

Effect of Circuit Training and Interval Training Towards the Physical Fitness of Korpasgat Command Headquarter Personnels

Cartu Gustiar¹, Duwi Kurnianto Pambudi²

^{1,2}Departement of Sport Science, Faculty of Sport and Health Sciences, Yogyakarta State University, Yogyakarta, Indonesia

ABSTRACT: This research aims to analyze and prove: (1) the effect of circuit training on the physical fitness of Korpasgat Command Headquarters personnels; (2) the effect of interval training on the physical fitness of Korpasgat Command Headquarters personnels; and (3) the difference in the effect of circuit training and interval training on Korpasgat Command Headquarters personnels.

The type of this research was an experiment with a "Two Groups Pretest-Posttest Design" to determine the physical fitness of Korpasgat Command Headquarters personnels. The research population was 24 personnels of Korpasgat Command Headquarters aged 30 to 40 years old, located at the Korpasgat Command Headquarters. The research sampling was conducted by performing pretests, then the results were ranked and then divided into two groups with 12 people each, paired (matched) with an A-B-B-B pattern. The sample distribution technique used ordinal pairing. This research instrument used the Standard Technical Guidelines owned by the Indonesian Air Force based on the Decree of the Chief of Staff of the Air Force Number: 326 / XI / 2019 concerning the technical instructions for the Indonesian Air Force Fitness Test. The technique used in the normality test was the Shapiro-Wilk normality test. The technique used in the hypothesis test was the R program using the Shapiro-Wilk formula.

The research findings reveal that: (1) there is a significant effect of circuit training on the physical fitness of Korpasgat Command Headquarters personnels, with a $p = 0.000011$ test result because $p < 0.05$; (2) there is a significant effect of interval training on physical fitness with a $p = 0.000003$ result because $p < 0.05$; (3) there is a difference in the effect between circuit training and interval training on the physical fitness of Korpasgat Command Headquarters personnels. The results of the analysis using ANOVA and followed by a Tukey HSD post hoc test show a $p = 0.063$ comparison of circuit training and interval training, indicating there is no any significant difference in the effect between the two types of training. However, both circuit training and interval training show significant differences compared to the control group.

KEYWORDS: Circuit Training, Interval Training, Physical Fitness

I. INTRODUCTION

The Command of the Fast Moving Forces (abbreviated as Korpasgat, or other names of the Orange Beret Corps), is a special force owned by the Indonesian Air Force. Korpasgat is a land combat unit with three dimensions, namely air, sea, and land. Each Pasgat soldier is required to have at least a para-command qualification (Parako) to be able to carry out their duties professionally, then special abilities are added according to their specialty.

The duties and responsibilities of the corpsmen are the same as those of other combat forces, namely state combat units. As a battalion of the Republic of Indonesia that is ready to be deployed in all terrains, both forests, cities, swamps, rivers, and the sea to eradicate all enemies who fight against the Republic of Indonesia. The difference is that Korpasgat has the characteristics of additional tasks that other forces do not have, namely the operation of establishing and operating an air base (OP3U), namely capturing and defending the base and subsequently preparing aircraft landings and troop parachutes.

Physical fitness is very important for Korpasgat members because it supports performance and performance when carrying out duties at home or abroad. Nugroho, et al. (2021) stated that physical fitness is physical compatibility or physical suitability or can be interpreted as the compatibility of physical requirements for the tasks that must be carried out by the physical, both anatomical requirements and especially physiological requirements that must be possessed by the individual concerned. Physical fitness can be interpreted as the ability of a person's body to perform daily work tasks, without causing significant fatigue (Bafadal, 2021). Suryadi et al., (2021) define physical fitness as a person's ability to perform their daily tasks easily, without feeling

Effect of Circuit Training and Interval Training Towards the Physical Fitness of Korpasgat Command Headquarter Personnels

excessively tired, and still have residual energy reserves to enjoy their leisure time and for sudden needs. Sumosardjuno and Giri Widjojo (2015) stated that physical fitness is the ability of the body to adjust the function of body tools within physiological limits to environmental conditions or physical work efficiently without excessive fatigue. Physical fitness is a physical aspect of the 4 total fitness that enables a person to live a productive life and can adjust to every proper physical load or stress (Yulianingsih, 2019). In general, what is meant by fitness is physical fitness, which is a person's ability to be able to do daily work efficiently without excessive fatigue so that they can still enjoy their free time (Shofia et al., 2021).

Based on the results of previous researchers, circuit training and interval training methods have an effect on improving physical fitness, namely cardiovascular physical fitness, muscle strength and agility, from the two training methods that have an impact on exercise, namely circuit training. Based on various facts and results from the observations that have been presented in the paragraph above, it can be concluded that in fact there are still many members of Mako Korpasgat who have enough fitness to reach 80% so that it can affect physical activity. Good physical fitness not only supports the physical aspect, but also affects the ability of the body's organs, emotions, sportsmanship, and spirit of life. However, in reality, maintaining the level of physical fitness of soldiers consistently faces various challenges, such as daily task routines, limited effective training time, and potential saturation of conventional training methods. This problem can decrease cardiovascular endurance, muscle strength and agility of members which directly impact the performance and preparedness of members. To overcome these problems, exercise methods that have been proven to be effective and efficient in improving the physical fitness component are needed. Two relevant training methods that are known to be short and efficient are circuit training and interval training.

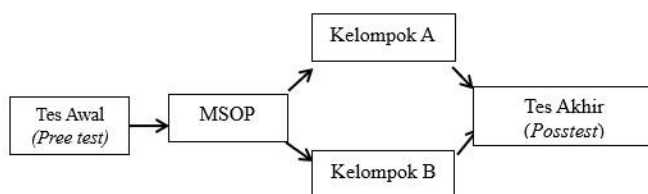
Although both methods promise great benefits, it is still not known exactly which method is more influential and optimal in improving specific physical fitness in the context of Mako Korpasgat members, who have certain task and physical characteristics. Therefore, this study is important to find out and compare the influence of circuit training and interval training on the physical fitness of Mako Korpasgat members, so that it can provide appropriate physical exercise recommendations to support the main and operational tasks of Mako Korpasgat members. Therefore, from the description above, the author is interested in conducting a research entitled "The Effect of Circuit Training and Interval Training on Improving the Physical Fitness of Mako Korpasgat Members".

II. METHODS

This type of research is experimental. The experimental method is defined as a systematic method to build relationships that contain causal-effect relationships (Sukardi, 2015: 178). The design used in this study is "Two Groups Pretest-Posttest Design", which is a research design that contains a pretest before being treated and a posttest after being treated, thus being known to be more accurate, because it can be compared with being held before being treated (Sugiyono, 2019: 64). The design can be described as follows:

Table 1. Two Group Pretest-Posttest Design

(Sumber: Sugiyono, 2015: 32)



Keterangan:

- Pre-test : Tes awal
- MSOP : Matched Subject Ordinal Pairing
- Kelompok A : Perlakuan (treatment) Circuit Training
- Kelompok B : Perlakuan (treatment) Interval raining
- Post-test : Tes akhir

A. Data, Instruments, and Data Collection Techniques

An instrument is defined as a measuring instrument used in research is a tool used to measure the observed variables (Sugiyono, 2019: 148). A data collection instrument is a tool used to collect data. The quality of a study will be determined by the

Effect of Circuit Training and Interval Training Towards the Physical Fitness of Korpasgat Command Headquarter Personnels

quality of the data collected. Data is a description of research variables. The quality of the data is highly dependent on the quality of the instruments used to collect information or research data. Good instruments in general must meet several criteria (Budiwanto, 2017: 183).

In this measurement test, it uses instruments that are standard and applicable within the Air Force based on the Rafter Decree Number: 326/XI/2019 concerning Technical Instructions for the Air Force Readiness Test, which follows the flow by being given a postal post according to the item used, namely the Garjas A test, which is a 12-minute run, and the Garjas B test which consists of pull ups, Sit ups, push ups, and shuttle runs for 1 minute are done as much as possible to get maximum results. All test participants are given the flow as above and are carried out in turn and wait for their turn, a break between station A to station B for 10 minutes and a break between station B1 to B2 for 5 minutes and so on, in the test will be carried out with the number of existing facilities, so that the change in the number of facilities that carry out depends on the facilities owned.

B. Data Collection Techniques

Before hypothesis testing is carried out, it is necessary to carry out a prerequisite test. Testing of measurement data related to research results aims to help the analysis to be better. For this reason, in this study, normality and data homogeneity will be tested. Before stepping into the t-test, there is a requirement that must be met by the researcher that the analyzed data must be normally distributed, for that it is necessary to carry out a normality test and a homogeneity test (Arikunto, 2019: 299)

Prerequisite Test

Normality Test

The technique used in the normality test is the Shapiro Wilk normality test. The data normality test can be carried out using the Shapiro Wilk technique, which examines the frequency distribution of the sample based on the normal distribution on single data or single frequency data. Normality testing is carried out to find out whether or not a data distribution is normal. This is important to know in relation to the accuracy of the selection of statistical tests to be used, because parametric statistical tests require that the data must be distributed normally. If, obtained data is not normally distributed, it is recommended to test nonparametric statistics (Ananda & Fadli, 2018: 150).

Homogeneity Test

Variance homogeneity testing using the Levene Test. Homogeneity testing was carried out in order to test the similarity of variance of each data group. The homogeneity test requirement is required to perform an inferential analysis in a comparative test (Ananda & Fadli, 2018: 152).

III. RESULT

The data from the results of this study is in the form of pretest and posttest data for physical fitness test members of Makor Korpasgat. The research process will take place in three stages. The first stage is to conduct a pretest to obtain preliminary data on the physical fitness of Makor Korpasgat members. The second stage of this research activity is to carry out treatment, this research lasts for 18 meetings. The implementation of treatment will last for 6 weeks with a frequency of 3 times a week.

The results of the pretest and posttest physical fitness test for Makor Korpasgat members can be explained as follows:

Table 2. Pretest and Posttest Group circuit training

No Subjek	Skor Preetest	Skor Posttest	Selisih
1	77.50	78.75	1.25
2	61.50	63.25	1.75
3	60.63	62.38	1.75
4	59.75	62.50	2.75
5	56.50	60.50	4
6	50.51	53.38	2.87
7	51.63	55.88	4.25
8	48.40	50.63	2.23
9	48.00	51.53	3.58
10	41.75	43.75	2

Effect of Circuit Training and Interval Training Towards the Physical Fitness of Korpasgat Command Headquarter Personnels

11	41.38	47.38	6
12	34.38	37.14	2.84

Descriptive statistics of pretest and posttest physical fitness of Makor Korpasgat members of the circuit training group are presented in table 3.

Table 3. Descriptive Statistics of Pretest and Posttest Group Circuit Training

Statistik	Pretest	Posttest
<i>N</i>	12	12
<i>Mean</i>	52,66	55,99
<i>Median</i>	51,07	54,63
<i>Mode</i>	34,84	37,14
<i>Std. Deviation</i>	11,48	10,90
<i>Minimum</i>	34,38	37,14
<i>Maximum</i>	77,50	78,75

The results of the pretest and posttest of the physical fitness of the interval training group are presented in table 4.

Table 4. Pretest and Posttest Interval Training group.

No Subjek	Skor Preetest	Skor Posttest	Selisih
1	62.75	64.24	1.49
2	61.63	64.88	3.25
3	60.50	67.38	6.88
4	60.25	67.00	6.75
5	53.75	59.25	5.5
6	52.25	57.25	5
7	50.38	54.00	3.62
8	50.13	54.75	4.62
9	45.13	47.25	2.12
10	44.00	49.25	5.25
11	40.13	45.00	4.87
12	37.75	40.25	2.5

Descriptive statistics of pretest and posttest physical fitness of Makor Korpasgat members of the interval training group are presented in table 5.

Table 5. Score Criteria Results

Statistik	Pretest	Posttest
<i>N</i>	12	12
<i>Mean</i>	51,55	55,88
<i>Median</i>	37,75	40,25
<i>Mode</i>	51,31	56
<i>Std. Deviation</i>	8,58	9,08

Effect of Circuit Training and Interval Training Towards the Physical Fitness of Korpasgat Command Headquarter Personnels

<i>Minimum</i>	37,75	40,25
<i>Maximum</i>	62,75	67,38

IV. DISCUSSION

Based on the results of the analysis, it shows that there is a significant influence of circuit training on the physical fitness of Makor Korpasgat members. These results are in line with research conducted by Taufik, et al., (2021) which shows that there is a significant influence of circuit training with an increase in the VO2Max of futsal players. The training was conducted over two months with 18 sessions three times a week.

The results of the research of Hariyanta et al. (2014: 8); Elba (2016: 6); Sanders & Sanders (2022: 7); Sukma & Sulendro (2022: 114); Purba et al. (2022: 164) show that there is a significant influence of circuit training on cardiorespiratory fitness based on the increase in VO2 max values. Circuit training is a training method using several posts that are arranged with specific intents and objectives in the training situation (Sonchan & Moungmee, 2017: 110). The exercises in the circuit must be cyclical and varied so as not to be boring (Saputra & Sutiya, 2017: 115). Exercise variations have a comparative component between: (1) work and rest, and (2) heavy and light exercise (Aryatama, 2022: 42). The adaptation process will occur well if exercise activities are balanced by rest time and heavy intensity is balanced with low (Sugarwanto & Okilanda, 2020: 87). Circuit training can strengthen the respiratory muscles and have an impact on cardiovascular endurance, this is useful for maintaining heart and lung fitness (Romadhoni et al., 2018: 45).

Research conducted by Gokulkrishnan (2018) shows that circuit training has a significant positive increase in pulmonary vital capacity and VO2Max levels. During the training period, the experimental group underwent a training program for 12 weeks (4 days/week) and the training program was given about 45 to 60 minutes per day. Research conducted by Singh (2022) shows that the significance of the level of trust is set at 0.05. Therefore, it is concluded that circuit training has a significant positive increase in lung vital capacity and VO2Max levels. During the training period, the experimental group underwent a training program for 12 weeks (4 days/week) and the training program was given about 20 to 30 minutes per day.

The results of the study of Bahtra, et al., (2020) show that t count (10.70) > t table (1.730), meaning that extensive circuit training can increase VO2Max, where the average increase in player VO2Max is 3.32. The conclusion of this study is that circuit training exercises are extensively effective in increasing the VO2Max of football players. Research conducted by Yola & Rifki (2020) shows that circuit training has an effect on increasing the VO2Max of football players. In addition to improving fitness, heart endurance or VO2Max circuit training also plays a role in improving other physical fitness components such as; muscle strength, muscle endurance, flexibility, body composition, agility, speed, balance, coordination and explosiveness.

Based on the results of the analysis, it was shown that there was a significant influence of interval training on the physical fitness of Makor Korpasgat members. This is in line with research conducted by Irfan & Kasman (2021: 187); Windiastoni & Haritsh (2019: 173); Putra et al. (2017: 167); Sumintarsih et al. (2023: 3036), showed that there was a significant effect of interval training on cardiorespiratory fitness based on the increase in VO2 max values. Nugraha & Berawi (2017: 2) stated that one of the methods of physical activity that can improve cardiorespiratory fitness is interval training. This method has several advantages such as a shorter training time, flexibility, and less injury effect on the musculoskeletal system so it is recommended to be done in people with lifestyle standards, overweight, obese, and young adults (Fisher et al., 2015:3) Interval training is a sport that requires oxygen for its energy formation which is carried out continuously, rhythmically, involving large muscle groups, especially leg muscles at the intensity of exercise 60%–90% of the Maximal Heart Rate (MHR) and 50%–85% of the maximum use of oxygen for 20–50 minutes with a frequency of exercise 3 times per week (Kusumaningtyas, 2011: 3). By applying the basic principles of training systematically, repeatedly over a long period of time, interval training can increase the activity and work of mitochondria in muscle cells, so that not only the strength of the leg muscles increases but also the VO2 max also increases (Hariyanta et al., 2014: 9).

Interval training in this case is carried out by doing training in stages by increasing the frequency of training in each training session. The most important exercise activity in this case is carried out continuously by increasing the load in each session. As stated by Tohar (2004:55) Frequency can also be interpreted as several exercises per day or how many days of exercise per week. The frequency of exercise given in this study was three times per week for six weeks, so that there was no fatigue with a six-week training duration.

Interval training causes the heart muscle to get stronger, the stronger the heart muscle will result in the amount of blood that the heart can pump in each beat will increase. Likewise, the size of the blood vessels will increase as a result of providing training, with the increase in the size of these blood vessels will cause the blood that can flow through these blood vessels will also increase. Likewise, the oxygen carried by the blood will also increase and the amount of hemoglobin will also increase. The maximum

Effect of Circuit Training and Interval Training Towards the Physical Fitness of Korpasgat Command Headquarter Personnels

volume of oxygen (VO₂Max) is influenced by the ability of the cardiorespiratory system to deliver blood to tissues that are actively working with the ability of muscles to use oxygen lowered by the blood. Along with increasing VO₂Max, it will also result in increased aerobic endurance.

V. CONCLUSIONS

Based on the results of data analysis, description, testing of research results, and discussion, it can be concluded that:

There was a significant influence of circuit training on the physical fitness of Mako Korpasgat members with a t value calculated > t table and a p value of < 0.05. Based on the results of the analysis of the paired t-test conducted in the circuit training group for between pretest and posttest scores, the target of increasing the physical fitness of the members of the Korpasgat mako was 7.58%.

There was a significant effect of training intervals on the physical fitness of Mako Korpasgat members with a t-value of > t and a p-value of < 0.05. Based on the results of the paired t-test carried out in the interval training group to find out the difference between the pretest and posttest scores, the amount of physical fitness improvement of Mako Kopasgat members was 8.59%.

There was no significant difference in influence between the type of circuit training and interval training because the analysis results showed that the comparison between circuit training and interval training had a value of p = 0.063, but for interval training, it was better to see the increase from the results of the increase reaching 8.59% while the circuit training increase was smaller by 7.58%. In the research carried out by the circuit training exercise program which was carried out with a post-by-post pattern where there were six 6 posts, including jumping jack, squat trus, sit up, push up, back up and 20-meter sprint run. And the interval training program with a 400-meter run with a time achieved of 2 minutes 30 seconds was carried out 8 reps. The results of the comparison between the circuit training method and interval training did not show a significant difference, the results of circuit training were smaller because the research instrument of the physical fitness test in the TNI combined cardiovascular, muscle strength and agility aspects of the 12-minute running test and the B battery test, pull up, sit up, push up, and shuttle run which comparatively had a higher weight of the 12-minute run, So that when carrying out treatment, each group carried out its own exercises according to the shortcomings of each group.

ACKNOWLEDGMENT

Thank you to those who contributed to this research, especially the thesis supervisors in the master of sports science programme, Yogyakarta State University.

REFERENCES

- 1) Ariani, A. (2021). Discrepancy Evaluation Model ... 22. In Jurnal Pahlawan | (Vol. 17, Issue 02).
- 2) Abida, B., & Hussain, I. (2013). Effect of fartlek training on selected physical and physiological variables of inter district women athletes. International Journal of Creative Research Thoughts, 1 (3).
- 3) Bandyopadhyay, A. (2015). Validity of cooper's 12-minute run test for estimation of maximum oxygen uptake in male university students. Biology of Sport, 32(1), 59–63. <https://doi.org/10.5604/20831862.112728>
- 4) Beachle, T. R. (1997). Latihan beban: Langkah-langkah menuju sukses. Jakarta: PT Raja Grafindo Persada
- 5) budhy Santoso. "Baret Jingga. Pasukan Payung Pertama di Indonesia". Gramedia Pustaka Utama, Jakarta, 1999.
- 6) Birch, K., MacLaren, D., & George, K. (2005). Sport & exercise physiology. UK: Garland Science/BIOS Scientific Publishers
- 7) Carless, D., & Douglas, K. (2010). Sport and physical activity for mental health. Blackwell Publishing Ltd.
- 8) Chaudhari, N. D. (2017). Effect of fartlek training on speed and cardiorespiratory endurance of university men students. International Journal of Physiology, Nutrition and Physical Education, 2(1), 273-275.
- 9) Chu, H., Kim, M. J., Katsumi, K., Kovalev, S., Dawson, R. D., Schwarz, L., Yoshikawa, N., Kim, G., Putzky, D., Li, Z. Z., Raffy, H., Germanskiy, S., Deinert, J. C., Awari, N., Ilyakov, I., Green, B., Chen, M., Bawatna, M., Cristiani, G., & Kaiser, S. (2020). Phase-resolved higgs response in superconducting cuprates. Nature Communications, 11(1), 6–11. <https://doi.org/10.1038/s41467-020-15613-1>
- 10) Depdiknas. (2000). Pedoman dan Modul Pelatihan Kesehatan Olahraga Bagi Pelatih Olahragawan Pelajar. Jakarta: Depdiknas
- 11) Direktorat Jendral Olahraga. Sudarno. (1991). Pendidikan Kesegaran Jasmani. Jakarta: Ditjen. Dikti. Depdikbud.
- 12) Fenan lampir, A., & Muhyi, F. M. (2015). Tes dan pengukuran dalam olahraga. Yogyakarta: CV Andi Offset.
- 13) Sutrisno. "Marsekal TNI Suryadi Suryadarma" Departemen Pendidikan dan Kebudayaan, Jakarta, 1985.

Effect of Circuit Training and Interval Training Towards the Physical Fitness of Korpasgat Command Headquarter Personnels

- 14) Tanzila, R. A., & Hafiz, E. R. (2019). Latihan fisik dan manfaatnya terhadap kebugaran kardiorespirasi. *Conferences of Medical Sciences Dies Natalis Faculty of Medicine Universitas Sriwijaya*, 1(1), 316–322.
- 15) Trisandy, M., & Sugiyanto. (2019). Peningkatan VO2 Max melalui circuit training pada siswa kelas VIII 4 SMP Negeri 4 kota Bengkulu. *Kinestetik*, 3(1), 70–77. <https://doi.org/10.33369/jk.v3i1.8814>
- 16) Ulpi, W., Hakim, N., Kadir, A., Pajariantio, H., & Rahmatia, R. (2021). Gambaran Kebugaran Jasmani Anak Usia Dini pada Masa Pandemi Covid-19. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, 6(1), 30–39.
- 17) Wahyuri, A. S. (2017). Pengembangan Model Latihan Kebugaran Jasmani Berbasis Aktivitas Bermain. *Jurnal MensSana*, 2(2), 14.
- 18) Wahjoedi. (2000). *Landasan Evaluasi Pendidikan Jasmani*. Jakarta: PT Panjagra Sindo Persada.
- 19) Widiastuti. (2017). *Tes dan pengukuran olahraga*. Jakarta: PT Bumi Timur Jaya



There is an Open Access article, distributed under the term of the Creative Commons Attribution – Non Commercial 4.0 International (CC BY-NC 4.0) (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits remixing, adapting and building upon the work for non-commercial use, provided the original work is properly cited.