



weeks (Ningrum et al., 2022). WHO defines physical activity as any bodily movement produced by skeletal muscles that requires energy expenditure (WHO, 2018). Physical activity refers to all movement including during leisure time, transportation to and from places, or as part of one's job. Moderate and vigorous intensity physical activity improves health. Activities that include physical activities such as walking, cycling, sports, play, and all activities that foster enjoyment for everyone.

Doing physical activity such as regular exercise every day is one of the foundations of a healthy lifestyle. However, many people still interpret physical activity as strenuous exercise full of torture. A regular physical activity or light to moderate exercise, to routine and regular and sustainable is one of the most important things that can be done easily to obtain various health benefits.

Physical activity such as exercise can affect a person's oxygen levels and pulse frequency. In general, oxygen levels and heart rate have a reciprocal relationship. When exercising or physical activity, the heart rate tends to be faster, so the need for oxygen in the body also increases. According to WHO, normal oxygen saturation is between 95% -100% oxygen saturation measurement using a pulse oximetry device (Wulandari & Wigunantingsih, 2022). Therefore, with a fast heart rate, it will accelerate blood flow, and more oxygen will diffuse into the pulmonary capillaries. During physical exercise does not decrease the value of oxygen saturation but remains or increases.

Low oxygen saturation is a sign that the body's tissues are not getting enough oxygen. With an oxygen saturation value of less than 70%, a person needs to get help immediately, because this endangers the body's condition (Rompas et al., 2020). Thus, normal oxygen saturation has benefits for human life processes.

Oxygen saturation is a measure of health to measure the level of oxygen in the bloodstream. This medical examination is important to find out whether a person's condition is lacking oxygen or not. Previous studies mentioned that there is an effect of physical activity on increasing oxygen saturation, but there is also the

opposite. Physical activity has a direct effect on the cardiovascular system, both acute and chronic effects. If physical activity is increased it will be followed by an increase in pulse frequency and vice versa. The pulse is the rotational frequency of the amount of blood circulation to the heart and is measured to determine the frequency of the heart rate (Effendi, 2019).

The heart rate is affected by blood flow requirements, the chemoreceptor system and the baroreceptor system (Suwanto et al., 2021). Pulse measurement to track the work of the heart which does not include pulmonary status. Pulse measurement is so important, for a normal pulse measurement it is 60-100 times per minute where the measurement also uses the same tool. For teenagers, when doing sports, it is necessary to pay attention that the pulse should not exceed 160 beats per minute and even exceed 180 beats per minute because it will be risky for the heart. Therefore, it is necessary to calculate heart rate before and after exercising physical activity.

Foss (1997) says pulse rate increases during physical exercise. This increase is due to the increased need for blood to transport O<sub>2</sub> to active parts of the body, CO<sub>2</sub> buildup, increased body temperature, lactic acid buildup, and reduced O<sub>2</sub>. (IN Sandi, 2016). There is very strong scientific evidence that doing moderate-intensity physical activity for at least 30 minutes per day or 150 minutes per week regularly can reduce the risk of various non-communicable diseases and the risk of premature death from chronic diseases. Regular physical activity also plays a role important for cardiovascular health. Research estimates that for every additional 2 hours of sitting, the risk of cardiovascular disease events increases by 5%. But on the other hand, at least exercising for 1 hour can restore the body's fitness lost due to 6-7 hours of sitting. Any increase in activity will be very beneficial for health. Compared to sitting still on the couch, taking more frequent steps is better. Walk briskly or exercise at a moderate intensity for 30 minutes

In general, all physical activities that require physical exercise require VO<sub>2</sub>max (aerobic capacity). VO<sub>2</sub>max is the athlete's body's ability to overcome

fatigue and be used by the body during strenuous activity (Bassett & Howley, 2000). In sporting activities a person's maximum oxygen uptake is very necessary, because he can continue to exercise actively. Because the main purpose of VO<sub>2</sub>max is to increase the work capacity of the heart in addition to increasing the work of the lungs and the circulatory system and increasing physical fitness (Anggrain & Widodo, 2021). In summary, it can be seen that maximum oxygen uptake (VO<sub>2</sub>max) is very important for the human body.

Regular and planned exercise will increase the strength and volume of breathing of the respiratory muscles. Endurance training is important in the cellular adaptation of respiratory muscles and the respiratory system (Taýgýn & Dönmez, 2009). The functional status of the respiratory system can conventionally be determined by measuring the volume and capacity of the lungs. Changes in respiratory volume and frequency occur with physical activity. aerobic exercise; This is a type of exercise in which large muscle groups participate continuously and rhythmically. Aerobic exercise helps improve the athlete's oxygen system (Ard, 2014). Aerobic-based exercise tends to be considered one of the foundations of a quality and healthy life. Sports program in accordance with the goal of achieving a quality and healthy life.

This study aims to see the effect of physical activity on oxygen saturation and pulse frequency in the 4th Journalist Games Participants. It is hoped that the results of this study can add to the knowledge of participants in particular and readers in general about the importance of knowing physical activity in the form of 3 on 3 basketball, badminton or futsal on oxygen saturation and pulse frequency.

## **METHOD**

This research is an experimental research with a research design "One Groups Pretest-Posttest Design". The research design contained a pretest before being given treatment and a posttest after being given treatment (Sugiyono, 2015). sampling selection technique using purposive sampling of 92 people. The sample

limits are included in the inclusion criteria, namely participants in the fourth Journalist Games and aged  $\geq 17$  years. The exclusion criteria were participants in the 4th Journalist Games who could not communicate well in the sense that they could not read, write and hear well.

The research was conducted at the Futsal and Badminton Courts of the Republic of Indonesia Ministry of Youth and Sports, on August 31 2022. Oxygen saturation and pulse frequency data were collected using pulse oximetry, where measurements were taken 30 minutes before and 30 minutes after the respondent carried out physical activities such as basketball 3 on 3, badminton or futsal. Data is processed using the Normality Test and the Wilcoxon test.

## RESULTS AND DISCUSSION

Table 1 shows the average value of oxygen saturation before exercising physical activity, namely 98.10 with a minimum value of 93, a maximum value of 99, and a standard deviation of 1.100. The mean value of oxygen saturation after exercising physical activity is 97.79, with a minimum value of 95, a maximum value of 99, and a standard deviation of 1.043.

**Table 1.** Distribution of statistical descriptive values of oxygen saturation before and after exercising physical activity

Oxygen Saturation	N	Average	Min	max	SD
Pre	98.10	92	93	99	1,100
Post	97.79	92	95	99	1,043

Table 2 shows the average pulse rate before doing physical activity, namely 98.64 with a minimum value of 63, a maximum value of 143, and a standard deviation of 15.71. The mean pulse rate after physical activity is 109.54, with a minimum value of 71, a maximum value of 158, and a standard deviation of 16.65.

**Table 2.** Distribution of statistical descriptive values of pulse frequency before and after exercising physical activity

Pulse Frequency	N	Average	Min	Max	SD
Pre	98.64	92	63	143	15,71
Post	108,37	92	71	158	16.65

The results of the data normality test with the Kolmogorov-Smirnov and Shapiro-Wilk tests showed that the data were not normally distributed, which can be seen in the table below this.

**Table 3.** Normality data

Variable	Kolmogorov-Smirnov		Shapiro-Wilk
		Sig.	Sig.
oxygen saturation	Pre	0.000	0.000
	Pos	0.000	0.000
	t		
Pulse Frequency	Pre	0.032	0.068
	Pos	0.019	0.141
	t		

Based on the table above, determine whether the data is normally distributed or not by using the Kolmogorov-Smirnov test, because there were 92 people in this study, the results of the normality test obtained a p-value of less than 0.05, which means that the data is not normally distributed, so the Wilcoxon test was carried out to see the difference in oxygen saturation and initial and final pulse frequency in each group. So then, to test the differences from each group of respondents, a non-parametric test was carried out, namely using the Wilcoxon test with a significance level of p 0.05. Can be seen in the table below:

**Table 4.** Wilcoxon Signed Rank Test Results

	Oxygen Saturation pretest - posttest	Pulse Frequency pretest - posttest
Z	-2,272	-5.154
asympt. Sig. (2-tailed)	0.023	0.000

For oxygen saturation before and after, the results of the calculation of the Wilcoxon Signed Rank Test get a Z value of -2.272 with a p value = 0.023 <0.05 (Asymp. Sig. 2-tailed) which means there is a significant difference between the pretest and posttest groups. So it can be concluded that there is an effect of physical activity on oxygen saturation in the 4th games journalist participants.

Furthermore, the results of the calculation of the Wilcoxon Signed Rank Test get a Z value of -5.154 with a p value = 0.000 <0.05 (Asymp. Sig. 2-tailed). It

can be concluded that there is a difference between the pulse frequencies of the groups pretest - posttest doing physical activity. So it can be concluded that there is an effect of physical activity on the pulse frequency of the 4th games journalist participants.

## Discussion

The results of the study showed that there was an average difference in oxygen saturation where there was a decrease in oxygen saturation after physical activity. This finding is in accordance with the research of Kalkan and Daglioglu (2018) that there is an effect of short-term training on oxygen saturation with physical exercise in soccer players. (Kalkan & Daglioglu, 2018). Rhythm Gymnastics for Family Fitness can provide a positive contribution on physical fitness (Puspitorini & Tangkudung, 2022). So, with a decrease in this saturation value indicates that when doing physical activity there is no increase in oxygen uptake.

In this study, oxygen saturation values and pulse rates were found to persist, decrease, and increase after physical exercise (basketball 3 on 3, badminton or futsal). The results of this study were statistically significant when tested with the Wilcoxon Signed Rank Test, which means that there were significant differences in the oxygen saturation values before and after doing physical activity in the research subjects. The results of this study are in line with the findings of the study that there was a significant increase in oxygen saturation values with a value of  $p = 0.0041$  after performing acute physical exercise. (Simanjuntak et al., 2016). Someone who does regular physical activity can improve cardiovascular abilities and lung vital capacity. That way the oxygen saturation value will increase or stay the same after completing physical activity. This can help the body to carry out optimal physical activity, because the oxygen supply is sufficient and energy needs will be more easily met.

Then, for the average value of pulse frequency, there was an increase after doing physical activity. The results of this study were also statistically significant when tested with the Wilcoxon Signed Rank Test, which means that there were significant differences in the pulse frequency values before and after exercising physical activity. This is in line with research findings regarding significant differences in oxygen saturation between futsal athletes and non-athletes in Yogyakarta (Damayanti, 2016). In addition, from the research results of Eroglu et. It is known that acute aerobic exercise significantly reduced oxygen saturation in arterial blood,  $p < 0.01$  (Eroglu et al., 2018). Furthermore, the results of previous research found that with 2 x 30 minutes of aerobic exercise carried out, it can increase pulse frequency, blood lactic acid, body temperature, and exercise blood pressure. (N. Sandi et al., 2016). During physical exercise, heart rate is largely controlled by the balance between inhibition by the vagus nerve and stimulation by the cardiac sympathetic nerves. So that if the intensity of physical activity is increased it will be followed by an increase in pulse frequency.

## CONCLUSION

The conclusion of this study is that there is a significant effect between physical activity on oxygen saturation with a value of  $p = 0.023 < 0.05$ , and there is a significant effect between physical activity on pulse frequency with a value of  $p = 0.000 < 0.05$ . Thus, there is a significant difference in the value of oxygen saturation and pulse frequency before and after exercising physical activity.

The researcher's suggestion is that it is necessary to carry out further research by providing further physical activity with a greater number of respondents, as well as paying attention to the factors that affect oxygen saturation and pulse frequency.

## REFERENCES

- Anggrain, F. S., & Widodo, A. (2021). Analisis Kapasitas Aerobik Maksimal (VO2Max) Pada Atlet Sepak Bola UNESA. *Jurnal Kesehatan Olahraga*, 9(4), 103–106.
- Bassett, D. R., & Howley, E. T. (2000). Limiting factors for maximum oxygen



- uptake and determinants of endurance performance. / Facteurs limitants de la consommation maximale d'oxygene et determinants de la performance d'endurance. *Medicine & Science in Sports & Exercise*, 32(1), 70–84.
- Damayanti, S. (2016). Study Komparatif Kapasitas Vital Paru Dan Saturasi Oksigen Pada Atlet Futsal Dan Non Atlet Di Yogyakarta. *Jurnal Keperawatan Respati Yogyakarta*, 3(2), 23–34. <http://nursingjurnal.respati.ac.id/index.php/JKRY/article/view/27>
- Efendi, H. (2019). Perubahan Denyut Nadi Pada Remaja Setelah Jogging Dengan Jarak 2 Km Di Taman Cadika Medan Johor. *Jurnal Penelitian Kesmasy*, 2(1), 58–63. <https://doi.org/10.36656/jpkpsy.v2i1.160>
- Eroğlu, H., Okyaz, B., & Türkçapar, Ü. (2018). The Effect of Acute Aerobical Exercise on Arterial Blood Oxygen Saturation of Athletes. *Journal of Education and Training Studies*, 6(9a), 74. <https://doi.org/10.11114/jets.v6i9a.3562>
- Kalkan, M. K., & Daglioglu, O. (2018). The Effects of 8-Week Aerobic Training Program on Respiratory and Circulatory Parameters of Female Swimmers Between 12-14 Years Old. *Journal of Education and Training Studies*, 6(12), 202. <https://doi.org/10.11114/jets.v6i12.3745>
- Ningrum, D. T. M., Chaniago, H., Pasaribu, A. M. N., & Mahyudi, Y. V. (2022). Types of Physical Activity and Sports for teens in Maintaining Physical Fitness in Leisure. *Halaman Olahraga Nusantara (Jurnal Ilmu Keolahraagan)*, 5(2), 661. <https://doi.org/10.31851/hon.v5i2.8710>
- Puspitorini, W., & Tangkudung, J. (2022). Rhythm Gymnastics Modification Model for Family Fitness During The Covid 19 Pandemic. *Halaman Olahraga Nusantara (Jurnal Ilmu Keolahraagan)*, 5(2), 414. <https://doi.org/10.31851/hon.v5i2.7764>
- Rompas, S. E., Pangkahila, E. A., & Polii, H. (2020). Perbandingan Saturasi Oksien Sebelum dan Sesudah Melakukan Latihan Fisik Akut pada Mahasiswa Fakultas Kedokteran Unsrat Angkatan 2019. *Jurnal E-Biomedik*, 8(1), 41–45.
- Sandi, I. N. (2016). Pengaruh latihan fisik terhadap frekuensi denyut nadi. *Sport and Fitness Journal*, 4(2), 1–6.
- Sandi, N., Pangkahila, A., & Adiatmika, P. G. (2016). Relative Humidity of 40% Inhibiting the Increase of Pulse Rate, Body Temperature, and Blood Lactic Acid During Exercise. *Bali Medical Journal*, 5(2), 30. <https://doi.org/10.15562/bmj.v5i2.203>
- Simanjuntak, R. H., Engka, J. N. ., & Marunduh, S. R. (2016). Pengaruh latihan fisik akut terhadap saturasi oksigen pada pemain basket mahasiswa Fakultas Kedokteran Unsrat. *Jurnal E-Biomedik*, 4(1), 20–24.

---

<https://doi.org/10.1249/JES.0000000000000116>

Suwanto, Y. A., Lusiana, L., & Purnama, Y. (2021). Perbedaan Denyut Nadi dan Saturasi Oksigen Sebelum dan Sesudah Senam Bhineka Tunggal Ika (SBTI) di Era Pandemi Covid-19. *Journal of Sport Coaching and Physical Education*, 6(1), 59–62. <https://doi.org/10.15294/jscpe.v6i1.46034>

WHO, W. H. O. (2018). *World Health Statistics 2018 : Monitoring health for the SDGs : Sustainable Development Goals* (Vol. 63, Issue 2). [http://forschungsunion.de/pdf/industrie\\_4\\_0\\_umsetzungsempfehlungen.pdf](http://forschungsunion.de/pdf/industrie_4_0_umsetzungsempfehlungen.pdf) [https://www.dfki.de/fileadmin/user\\_upload/import/9744\\_171012-KI-Gipfelpapier-online.pdf](https://www.dfki.de/fileadmin/user_upload/import/9744_171012-KI-Gipfelpapier-online.pdf) [https://www.bitkom.org/sites/default/files/pdf/Presse/Anhaenge-an-PIs/2018/180607 -Bitkom-KPM](https://www.bitkom.org/sites/default/files/pdf/Presse/Anhaenge-an-PIs/2018/180607-Bitkom-KPM)

Wulandari, T., & Wigunantiningih, A. (2022). Pengaruh Aktivitas Fisik Berat Terhadap Saturasi Oksigen. *Jurnal Link*, 18(2), 113–118. <https://doi.org/10.31983/link.v18i2.8935>