The Effect of Aerobic Exercise in Combination with Intermittent Fasting Diet on Changes in Total Cholesterol Levels in Overweight Individuals in Bulukumba Regency

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ABSTRACT

Background: Being overweight and obese is a major risk factor for metabolic disorders, including hypercholesterolemia, which can lead to cardiovascular disease. Cholesterol levels can be reduced through non-pharmacological interventions such as aerobic exercise and intermittent fasting, which are believed to be effective in lowering cholesterol levels. Objective: To determine the effect of aerobic exercise combined with intermittent fasting diet on changes in cholesterol levels in overweight individuals in Bulukumba Regency. Method: This research method uses a quasi-experimental design with a nonequivalent control group design. The sample consisted of 34 respondents divided into two groups, namely the intervention group and the control group, each with 17 people. This intervention was carried out for 6 weeks, with a frequency of exercise 3x a week and interspersed with an intermittent fasting diet. Cholesterol levels were measured before and after the intervention using a cholesterol meter. Data analysis was carried out using a paired t-test. Results: The analysis showed a decrease in the average cholesterol level in the intervention group from 208.29 mg/dl to 182.24 mg/dl. Conversely, in the control group, there was an increase in cholesterol levels from 202.35 mg/dl to 211.76 mg/dl. Statistical tests showed a p value = 0.001 ($p < 0.005$), which means there is a significant effect between aerobic exercise combined with intermittent fasting diet on changes in cholesterol levels. Conclusion: Aerobic exercise combined with an intermittent fasting diet is effective in lowering cholesterol levels in overweight individuals. This intervention could be an alternative non- pharmacological strategy for controlling cholesterol levels and preventing cardiovascular disease.

Keywords: Aerobic; Intermittent Fasting; Overweight; Obesity

INTRODUCTION

In Indonesia, many individuals from all age groups suffer from obesity. (Wibisono et al., 2024) Obesity can affect anyone, from children to adults. Lifestyle changes due to urbanization, modernization, and globalization are contributing factors to the increasing prevalence of non-communicable diseases (NCDs), including obesity. (Nadila Sari dkk, 2024)

Eating habits formed during adolescence can impact health later in life, including adulthood and old age. Unhealthy eating patterns, such as consuming high-calorie foods, lots of sugar, and sugary drinks, and not consuming enough vegetables, fruits, and fiber,

can lead to health problems. An imbalance between calorie intake and expenditure can lead to weight gain.. (Retno Wahyuningsih & Jaya ningrat, 2015). According to WHO (World Health Organization) data, more than 1.4 billion adults are overweight, and around 2.8 million adults die each year due to obesity. (Kemenkes RI, 2017).

Data from the Indonesian Health Survey (SKI) shows that the prevalence of overweight and obesity increased in the previous year, with the overweight rate reaching 13% and the obesity rate reaching 21%. By 2023, the prevalence of overweight and obesity is expected to increase to 14.4% and 23.4%.(Kemenkes, 2023). In South Sulawesi Province, there has been an increase in cases of overweight and obesity among those aged 18 and over, with prevalence reaching 13% and 21% for obesity, respectively. Furthermore, cases of overweight and obesity are higher among women than men. (Kemenkes, 2023). Data from the Bulukumba Regency Health Office shows a year-over-year increase. In 2024, cases of overweight and obesity reached 7,483 and 11,814, respectively. This is concerning, considering that overweight and obesity are risk factors for various non- communicable diseases (NCDs), such as high cholesterol and other degenerative diseases.

Most overweight individuals tend to have a sedentary lifestyle, consuming foods high in fat and carbohydrates. (Nadia Alfira & Muriyati, 2021). If this trend continues, it is estimated that by 2030 around 38% of the global population will be overweight, while another 20% will be obese. High fat consumption can cause increased cholesterol levels in the blood. (Roziana et al., 2024) Cholesterol is a type of fat found in the bloodstream and body cells. Cholesterol is necessary for the formation of cell walls and as a basic ingredient in hormone synthesis. Approximately 80% of the body's cholesterol is produced naturally by the liver. Meanwhile, about 20% of cholesterol comes from food, particularly animal products such as meat, eggs, and milk. Total cholesterol consists of several types, including LDL cholesterol, HDL cholesterol, and triglycerides. (Duwi Anita Sari et al., 2024).

Research conducted by (Wahadi et al., 2024) One non-pharmacological therapy that can prevent calorie gain is diet. Intermittent fasting is a dietary strategy comparable to calorie restriction. Implementing intermittent fasting has several effects, including weight loss, lipid metabolism, blood pressure, cardiovascular risk, diabetes mellitus, and microvascular and macrovascular complications. Intermittent fasting is effective for the primary prevention of obesity and diabetes, as well as the treatment of other

cardiovascular factors.

Research on intermittent fasting diet and cholesterol by (Hamdani & Fahlevi, 2025) Studies have shown that intermittent fasting has an impact on fat levels. Within 2-3 weeks of the diet, weight loss is approximately 3%. Over the long term, weight loss can reach 8% due to reduced visceral fat. Additionally, total cholesterol (TC), triglyceride (TG), and LDL levels also decrease, thereby reducing the risk of cardiovascular disease. Furthermore, the reduction in body fat and chronic inflammation caused by intermittent fasting also contributes to reduced insulin resistance.

Research on aerobic exercise and total cholesterol levels has been conducted by (Nurul et al., 2022) He said that physical activity such as aerobics is a type of light exercise that can increase heart and lung endurance and can lower cholesterol levels in the body, lower blood pressure, improve body weight, improve mood, and prevent depression.

According to (Muriyati & Syamsuddin, 2018) Aerobic exercise increases the use of fat as an energy source by burning free fatty acids. As we see today, especially in the Bulukumba region, everything is instant, especially considering the high prevalence of obesity and overweight, which can potentially trigger degenerative diseases such as heart disease, hypertension, diabetes, and stroke, which can accelerate death. Therefore, researchers are interested in examining cases of overweight by observing and providing interventions according to the research title "The Effect of Aerobic Exercise Combined with an Intermittent Fasting Diet on Changes in Cholesterol Levels in Overweight Individuals" to provide new insights into how the combination of these two interventions can affect cholesterol levels and prevent fat gain.

The aim of this study was to determine the effect of aerobic exercise combined with an intermittent fasting diet on changes in total cholesterol levels in overweight individuals.

MATERIALS AND METHODS

This quantitative study employed a quasi-experimental design with a nonequivalent control group design. It was conducted from April to May 2025 in Bulukumba Regency. The population comprised 19,297 overweight and obese individuals, registered from January to December 2024. The sample size consisted of 34 individuals, consisting of an intervention group and a control group, selected using a non-probability random sampling technique with a purposive sampling approach.

The instruments used were an observation sheet, a glucometer, and blood glucose

strips, branded Nesco Multicheck, with AKL number 20101112731 from the Ministry of Health of the Republic of Indonesia. Bivariate analysis aimed to identify the relationship between the independent and dependent variables. Therefore, the statistical test used was an unpaired t-test. Data analysis in this study used SPSS version 22 for Windows. This research has received approval from the Research Ethics Commission of Panrita Husada Bulukumba Health College with number: 001196/KEP Panrita Husada Bulukumba Health College/2025.

RESULTS

Based on Table 1, the characteristics of respondents in the intervention group show that the majority were female (16 people) and 1 person (5.9%). Based on age category, 1 person (5.9%) was 18-25 years old, 4 people (23.5%) were 26-35 years old, and 12 people (70.6%) were 36-45 years old. For occupational categories, 1 person (5.9%) was a student, 3 people (17.6%), and 13 housewives (76.5%). In the BMI category, 4 people (23.5%) were overweight and 13 people (76.5%) were obese. Meanwhile, based on the genetic history category, 9 people (52.9%) had a genetic history of being overweight and 8 people (47.1%) had no genetic history.

Meanwhile, in the control group, the majority of respondents were also female (16 people (94.1%), and 1 person was male (5.9%). Based on age category, 1 person (5.9%) was 18-25 years old, 5 people (29.4%), and 11 people (64.7%) were 36-45 years old. Meanwhile, in the occupational category, 1 person (5.9%) was self- employed, and 16 people (94.1%) were housewives. For the BMI category, 6 people (35.3%) were overweight, and 11 people (64.7%) were obese. As for the genetic history category, 8 people (47.1%) had a genetic history of being overweight, and 9 people (52.9%) had no history genetik.

Tabel 1. Respondent Characteristics Based on Gender, Age, Occupation, BMI, and Genetic History in Overweight Individuals in Bulukumba Regency

Respondent Characteristics	Intervention Group		Control Group	
	Frekuensi (n)	Persentase (%)	Frekuensi (n)	Persentase (%)
Gender				
Men	1	5,9	1	5,9
woman	16	94,1	16	94,1
age				
18-25 year	1	5,9	1	5,9
26-35 year	4	23,5	5	29,4
36-45 year	12	70,6	11	64,7
work				

student	1	5,9	0	0,0
Self-employed	0	0,0	1	5,9
Teacher	3	17,6	0	0,0
Housewife	13	76,5	16	94,1
IMT				
Overweight	4	23,5	6	35,3
Obesitas	13	76,5	11	64,7
Genetic History				
no	9	52,9	8	47,1
yes	8	47,1	9	52,9
Total	**17**	**100,0**	**17**	**100,0**

Based on table 2, the average value is known that the number of respondents in each group, both the intervention and control groups, was 17 people. The average (mean) cholesterol level in the intervention group before the intervention was 208.29 mg/dl (45,383), while in the control group the average cholesterol level was 202.35 mg/dl (25,402). This shows that before the intervention, the cholesterol levels in the two groups were not much different.

Table 2. Distribution of Total Cholesterol Levels in the Intervention and Control Groups Before *Intermittent Fasting Diet Combination Aerobic Exercise*

Cholesterol Total Up	T	Mean SD
Pretest Intervensi	17	208.29 45.383
Pretest Control	17	202.35 25.402

Based on table 3, it shows that after aerobic exercise combined with intermittent fasting diet, there was a difference in the average cholesterol levels in the intervention and control groups. The intervention and control groups consisted of 17 respondents with an average cholesterol level of 182.24 mg/dl (34,361), while the control group had an average cholesterol level of 211.76 mg/dl (28,746). This shows that there was a decrease in cholesterol levels in the intervention group after aerobic exercise combined with intermittent fasting diet, while the control group showed an average cholesterol level that remained higher.

Tabel 3. Distribution of Total Cholesterol Levels in the Intervention and Control Groups After Aerobic Exercise Combined with Intermittent Fasting Diet

Cholesterol Up	N	Mean ± SD
Posttest Intervensi	17	182.24 34.361
Posttest Kontrol	17	211.76 28.746

Based on table 4, it is known that there is an average difference in cholesterol levels between the intervention and control groups after treatment in the form of aerobic exercise combined with an intermittent fasting diet. In the intervention and control groups consisting of 17 respondents, the average cholesterol level was recorded at 182.24 mg/dl (34,361), while in the control group the average result was 211.76 mg/dl (28,746).

This means that there is an effect of aerobic exercise combined with an intermittent fasting diet on changes in cholesterol levels.

The results of the paired T-test obtained $p = 0.011$, ($p < 0.005$), so it was concluded that there was an effect on cholesterol levels. In other words, aerobic exercise combined with intermittent fasting diet, if done routinely and consistently, can lower cholesterol levels. However, if done irregularly with a controlled diet, it can affect cholesterol levels.

Table 4. Analysis of the Effect of Aerobic Exercise Combined with Intermittent Fasting Diet on Changes in Total Cholesterol Levels in the Intervention and Control Groups

Groups	N	Mean ± SD	Differences	Value *p* Sig. (2-tailed)
Intervention	17	182.24 ±34.361	-29.529	0,011
Control	17	211.76 ± 28.748		

DISCUSSION

Cholesterol levels before aerobic exercise combined with intermittent fasting diet in overweight individuals in Bulukumba Regency.

The results of this study showed that the average cholesterol level before the intervention in the intervention group was 208.35 mg/dl, while in the control group it was 202.35 mg/dl. This indicates that before the intervention, cholesterol levels in both groups were high and did not differ significantly.

The results of this study showed that the average cholesterol level before the intervention in the intervention group was 208.35 mg/dl, while in the control group it was 202.35 mg/dl. This indicates that before the intervention, cholesterol levels in both groups were high and did not differ significantly (Indasah & Utama, 2021) High total cholesterol levels (>200 mg/dl) indicate a fat metabolism disorder that often occurs in overweight and obese individuals due to an imbalance between energy intake and expenditure.

This research is in line with (Duwi Anita Sari et al., 2024) stated that the average cholesterol level before aerobic exercise intervention in elderly respondents was also in the high range, namely 236 mg/dl, which strengthens the finding that overweight individuals tend to experience dyslipidemia. In addition, research that is in line with the intermittent fasting diet according to (Fairuz et al., 2024) said that before the dietary intervention, the results of the intervention showed that most respondents had an unhealthy lipid profile, which was likely influenced by lifestyle factors, such as a high-fat diet, fast food consumption, and lack of physical activity.

Researchers assumed that high cholesterol levels before the intervention were caused by a high-fat and high-carbohydrate diet and lack of physical activity.

Furthermore, genetic and lifestyle factors, particularly in Bulukumba Regency, tend to prioritize instant gratification, likely influencing lipid profile values..

Cholesterol levels after aerobic exercise combined with intermittent fasting in overweight individuals in Bulukumba Regency.

The results of the six-week study showed that cholesterol levels in the intervention group decreased to 182.24 mg/dl, while in the control group they increased to 211.76 mg/dl. This suggests that aerobic exercise combined with intermittent fasting has an effect on cholesterol levels.

According to (Muriyati & Syamsuddin, 2018) Aerobic exercise increases fat utilization as an energy source by burning free fatty acids, while intermittent fasting stimulates fat metabolism by reducing calorie intake and increasing insulin sensitivity. This combination of interventions synergistically improves lipid metabolism. This research is in line with (Nurul et al., 2022) in his research stated that mixed-effect aerobics can significantly lower cholesterol. In addition, research by(Fairuz et al., 2024) shows that the intermittent fasting diet is able to reduce total cholesterol levels through the mechanism of breaking down fat into ketone bodies as an alternative energy source.

The researchers hypothesized that the decrease in cholesterol levels in the intervention group was due to increased fat burning through exercise and the presence of fasting breaks that significantly reduced calorie intake. In contrast, the control group, which followed no diet or structured activity, showed a trend toward increased cholesterol levels.

The Effect of Aerobic Exercise Combined with an Intermittent Fasting Diet on Changes in Cholesterol Levels.

The results of this study showed a significant difference in cholesterol levels between the intervention and control groups after the intervention. The intervention group showed a decrease in cholesterol levels with an average value of 182.24 mg/dl, while the control group experienced an increase of 211.76 mg/dl. This indicates the effect of aerobic exercise combined with intermittent fasting on changes in cholesterol levels.

Aerobic exercise is a type of exercise involving light movements that can improve heart and lung endurance. When done regularly, this exercise can improve overall body condition. (Kardi et al., 2020) Meanwhile, intermittent fasting is a diet that requires you to abstain from food for a set period of time. During the fasting period, you're allowed to drink water to prevent dehydration. (Amirah Zakaria et al., 2022). This research is in line

with (Duwi Anita Sari et al., 2024) showed a significant decrease in cholesterol from 236 mg/dl to 141.18 mg/dl after low-impact aerobic exercise. Meanwhile, according to (Hamdani & Fahlevi, 2025) In his research, he stated that with intermittent fasting, after 6-8 hours, ketone levels begin to rise, indicating that the body is shifting to fat storage as its primary energy source. This process leads to a decrease in LDL levels and a decrease in HDL.

The combination with an intermittent fasting diet has not been widely studied, so this study can be used as initial empirical evidence regarding the effectiveness of combining two non-pharmacological approaches. Researchers believe that combined interventions are more effective than either therapy alone. The combination of exercise and diet creates a synergistic effect in controlling cholesterol levels through different but mutually reinforcing metabolic pathways: increased energy expenditure and energy restriction.

CONCLUSION

The average pretest cholesterol level of respondents who did aerobic exercise combined with intermittent fasting diet in the intervention group was 208.29 mg/dl and in the control group was 202.35 mg/dl. The average post-test cholesterol level of respondents who did aerobic exercise combined with an intermittent fasting diet in the intervention group was 182.24 mg/dl and in the control group was 211.76 mg/dl. There is an effect of aerobic exercise combined with an intermittent fasting diet on changes in cholesterol levels in overweight individuals.

REFERENSI

Amirah Zakaria, N., Ezayana Zainal, N., & Sains Komputer dan Teknologi Maklumat, F. (2022). Pembangunan sistem aplikasi Intermittent Fasting Track (Development of Intermittent Fasting Track application system). *Applied Information Technology And Computer Science*, *3*(1), 506–513. https://doi.org/10.30880/aitcs.2022.03.01.033

Duwi Anita Sari, N., Teguh Kurniawan, S., Dwi Sulisetyowati, S., Program Studi Keperawatan Program Sarjana Fakultas Ilmu Kesehatan Universitas Kusuma Husada Surakarta, M., & Program Studi Keperawatan Program Sarjana Fakultas Ilmu Kesehatan, D. (2024). *Program Studi Keperawatan Program Sarjana Fakultas Ilmu Kesehatan Universitas Kusuma Husada Surakarta 2024 Pengaruh Aktivitas Fisik (Senam Aerobic) Terhadap Perubahan Kadar Kolestrol Di Posyandu Lansia Desa Candisari Kabupaten Grobogan*. *000*.

Fairuz, R. A., Absari, N. W., Utami, R. F., & Djunet, N. A. (2024). Pengaruh Diet Puasa (Intermittent Fasting) Terhadap Penurunan Berat Badan, Perubahan Metabolik, Dan Massa Otot. *Healthy Tadulako Journal (Jurnal Kesehatan Tadulako)*, *10*(1), 40–
47. https://doi.org/10.22487/htj.v10i1.975

Hamdani, R., & Fahlevi, I. (2025). Pengaruh Puasa Intermiten Terhadap Kesehatan Kardiovaskular. *Scientific Journal*, *4*(3), 181–192. https://doi.org/10.56260/sciena.v4i3.223

Indasah, & Utama, R. D. (2021). Kolesterol Dan Penanganannya. In *Strada Press*.

Kardi, I. S., Widarti, R., & Nasrii. (2020). Penerapan Senam Lansia untuk Mengontrol Kadar Kolesterol Di Posyandu Marsudi Waras RW 12 Kota Surakarta. *The 11th University Research Colloquium 2020 Universitas 'Aisyiyah Yogyakarta*, *3*, 59–63. http://repository.urecol.org/index.php/proceeding/article/view/898/869

Kemenkes. (2023). Survei Kesehatan Indonesia 2023 (SKI). In *Badan Kebijakan Pembangunan Kesehatan (BKPK)*.

Kemenkes RI. (2017). *Paduan Pelaksanaan Gerakan Nusantara Tekan Angka Obesitas (GENTAS)* (p. 40). www.p2ptmkemenkesri.go.id

Muriyati & Syamsuddin. (2018). *DASAR- DASAR OVERWEIGHT OBESITAS AEROBIK* (T. W. Publish (ed.)). WADE GROUP. Buatbuku.com

Nadia Alfira & Muriyati. (2021). Borobudur Nursing Review. *Borobudur Nursing Review*, *01*(01), 43. https://doi.org/10.31603/bnur.11600

Nadila Sari dkk. (2024). *Gambaran Pengetahuan Mahasiswa Calon Guru Sekolah Dasar terkait Masalah Obesitas*. *10*(1), 10–23.

Nurul, S., Langlang, M., Rahmasari, I., & ... (2022). Senam Aerobic Mix Impact Mampu Menurunkan Kadar Kolesterol. *Prosiding Seminar …*, 524–528. http://ojs.udb.ac.id/index.php/sikenas/article/download/2108/1664

Putri, A., Nazara, R., & Febriyanti, E. (2022). Sosialisasi Pencegahan Obesitas Berdasarkan Indeks Massa Tubuh. *Jurnal Implementa Husada*, *3*(3), 131–134. https://doi.org/10.30596/jih.v3i3.11797

Retno Wahyuningsih & Jaya ningrat. (2015). *BUKU SAKU KEGEMUKAN DAN GIZI SEIMBANG*.

Roziana, R., Gultom, Y. M., Alza, Y., & Arsil, Y. (2024). Hubungan Asupan Zat Gizi Terhadap Kadar Glukosa Darah, Kolesterol Dan Asam Urat, Pada Pegawai Kantor Di Provinsi Riau. *Darussalam Nutrition Journal*, *8*(1), 24–33.

https://doi.org/10.21111/dnj.v8i1.10771

Wahadi, W., Nurachmah, E., & Maria, R. (2024). Diit Rendah Karbohidrat dan Puasa Intermitten terhadap Tekanan Darah pada Penderita Hipertensi. *Journal of Telenursing (JOTING)*, *6*(1), 921–929. https://doi.org/10.31539/joting.v6i1.9513

Wibisono, I. G. A. B., Irawan, D. C., & Aziz, M. Z. (2024). Hubungan aktivitas fisik terhadap prevalensi overweight pada siswa SMP Muhammadiyah 10 Sidoarjo. *Jurnal Olahraga Pendidikan Indonesia (JOPI)*, *3*(2), 116–125. https://doi.org/10.54284/jopi.v3i2.304

Kemenkes. (2018). Laporan Riskesdas 2018 Nasional.pdf. In *Lembaga Penerbit Balitbangkes*. Badan Penelitian Dan Pengembangan Kesehatan Kementerian Kesehatan RI. https://repository.badankebijakan.kemkes.go.id/id/eprint/3514/1/Laporan Riskesdas 2018 Nasional.pdf

Kemenkes. (2023). Survei Kesehatan Indonesia 2023 (SKI). In *Badan Kebijakan Pembangunan Kesehatan (BKPK)*. https://kemkes.go.id/id/survei-kesehatan-indonesia-ski-2023

WHO. (2024). *Obesity and overweight*. https://www.who.int/news-room/fact- sheets/detail/obesity-and-overweight