PHYSICAL FITNESS OF THE POOMSAE TAEKWONDO ATHLETES IN TERMS OF AGILITY, BALANCE AND ENDURANCE

Fahmy Fachrezzy1*, Uzizatun Maslikah2, Endy Safadilla3, Reggie Reginald4, Singgih Hendarto5

1234State University of Jakarta: Physical Education, Faculty of Sport Science, Universitas Negeri Jakarta, Jakarta, Indonesia
5Sebelas Maret University: Physical education sports, health and recreation, Faculty of Sports, Universitas Sebelas Maret, Surakarta, Indonesia

Abstract

The purpose of this study was to determine physical fitness training to increase agility, balance, and endurance of taekwondo athletes State University of Jakarta Poomsae number. The sample used in this study of taekwondo athletes Poomsae number of 30 people. The method used in this research is quasi-experimental design research using the design of one group pretest-posttest design. Data analysis techniques used in this study are using descriptive analysis and inferential analysis, descriptive analysis is used to describe the results of this research while inferential analysis using t-test with significant level $\alpha=0.05$ analysis used with the help of SPSS version 20.0. The results of this study can be concluded that physical fitness exercises used have a significant effect on increasing agility, balance, and endurance in taekwondo athletes State University of Jakarta Poomsae number. In this study only involved physical fitness training to improve some physical components, but for further research, physical activity training methods and psychosocial and social environments will be carried out to improve the physical components of taekwondo athletes, especially in poomsae numbers to support qualified achievement.
INTRODUCTION

Taekwondo is a martial art originating from the predominantly Korean ginseng country using hand and foot techniques to attack and defend (C. A. Bridge et al., 2013; Craig A. Bridge et al., 2014; Pieter, 2009; Schlüter-Brust et al., 2011). Taekwondo is dominant in using legs to defend and attack, so taekwondo is a martial art that dances with. Menurut (Campos et al., 2012; Del Vecchio et al., 2011; Ji, 2016; Monks et al., 2017; Schlüter-Brust et al., 2011) There are three important numbers in taekwondo, namely Taekwondo (Poomsae), the technique of breaking hard objects with kickstand punches (kyukpa), and the fight in taekwondo martial arts is (Kyoruki). Mastery of basic techniques in taekwondo is very important to support the skills in competition.

In this study, researchers only chose one of the numbers in taekwondo namely poomsae number. By (Choi & Joo, 2016; Chung & Johnson, 2019; Kazemi et al., 2016; Shin et al., 2016) Poomsae is a series of defensive and attacking movements that must be trained as if we are fighting against many opponents around us. Poomsae not only involves physical movements solely but involves breathing, soul process, mental process, and all spiritual, moral, techniques that are learned earlier as we begin to learn martial arts.

Poomsae is a form of active meditation in martial arts because it requires concentration and harmony between the mind, body, and spirit of the practitioner to produce the highest self-awareness to control and combine all the things learned above in a series of motions in synergy.

To learn taekwondo techniques consisting of punches, strokes, and kicks there is such a thing as Gibon dongjak/movement so that it forms a Poom which is the final form of taekwondo technique. According to several research results, among others (Altarriba-Bartes et al., 2014; Estevan et al., 2013; Ji, 2016) as for taekwondo kicks of many types, such as a straight forward kick to the head (ealgol ap chagi), a straight forward kick to the abdomen (Momtong dolly changi), a kick to the back turn the leg body folded and then flicked backward with snap (dwiChagi), Yeop chagi kick or puncture. Taekwondo can be learned by anyone regardless of gender, age, and social status. Taekwondo is a rapidly growing achievement sport around the world.

In sports achievements the need for systematic coaching. It means that the sports coaching system that places the development of the potential and talents of early childhood as the main foundation, further carried out coaching through a systematic, tiered, and sustainable training program to achieve high performance (Bompa & Haff, 2009). To display high performance, it is necessary to systemic exercises to realize good physical fitness. Physical fitness is the body's wildness in adjusting the load of a physical activity received to do daily activities.

One indicator of knowing physical fitness is through tests of balance, agility, and endurance. According to (Antara et al., 2017; Munawarah, 2019; Nurhakim et al., 2013; Pelana, 2016; Rawe et al., 2017; Syaefullah et al., 2017) that balance is the ability to hold the body to react to any changes in body position so that the body remains stable and controlled both statically and dynamically.

Agility is a person's physical ability to change direction quickly direction or body parts without interference with a balance is indicated to maintain static and dynamic balance (Aksoy, 2019; Arabaci et al., 2010; Chaabene et al., 2018; Singh et al., 2015, 2017; Tirtawirya, 2011).
Endurance is the ability and ability to do work or activities without experiencing significant or excessive fatigue to perform further activities (Indrayana, 2012; Kurnia & Anggraini, 2020; Kurniawan & Gusrianty, 2019; Nugraheni et al., 2017; Solissa, 2018).

Thus, to improve the physical condition, the need for systematic exercise and the need to pay attention to aspects of the exercise consisting of various disciplines or scientific fields incorporated in an exercise system is inseparable from science (Jariono et al., 2020; Jariono & Subekti, 2020).

Several factors must be considered, among others, including clear coaching objectives, systematic training programs, appropriate training materials and methods, and evaluations that can measure the success of the coaching process itself (Arief Parena et al., 2017; Effendi, 2016; Irmansyah, 2017; Parena et al., 2017; Ruslan, 2011b, 2011a; Tangkudung James, 2006).

To approach science and technology to evaluate the ability of physical components of Taekwondo athletes more accurately in the future it is necessary to conduct research. As for the study is the physical fitness of the poomsae taekwondo athletes in terms of agility, balance, and endurance.

METHODS

The method used in this research is quasi-experimental design research using a quantitative approach. This research was conducted from July-August 2020. This study aims to analyze the effect of treatment on increased agility, balance, and endurance. As for the design in this research there using one group pretest_posttest design, the design of this research can be seen in the following figure:

![Figure 1. Research Design](image)

In this research there are several steps taken, namely "(1) establish the research subject group; (2) pre-test \(O_1\); (3) To treat physical fitness models consisting of sit-ups, push-ups, pull-ups, vertical jumps, and multi-stage running; (4) Carry out post-test \(O_2\); (5) look for pre-test and post-test average scores and be compared between the two; (6) look for the difference between the two averages through the statistic k (t-test) method "to determine whether or not there is a significant influence of physical fitness exercise".

Quasi-experimental research using a single-subject design is done by giving tests to subjects who have not been treated called pretests \(O_1\). After obtaining the data of students who have preliminary data, it is treated using a circuit learning approach within 8 weeks. Then performed treatment to taekwondo athletes’ Poomsae number, then given again a test called \(O_2\) to measure whether or not the influence of physical fitness training model \(X\), in the post-test obtained data results from experiments where students’ physical fitness ability increased or no change at all.

Participants

This research was carried out at The State University of Jakarta with a sample of 30 taekwondo athletes who participated in taekwondo training poomsae number.

Sampling Procedures

This sampling procedure is purposive sampling. This study requires consideration on the grounds of the characteristics of taekwondo athletes on Poomsae numbers who have participated...
in training for 1 year or more. So the researchers took a sample that had already followed the exercise.

**Materials and Apparatus**

Data collection techniques using practice tests. Practice tests are used for agility tests using shuttle run tests, balance tests using static balance tests, while endurance tests use multi-stage fitness tests (MFT).

**Procedures**

The procedures in this study were: (1) the first stage the researcher conducted a test and measurement consisting of a balance, agility, and endurance test; and (2) the researcher categorizes the supporting and unsupportive data with the focus in this study. Then the researcher examined the relationship between the data and field notes so that the data or information obtained during the field could be known.

**Design or Data Analysis**

The data analysis used in this study is descriptive, the prerequisite test includes normality test and homogeneity test, then the hypothesis test is a don't-test. Overall for data analysis using SPSS software version 20.0

**RESULT**

1. Descriptive analysis

Descriptive analysis of data aims to draw in general on distribution dissemination of "pretest and posttest" agility, balance, and durability. A recap of the results of the descriptive analysis of data can be seen in figure 1.

**Figure 2. Histogram mean value “pretest dan posttest” agility, balance, and endurance**

Based on the descriptive analysis results in figure 1 histogram the difference in average "pretest and posttest" can be concluded that there is an increase in pretest and posttest taekwondo athletes state university of Jakarta Poomsae numbers reviewed from agility, balance, and endurance. This is evidenced from 30 samples obtained pretest and posttest average values of 26.88 and 18.23 differences of 8.65, balances of 3.80 and 57.8 difference of 1.97, and endurance of 23.07 and 34.22 difference of 11.5. Thus it can be concluded that physical fitness exercises can improve the agility, balance, and endurance of taekwondo athletes at the Poomsae number State University of Jakarta.

2. Prerequisite test

The normality test is used as a prerequisite for the hypothesis test. The normality test using Kolmogorov-Smirnov Z (KS-Z) test can be seen in the following histogram image:
Based on the test results of normality data on histogram image normality test values "pretest and posttest" agility, balance, and endurance Kolmogorov-Smirnov Z (KS-Z) in the entire data group turned out to be greater than the value of $\alpha = 0.05$. Thus it can be concluded that the sample of this study comes from a normally distributed population. After the normality test is carried out, then hypothetical testing is carried out.

3. Hypothesis test

| pretest-posttest | t_count | Sig    | t_table (0.05) |
|------------------|---------|--------|----------------|
| Agility          | 11.027  |        | 1.699          |
| balance          | 14.290  | 0.000  | 1.699          |
| Endurance        | 22.461  |        |                |

Based on analysis t_test "pretest and posttest" agility, balance, and endurance in table 1 above obtained the value of $t_{count}$ of 11.027, 14.290, and 22.461 and $t_{table}$ (29(10);0.05) of 1.699. Based on these results, it can be concluded that the correlation coefficient (t-test) between pretest and posttest increase in agility, significant balance, and endurance or $H_0$ is rejected and received $H_1$. Thus it can be concluded that there is a significant influence of physical fitness on the improvement of agility, balance, and endurance in taekwondo athletes State University of Jakarta poomsae number. Thus physical fitness exercise is one of the solutions to be applied in training especially to improve the physical components, especially agility, balance, and endurance as some of the physical components to maintain a person’s appearance (Ozmen & Aydogmus, 2016; Weiss et al., 2010; Yu et al., 2013) Thus physical fitness exercise is one of the solutions to be applied in training especially to improve the physical components, especially agility, balance, and endurance that is more effective and efficient. This physical fitness exercise is following the characteristics of taekwondo martial arts, especially in Poomsae numbers that require agility, balance, and endurance.

The advantages of method physical fitness exercises in the material presented are in the form of dominant exercises used in taekwondo in which there is unsure endurance, agility, and strength thus...
making athletes feel bored with the process of delivering the practice. Physical fitness exercises as process exercises are functional exercises of the body. Lack of exercise is the need for consistent and systematic practice.

**CONCLUSION**

From the results of the study, it can be concluded that physical fitness exercises used have a significant effect on increasing agility, balance, and endurance in taekwondo athletes State University of Jakarta poomsae number.

**ACKNOWLEDGEMENT**

Thank you to the faculty of the sports science State University of Jakarta who has facilitated researchers to conduct research.

**REFERENCES**

Aksoy, D. (2019). Effects of 10-Week Whole Body Vibration Training on Strength, Flexibility and Agility in Taekwondo Athletes. Journal of Education and Learning. https://doi.org/10.5539/jel.v8n2p213

Altarriba-Bartes, A., Drobnic, F., Til, L., Malliaropoulos, N., Montoro, J. B., & Irurtia, A. (2014). Epidemiology of injuries in elite taekwondo athletes: Two Olympic periods cross-sectional retrospective study. BMJ Open. https://doi.org/10.1136/bmjopen-2013-004605

Antara, K. A., Adiputra, I. N., & Sugiritama, I. W. (2017). Hubungan Flat Foot Dengan Keseimbangan Statis dan Dinamis pada Anak Sekolah Dasar Negeri 4 Tonja Kota Denpasar. Majalah Ilmiah Fisioterapi Indonesia.

Arabaci, R., Catikkas, F., & Gorgulu, R. (2010). Relationship Between Agility and Reaction Time, Speed and Body Mass Index in Taekwondo Athletes. E-Journal of New World Sciences Academy.

Arief Parena, A., Rahayu, T., & Artikel, S. (2017). Journal of Physical Education and Sports Manajemen Program Pembinaan Olahraga Panahan pada Pusat Pendidikan dan Latihan Pelajar (PPLP) Provinsi Jawa Tengah. Ipes.

Bompa, T. O., & Haff, G. G. (2009). Periodization: Theory and Methodology of Training. In Champaign, Ill.: Human Kinetics;

Bridge, C. A., McNaughton, L. R., Close, G. L., & Drust, B. (2013). Taekwondo exercise protocols do not recreate the physiological responses of championship combat. International Journal of Sports Medicine. https://doi.org/10.1055/s-0032-1327578

Bridge, Craig A., Ferreira Da Silva Santos, J., Chaabènè, H., Pieter, W., & Franchini, E. (2014). Physical and physiological profiles of Taekwondo athletes. In Sports Medicine. https://doi.org/10.1007/s40279-014-0159-9

Campos, F. A. D., Bertuzzi, R., Dourado, A. C., Santos, V. G. F., & Franchini, E. (2012). Energy demands in taekwondo athletes during combat simulation. European Journal of Applied Physiology. https://doi.org/10.1007/s00421-011-2071-4

Chaabene, H., Negra, Y., Capranica, L., Bouguezzi, R., Hachana, Y., Rouahi, M. A., & Mkaouer, B. (2018). Validity and reliability of a new test of planned agility in elite taekwondo athletes. Journal of Strength and Conditioning Research. https://doi.org/10.1519/JSC.0000000000002325

Choi, C. H., & Joo, H. J. (2016). Motion recognition technology based remote Taekwondo Poomsae evaluation system. Multimedia Tools and Applications. https://doi.org/10.1007/s11042-015-2901-1

Chung, B. K., & Johnson, J. A. (2019). Taekwondo Poomsae competitor perceptions of the official and new competition Poomsae, field of play, and competition rules. Physical Activity Review. https://doi.org/10.16926/PAR.2019.07.04
Del Vecchio, F. B., Franchini, E., Del Vecchio, A. H. M., & Pieter, W. (2011). Energy absorbed by electronic body protectors from kicks in a taekwondo competition. Biology of Sport. https://doi.org/10.5604/935878

Dobbins, M., Husson, H., Decorby, K., & Larocca, R. L. (2013). School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6 to 18. In Cochrane Database of Systematic Reviews. https://doi.org/10.1002/14651858.CD007651.pub2

Donnelly, J. E., Hillman, C. H., Etmin, J. L., Lee, S., Tomporowski, P., Lambourne, K., & Szabo-Reed, A. N. (2016). Physical activity, fitness, cognitive function, and academic achievement in children: A systematic review. In Medicine and Science in Sports and Exercise. https://doi.org/10.1249/MSS.0000000000000901

Effendi, H. (2016). Peranan Psikologi Olahraga Dalam Meningkatkan Prestasi Atlet. Nusantara (Jurnal Ilmu Pengetahuan Sosial). https://doi.org/http://jurnal.umtapsel.ac.id/index.php/nusantara/article/view/90/90

Erickson, K. I., Leckie, R. L., & Weinstein, A. M. (2014). Physical activity, fitness, and gray matter volume. In Neurobiology of Aging. https://doi.org/10.1016/j.neurobiolaging.2014.03.034

Estevan, I., Jandacka, D., & Falco, C. (2013). Effect of stance position on kick performance in taekwondo. Journal of Sports Sciences. https://doi.org/10.1080/02604414.2013.803590

Indrayana, B. (2012). Perbedaan Pengaruh Latihan Interval Training dan Fartlek terhadap Daya Tahan Kardiovaskular pada Atlet Junior Putra Taekwondo Wild Club Medan 2006/2007. Jurnal Cerdas Syifa.

Irmansyah, J. (2017). Evaluasi program pembinaan prestasi cabang olahraga bola voli pantai. Jurnal Keolahragaan. https://doi.org/10.21831/jk.v5i1.12759

Jariono, G., & Subekti, N. (2020). Sports Motivation Survey And Physical Activity Students Of Sport Education Teacher Training And Education Faculty FKIP Muhammadiyah University Surakarta. Kinestetik: Jurnal Ilmiah Pendidikan Jasmani. https://doi.org/10.33369/jk.v4i2.12449

Jariono, G., Subekti, N., Indarto, P., Hendarto, S., Nugroho, H., Fachrezzy, F., Surakarta, U. M., Sebelas, U., Surakarta, M., & Jakarta, U. N. (2020). Analisis Kondisi Fisik Menggunakan Software Kinovea Pada Atlet Pendahuluan. Kinestetik: Jurnal Ilmiah Pendidikan Jasmani. https://doi.org/10.33369/jk.v4i2.12449

Ji, M. J. (2016). Analysis of injuries in taekwondo athletes. Journal of Physical Science. https://doi.org/10.1589/jpts.28.231

Kazemi, M., Ingar, A., & Jaffery, A. (2016). Injuries in elite taekwondo poomsae athletes. Journal of the Canadian Chiropractic Association.

Kurnia, M., & Angraini, H. (2020). Pengaruh Latihan Jogging Terhadap Daya Tahan Kardiorespirasi Pada Atlet Taekwondo Survivar 5 Club Palembang. Halaman Olahraga Nusantara (Jurnal Ilmu Keolahragaan). https://doi.org/10.31851/hcn.v3i1.3558

Kurnawan, W. J., & Gusrianty, G. (2019). Sistem Pendukung Keputusan Seleksi Atlet Poomsae Taekwondo Dengan Metode Analitc Hierachy Process. JOISIE (Journal Of Information Systems And Informatics Engineering). https://doi.org/10.35145/joisie.v2i1.244

Monks, L., Seo, M. W., Kim, H. B., Jung, H. C., & Song, J. K. (2017). High-intensity interval training and athletic performance in Taekwondo athletes. Journal of Sports Medicine and Physical Fitness. https://doi.org/10.23736/S0022-4707.17.06853-0

Munawarah, S. (2019). Pengaruh Pemberian Senam Yoga Terhadap Keseimbangan Statis Pada Lansia 2019. Human Care Journal. https://doi.org/10.32883/hcj.v4i2.465

Nugraheni, H., Marjio, M., & Indraswari, D. (2017). Perbedaan Nilai Vo2max Antara Atlet Cabang Olahraga Permainan Dan Bela Diri. Diponegoro Medical Journal (Jurnal Kedokteran Diponegoro).
Nurhakim, H. A., Yunitaningrum, W., & Purnomo, E. (2013). Pengaruh Latihan Senam Lantai Terhadap Hasil Keseimbangan (Balance) STATIS SISWA. Jurnal Pendidikan Dan Pembelajaran.

Ozmen, T., & Aydogmus, M. (2016). Effect of core strength training on dynamic balance and agility in adolescent badminton players. Journal of Bodywork and Movement Therapies. https://doi.org/10.1016/j.jbmt.2015.12.006

Parenas, A. A., Rahayu, T., & Sugiharto. (2017). Manajemen Program Pembinaan Olahraga Panahan pada Pusat Pendidikan dan Latihan Pelajar (PPLP) Provinsi Jawa Tengah. Journal of Physical Education and Sports.

Pelana, R. (2016). Hubungan Kekuatan Otot Tungkai Dan Keseimbangan Statis Dengan Hasil Shooting Pada Atlet Klub Petanque. Prosiding Seminar Nasional Maret 2016.

Pieter, W. (2009). Taekwondo. In The Encyclopaedia of Sports Medicine: An IOC Medical Commission Publication, Epidemiology of Injury in Olympic Sports. https://doi.org/10.1002/9781444316872.ch19

Rauner, A., Mess, F., & Woll, A. (2013). The relationship between physical activity, physical fitness and overweight in adolescents: A systematic review of studies published in or after 2000. BMC Pediatrics. https://doi.org/10.1186/1471-2431-13-19

Rawe, H., Hidayah, T., & Re, A. R. (2017). Pengaruh Metode Latihan Keseimbangan dan Daya Tahan Otot Lengan terhadap Kecepatan Mendayung Kayak 1 Jarak 200 Meter Info Artikel Abstrak Perkembangan Olahraga di Indonesia. Journal of Physical Education and Sports.

Ruslan. (2011a). Meningkatkan Kondisi Fisik Atlet Pusat Pendidikan. Ilara.

Ruslan. (2011b). Meningkatkan Kondisi Fisik Atlet Pusat Pendidikan dan Latihan Olahraga Pelajar (PPLP) di Provinsi Kalimantan Timur. Ilara.

Schlüter-Brust, K., Leistenschneider, P., Dargel, J., Springorum, H. P., Eysel, P., & Michael, J. W. P. (2011). Acute injuries in Taekwondo. International Journal of Sports Medicine. https://doi.org/10.1055/s-0031-1275302

Shin, Y. S., Yang, S. M., Kim, M. Y., Lee, L. K., Park, B. S., Lee, W. D., Noh, J. W., Kim, J. H., Lee, J. U., Kwak, T. Y., Lee, T. H., Park, J., & Kim, J. (2016). Differences in respirogram phase between taekwondo poomsae athletes and nonathletes. Journal of Physical Therapy Science. https://doi.org/10.1589/jpts.28.2495

Singh, A., Boyat, A. K., & Sandhu, J. S. (2015). Effect of a 6 Week Plyometric Training Program on Agility, Vertical Jump Height and Peak Torque Ratio of Indian Taekwondo Players. Sports and Exercise Medicine - Open Journal. https://doi.org/10.17140/semoj-1-107

Singh, A., Sathe, A., & Sandhu, J. (2017). Effect of a 6-week agility training program on performance indices of Indian taekwondo players. Saudi Journal of Sports Medicine. https://doi.org/10.4103/sjsm.sjsm_19_17

Solissa, J. (2018). Pengaruh Metode Latihan Dan Kekuatan Terhadap Daya Tahan Tendangan Taekwondo. Gelanggang Pendidikan Jasmani Indonesia. https://doi.org/10.17977/um040v2i1p18-24

Syaefullah, R., Fitrianto, E. J., & Setiakarnawijaya, Y. (2017). Pengaruh Latihan Tai Chi Chuan terhadap Keseimbangan Statis pada Lansia di Klub Ying Yang Wushu Cabang Monas Jakarta Pusat. JURNAL SEGAR. https://doi.org/10.21009/segar.0401.02

Tirtawiry, D. (2011). AGILITY T TEST TAEKWONDO. Jurnal Olahraga Prestasi. https://doi.org/10.21831/jorpres.v7i7.10283

Weiss, T., Kreitinger, J., Wilde, H., Wiora, C., Steege, M., Dalleck, L., & Janot, J. (2010). Effect of Functional Resistance Training on Muscular Fitness Outcomes in Young Adults. Journal of Exercise Science and Fitness. https://doi.org/10.1016/S1728-869X(10)60017-2

Yu, J. H., Park, D. S., & Lee, G. C. (2013).
Effect of eccentric strengthening on pain, muscle strength, endurance, and functional fitness factors in male patients with achilles tendinopathy. American Journal of Physical Medicine and Rehabilitation. https://doi.org/10.1097/PHM.0b013e31826eda63