and needs analysis, the authors would like to conduct a study entitled "Development of an Exercise Program Preparation Model to Improve Physical Fitness of Table Tennis Club Athletes in Lubuklinggau City Through Applications".

Exercise Program

Training is a process for developing complex sports performances by using training content, training methods, and organizational actions that are in accordance with goals (Nossek, 2012). According to (Mylsidayu & Tangkudung, 2015), exercise comes from the word training, namely improving the ability to exercise consisting of theory, practice, methods and implementation rules so that the objectives of the exercise can be achieved. Stated that training is a systematic process that is useful for preparing athletes' conditions at the highest level of performance which is carried out repeatedly with increasing loads (Syamsuramel, S., Hartati & Rahmadani, 2019). Exercise in a physiological sense is an improvement of organ systems and functions in their duties to realize an athlete's achievement and training is a work process that must be carried out systematically and repeatedly (Iyakrus et al., 2012).

However, only training is not enough if the exercise applied is not in accordance with the needs or in accordance with the abilities of each athlete. According to (Sukadiyanto, 2011), exercises which are in English training which can contain a theory or practice, using several methods used and implementing rules with a scientific approach, using educational principles that are planned and regular so that the objectives of the exercise itself can be achieved on time. Exercise is often associated with a person's achievement, the more active a person practices, the greater the chance of achievement to be achieved.

METHODS

The method used in this research is the research and development method. The development research model uses the Borg and Gall model which consists of ten activities/stages, namely: (1) Research and information gathering; (2) Research planning, compiling a research plan, covering the abilities needed in conducting research, formulating the objectives to be achieved with the research, design or research steps, the possibility of testing in a limited scope; (3) Initial product development, development of learning materials and evaluation instruments; (4) Preparatory field trials; (5) Revised the results of the preparatory field trials; (6) Main field test; (7) Revised main field test results; (8) Operational field test; (9) Final product revision; and (10) Dissemination.

In this study, data were collected by means of observation, tests and questionnaires. The exercise program to improve the physical fitness of athletes that had been prepared in advance was validated by 3 expert practitioners of the table tennis sport. The purpose of this validation is to evaluate the feasibility of the exercise program made by the

researcher. Aspects that evaluate validators are: (1) a tool consisting of 5 indicators, (2) a training program consisting of 5 indicators, and (3) an instrument consisting of 4 indicators.

The instrument compiled must also meet the element of practicality, where practicality data comes from the responses of coaches and table tennis athletes through questionnaire answers totalling 12 statements with a Likert scale, namely for the answer choices Strongly Agree (SS) is given a score of 4, Agree (S) with a score of 3, Disagree (TS) with a score of 2, and Strongly Disagree with a score of 1. Effectiveness is the effect of a treatment on the object under study. The effectiveness analysis in this study used the SPSS for windows version 25.0 program (paired sample test). However, the data must be normally distributed using the method Kolmogorov Smirnov Test. This method has a higher level of normality for the same data size, with the criteria: if $Asymp. Sig (2-tailed) > 0.05$ then the data is declared normal, and vice versa. In this case, the development of effective programming is declared to be influential if the value of $sig > \alpha$, where α is a significance level taken at 0.05. Data analysis in this study consisted of analysis of validity, practicality, and effectiveness.

RESULT

The exercise program to improve the physical fitness of athletes that had been prepared in advance was validated by 3 expert practitioners of the table tennis sport. The purpose of this validation is to evaluate the feasibility of the exercise program made by the researcher. Experts who become validators include: (1) Indra Arianta, S.Pd., (2) Dedi Heryanto, S.Pd., and (3) Ardianus Novaredho, S.M. Aspects that evaluate validators are: (1) a

tool consisting of 5 indicators, (2) a training program consisting of 5 indicators, and (3) an instrument consisting of 4 indicators. The following table shows the results of the validation assessment of the preparation of the exercise program shows the percentage of assessment of the aids aspect of 90.6% and 90.6% of each training program located at intervals of 86-100 which is categorized as very good, as well as the instrument aspect of 90.0% which is also classified as very good. In addition to receiving an assessment, there are several suggestions submitted by the validator, including:

- a. Dosage or dose of exercise is corrected following the instructions.
- b. Add images in the training program.

The revision of the training program was in accordance with the criticism or suggestions given by the validator, including:

- a. The exercise dose is made into 2 sets, 10 repetitions, and 1 minute recovery.
- b. Images have been included in the exercise program.

The practicality data is sourced from the responses of the coaches and table tennis athletes through the answers to a questionnaire consisting of 12 statements with a Likert scale. The respondent's answers are given a score and then presented as shown in the following table:

The trainer's response to the preparation of the training program as shown in the table above is very high with a percentage of 87.5%. Table 3 above shows a very high response from athletes to an effective training program that can improve physical fitness, as well as the more varied training materials provided. Athletes also responded very highly about the training materials that had been arranged in a coherent and systematic manner so that they were easy to apply, but

athletes gave a high response regarding training materials that were carried out on time. Furthermore, the athlete's response to the training material is very high, which includes the components of physical fitness needed in table tennis. Athletes also give a very high response with a pleasant feel, involving movements that can improve basic table tennis technical skills, as well as the dose of exercise given according to the dose. However, regarding the fulfillment of the principles of training only in the high category. The athlete's response to the use of assistive devices is very high, and the training program can be used as a training method.

1. Effectiveness

The results of the pretest and posttest of physical fitness through a fit test with components of agility (shuttle run), balance (stroke standing balance stick test), coordination (throw and catch a tennis ball), flexibility of the shoulders and wrists, explosive power (vertical jump), and strength (sit-ups). The instrument was given to 10 athletes who were in small groups, and 20 athletes in large groups.

The pretest and posttest data in the table above were then analyzed using test statistics (paired sample test) through the SPSS for windows version 25.0 program. However, first a normality test was carried out using the Kolmogorov-Smirnov Test, the results of which can be seen in the following table:

Table 2 . Small Group Data Normality Test Results

		Posttest	Pretest
N		10	10
Normal Parameters	Mean	24.30	17.20
	Std. Deviation	1.567	1.229
Most Extreme Differences	Absolute	.224	.236
	Positive	.176	.236
	Negative	-.224	-.164
Kolmogorov-Smirnov Z		.709	.745
Asymp. Sig. (2-tailed)		.697	.636

The table above, obtained Asymp. Sig (2-tailed) in the posttest column 0.697 and the pretest column 0.636. Based on the test criteria, declared Asymp. Sig (2-tailed) > 0.05, so the pretest and posttest data for small groups are normally distributed so that the effectiveness analysis can be continued using the paired sample test, the results of which are shown in the following table:

Table 3. Effectiveness Analysis in Small Groups Paired Samples Test

Pair	Paired Differences		t	df	Sig. (2-tailed)				
	Mean	Std. Deviation							
		95% Confidence Interval of the Difference							
		Lower	Upper						
1	Posttest - Pretest	7.100	.876	.277	6.474	7.726	25.642	9	.000

The table above in column t obtained the value of t_{count} 25,642. Then look for the value of t_{table} with $dk = 10 - 1$, and the probability $(1 - \alpha)$, where $\alpha = 0.05$ obtained 1.833. Based on the test criteria, it was stated that $t_{count} > t_{table}$ or $25,642 > 1,833$, so the preparation of an effective training model in improving the physical fitness of table tennis athletes was tested in small groups.

Using the same calculations as in the small group, the results of the analysis in the large group can be seen in the following table:

Table 4. Results of Normality Testing for Large Groups of Data

		Posttest	Pretest
N		20	20
Normal Parameters	Mean	24.85	18.90
	Std. Deviation	1.424	1.410
Most Extreme Differences	Absolute	.175	.188
	Positive	.175	.188
	Negative	-.140	-.112
Kolmogorov-Smirnov Z		.781	.842
Asymp. Sig. (2-tailed)		.575	.477

The table above, obtained Asymp. Sig (2-tailed) in the posttest column 0.575 and the pretest column 0.477. Based on the test criteria, declared Asymp. Sig (2-tailed) > 0.05, so the pretest and posttest data for large groups are normally distributed so that the effectiveness analysis can be continued using the paired sample test, the results of which are shown in the following table:

Table 5. Effectiveness Analysis in Large Groups Paired Samples Test

		Paired Differences				T	df	Sig. (2-tailed)
		Mean	Std. Deviation	95% Confidence Interval of the Difference				
				Lower	Upper			
Posttest	Pretest	-5.950	.826	-6.336	-5.564	32.231	19	.000

The table above in column t obtained the value of tcount 32.231. Then look for the value of ttable with dk = 20 – 1, and the probability (1 – α), where α = 0.05 obtained 1.729. Based on the test criteria, it was stated that tcount > ttable or 32.231 > 1.729, so the preparation of an effective training model in improving the physical fitness of table tennis athletes was tested in large groups.

DISCUSSION

Physical fitness for athletes is an important element and forms the basis for the development of techniques, tactics, strategies, and mental development. Physical condition can reach an optimal point if training is started from an early age, carried out continuously throughout the year, in stages and guided by the principles of exercise correctly. This is in line with the opinion (Supriyoko, 2018),

that physical condition is the most important component in achieving achievement. Physical condition is an absolute thing that must be owned by athletes in developing and improving optimal sports performance, so that all physical conditions must be developed and improved according to the characteristics and needs of each sport.

Physical development must be planned periodically based on the stages of training, the status of the athlete's physical condition, sports, nutrition, facilities, tools, environment and the athlete's health status. According to (Lismadiana, 2017), planning is the preparation of a pattern of integrated and predetermined future activities. This requires the ability to predict, visualize, and look ahead based on certain goals. Furthermore, that planning includes the act of selecting and relating facts and making and using assumptions about the future in terms of visualizing and formulating proposed activities that are deemed necessary to achieve the desired results. Therefore, developing physical condition requires the qualification of professional trainers so that they are able to foster the overall physical development of athletes without causing negative effects in the future. However, based on preliminary observations found the fact that the level of physical fitness of athletes is low.

The low physical fitness of athletes is certainly influenced by several factors, one of which is the preparation of an exercise program. According to (Hasyim & Saharullah, 2019), the training program is a set of activities in training that are arranged in such a way that it can be carried out by athletes, both regarding the amount of training load and the intensity of the exercise. Furthermore (Bafirman HB. & Wahyuri, 2019) states that, athletes who follow an intensive physical condition training program for 6-8 weeks before the competition season, will have much better

strength, flexibility, and endurance during the competition season. The development of good physical condition also helps an athlete to be able to follow the next training to achieve the highest achievement.

The training program developed to improve the physical fitness of athletes is circuit training which consists of 6 posts. According to Kusuma quoted (Putra, 2020), circuit training is an exercise program that is combined from several exercise items whose purpose is to do an exercise so that it is not boring and more efficient. The function of this exercise is to make it easier for coaches and athletes to do a variety of exercises and focus more on an achievement that has been set by the coach for athletes.

Circuit training is then organized into an exercise program consisting of elements, including muscle flexibility, balance, agility, explosive power, and strength. The success of the exercise provided will be measured using an instrument in the form of a fit test which was previously developed by Dr. Iyakrus, M.Kes., covering the shuttle run, stroke standing balance stick test, throwing and catching tennis balls, flexibility of the shoulders and wrists, vertical jumps, and sit ups so that it is known the improvement of the athlete's physical fitness.

The products resulting from the preparation of an exercise program to improve the physical fitness of athletes were evaluated by expert practitioners of the sport of table tennis, supported by the responses of coaches and athletes through questionnaires, as well as physical fitness tests through fittest tests. Based on the evaluation, it was stated that the preparation of the training program was very good and suitable for mass use. This product in its use has several advantages and disadvantages. The advantage is that it is very effective in improving physical fitness, such as: muscle flexibility, balance, agility, explosive power, and

strength. In addition, it can make it easier for coaches and athletes to do a variety of exercises and focus more on a predetermined achievement. While the weaknesses of this product include the need for more supporting facilities and infrastructure, as well as setting the training dose according to the athlete's needs.

The findings of this study are in line with studies (Iyakrus et al., 2012), concluding that the physical exercise model for sepak takraw athletes is a form of exercise based on the needs of athletes' physical components in the game of sepak takraw which includes forms of explosive power, speed, agility, flexibility training, and endurance designed in a series of physical exercises. Likewise research (Amrullah, 2021) which concludes that the jump height is categorized as medium, abdominal muscle strength is excellent, arm muscle power is moderate, movement speed is moderate, as well as flexibility, agility is very good, while endurance is also classified as moderate. . Research (Irawan, 2020) concluded that the body mass index profile obtained was categorized as normal or ideal, cardiopulmonary endurance and abdominal muscle endurance were classified as moderate, while abdominal muscle endurance was categorized as very poor, arm muscle endurance was moderate, both right leg power and left in the less category, and agility in the medium category. Next research (Nurhidayah & Satya, 2017) concluded that the physical condition of the UNY Pencak Silat UKM athletes in 2016 on average was 63% in the good category, 25% sufficient, and 13% very good. The average physical condition of female athletes is 75% in the good category and 25% in sufficient condition. Meanwhile, research (Wiwoho, 2014) concluded that the average score for the level of physical condition of male basketball extracurricular students in 2012

was 2.65 which was included in the lesser category. Study (Picabea et al., 2021), the results of the study stated that there was a lack of relationship between sitting and reach tests with other capacities may indicate that flexibility is an independent capacity.

Study (Liskustyawati et al., 2016), the results of the research and development show that the appropriate physical tests for men and women's players aged 13-15 years consist of 6 test items including arm span, hands reaction speed, a tennis ball catching-throwing test, shuttle run, 20-meter sprint and multistage running. The conclusions of this research are that the developed physical tests are appropriate for men and women's table tennis players aged 13-15 years, including the length of arm span, speed of reaction hand, tennis ball catching-throwing test, shuttle run, 20-meter sprint, and multistage run tests. Research (Hindawi, 2021), analysis of experimental data shows that nutritional food can improve the physical indicators of table tennis players and enhance the overall health evaluation coefficient.

Research (Hertanto et al., 2018), the result of functional testing with black box testing as a base is; first, it states that all buttons, interface pages and menus can work properly. The app is then further tested for eligibility by the users of the tournament, referee and general users. As a result, the referee's feasibility test scores 90 from a scale of 100 (very feasible), and the user aspect scores 80 out of a 100 (feasible) scale. Generally, referee users and ordinary users attest to the fact that this app is worth using.

Study (Amalia et al., 2017), based on the results of processing and data analysis obtained conclusion as follows; 1) There is a positive effect of exercise motivation on the skills of playing table tennis. 2) There is an influence of motor skills on the skills of playing table tennis. And 3) There is a difference in the effect of exercise

motivation and motor skills on table tennis skills in junior athletes PTMSI Cianjur regency of West Java, where sports motivation contributes more to the skills of playing table tennis when compared with motor skills. Motivation exercises play a very important role in improving the quality of the exercise process in table tennis.

Research (Zagatto et al., 2018), future studies should focus on the relationship between energetic demand and table tennis performance with a view to predicting performance in table tennis using physiological parameters. Study (Ninglan et al., 2020), the results of this study show: there is the influence of high swing dumbbell training method and push-ups on the results of the accuracy of the forehand smash in table tennis at Silaberanti club, Palembang, there is no difference in influence between athletes who have a short arm and long arm category on the results of the forehand smash in table tennis at Silaberanti club, Palembang, there is an interaction effect between the method of high swing dumbbell training and push-up with arm length on the results of the accuracy of the forehand smash in table tennis at Silaberanti club, Palembang. Suggestions for sports coaches can be to use the dumbbell high swing training method and push-ups for arm muscle power by combining strength at speed, and for similar studies can develop further research with broader coverage.

CONCLUSION

Referring to the results of the research and discussion presented in the previous chapter, it can be concluded that the product resulting from the development of the training program is suitable for mass use. This is reinforced by the results of expert evaluations of table tennis practitioners, the responses of

coaches and athletes, as well as physical fitness tests for athletes. The results of the validity state that the product is categorized as very good, with a very high level of practicality for the response of coaches and athletes, and the preparation of an effective training program to improve the physical fitness of athletes.

REFERENCES

- Amalia, E. F., Subarjah, H., & Safari, I. (2017). The Influence of Exercise Motivation and Motor Ability towards the Table Tennis Playing Skills. *Health and Physical Education*, 1, 295–304.
- Amrullah, S. (2021). Profil Kondisi Fisik Atlet Bola Voli PBV IBVOS Tahun 2021. *Journal Active of Sport*, 1(1), 10–18.
- Bafirman HB., & Wahyuri, A. S. (2019). Pembentukan Kondisi Fisik. Raja Grafindo Persada.
- Hasyim, & Saharullah. (2019). Dasar-dasar Ilmu Kepeleatihan. Badan Penerbit UNM.
- Hertanto, D. B., Nugroho, S., & Prihatanta, H. (2018). Using the Prototype of Table Tennis Software in Managing Table Tennis Tournament. *Advances in Social Science, Education and Humanities Research*, 278, 456–460.
- Hindawi. (2021). Relationship of Table Tennis Sports Nutritional Food to Sports Athletes' Training and Physical Health. *Journal of Healthcare Engineering*, 1–8. <https://doi.org/http://doi.org/10.1155/2021/1873312>
- Irawan, A. (2020). Profil Kondisi Fisik Tim Futsal Liga Mahasiswa Universitas Negeri Jakarta 2019. *Jurnal Ilmiah Sport Coaching and Education*, 4, 72–82.
- Iyakrus, Rahayu, T., Sumaryanto, T., & Rahayu, S. (2012). Pengembangan Model Latihan Fisik untuk Atlet Sepaktakraw. *Seminar Nasional Hasil Penelitian Tesis Dan Disertasi PPs Unnes 2012*, 11–19.
- Liskustyawati, H., Sulaiman, & Rachman, H. A. (2016). The Physical Tests for 13-15 Year Old Table Tennis Players. *The Journal of Educational Development*, 4(2), 192–200. <http://journal.unnes.ac.id/sju/index.php/jed>
- Lismadiana. (2017). *Dasar-dasar Manajemen Olahraga*. UNY Press.
- Mahfud, I., Gumantan, A., & Nugroho, R. A. (2020). Pelatihan Pembinaan Kebugaran Jasmani Peserta Ekstrakurikuler Olahraga. *Wahana Dedikasi Jurnal PkM Ilmu Pendidikan*, 3(1), 56–61.
- Mukhayat. (2001). *Pemahaman Pelatih terhadap Konsep Dasar Pelatihan di Daerah Istimewah Yogyakarta*. Universitas Negeri Yogyakarta.
- Mylsidayu, A., & Tangkudung, J. (2015). *Mental Training: Aspek-aspek Psikologi dalam Olahraga*. Cakrawala Cendekia.
- Ninglan, T., Soegiyanto, & Sulaiman. (2020). Effect of Arm Muscles and Long Arm Power Exercises on the Results of Accuracy in Forehand Smash Blows in Table Tennis Games at Silaberanti Club, Palembang. *Journal of Physical Education and Sports*, 9(1), 88–94. <https://doi.org/http://doi.org/10.15294/ipes.v9i1.32158>
- Nosseck, J. (2012). *General Theory Of Training* (M. Furqon (ed.)). Universitas Negeri Sebelas Maret Press.
- Nurhidayah, D., & Satya, G. A. (2017). Profil Kondisi Fisik Atlet Unit Kegiatan Mahasiswa Pencak Silat Universitas Negeri Yogyakarta Kategori Tanding. *MEDIKORA*, 16(1), 1–16.
- Picabea, J. M., Cámara, J., & Yanci, J. (2021). Physical Fitness Profiling of National Category Table Tennis Players: Implication for Health and Performance. *International Journal of Environmental Research and Public Health*, 18(9362), 1–12. <https://doi.org/https://doi.org/10.3390/ijerph18179362>
- Prasetyo, E. (2018). Tingkat Kebugaran Jasmani Berdasarkan Indeks Massa Tubuh pada Siswa SMP Negeri 29 Bengkulu Utara. *KINESTETIK: Jurnal Ilmiah Pendidikan Dasar*, 2(2), 166–172.

- Putra, P. P. (2020). Circuit Training: Model Latihan untuk Menunjang Ketepatan Pukulan Backhand Bulutangkis. *Journal Sport Area*, 5(1), 84–96.
- Sriwihajriyah, N., Ruskan, E. L., & Ibrahim, A. (2012). Sistem pembelajaran dengan E-learning Untuk Mempersiapkan Ujian Nasional Pada SMA Pusri Palembang. *Jurnal Sistem Informasi*, 4(1), 450–467.
- Sukadiyanto. (2011). Pengantar Teori dan Metodologi Melatih Fisik. Lubuk Agung.
- Supriyoko, A. (2018). Kondisi Atlet Anggar Kota Surakarta. *Jurnal SPORTIF: Jurnal Penelitian Pembelajaran*, 4(2), 280–291.
- Syamsuramel, S., Hartati & Rahmadani, T. (2019). Pengaruh Latihan Interval Lari 30 Meter Terhadap Kemampuan Frekuensi Kecepatan Tendangan Lurus Siswa Ekstrakurikuler Pencak Silat di MAN 3 Palembang. *Jurnal Altius*, 8(1).
- Wayuhi, A. (2011). Implementasi Perencanaan Program Latihan Pelatih Klub Kompetisi Divisi Utama Pengcab PSSI Sleman. Universitas Negeri Yogyakarta.
- Wiwoho, H. A. (2014). Profil Kondisi Fisik Siswa Ekstrakurikuler Bola Basket Putra SMA N 02 Ungaran Tahun 2012. *Journal of Sport Sciences and Fitness*, 3(1), 44–48.
- Zagatto, A. M., Kondric, M., Knechtle, B., Sperlich, P. T., & Billy, N. &. (2018). Energetic Demand and Physical Conditioning of Table Tennis players. A Study Review. *Journal of Sports Sciences*, 36(7), 724–731. <https://doi.org/https://doi.org/10.1080/02640414.2017.1335957>