Jurnal Kesehatan Komunitas Indonesia (JKKI)
Volume 6 Issue 1, April 2026, pp 180-193
https://ebsina.or.id/journals/index.php/jkki
eISSN 2503-2801, pISSN 2985-3435

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Acute Triglyceride Response to 60-Minute Jogging Exercise Among Community-Dwelling Adults in Ternate

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Article History
Submitted: 21-02-2026
Revised: 03-04-2026
Accepted: 25-04-2026

doi.org/10.58545/jkki.v6i1.720

Abstract

Background: Elevated triglyceride levels are a recognized modifiable risk factor for cardiovascular disease. While moderate-intensity aerobic exercise is recommended for lipid management, evidence on acute triglyceride responses following 60-Minute jogging session remains limited in Indonesian community settings. **Objective:** This study aimed to analyze acute changes in blood triglyceride levels following 60-Minute jogging session among community members in Ternate City, Indonesia. **Methods:** A quantitative pretest–posttest observational design was employed with 50 participants selected via purposive sampling. Triglyceride concentrations were measured using Point-of-Care Testing (POCT) on capillary blood immediately before and after a standardized 60-minute jogging session. Data were analyzed using descriptive statistics and the Wilcoxon Signed-Rank test. **Results:** Following exercise, the proportion of participants with normal triglyceride levels (‹150 mg/dL) increased from 56.0% to 70.0%. The high and very high categories decreased, with the latter reaching 0%. The Wilcoxon Signed-Rank test confirmed a statistically significant reduction in triglyceride levels ($Z = -3.421$, $p < .001$) with a large effect size ($r = 0.48$). **Conclusion:** A single 60-minute jogging session induces a significant acute improvement in triglyceride profiles. These findings support moderate aerobic activity as an effective, accessible non-pharmacological strategy for cardiovascular risk reduction in community health settings.

Keywords
Triglycerides, Aerobic Exercise, Jogging, Lipid Metabolism

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How to cite:
Rizal, F., Nikma, & Khondowa, V. D. (2026). Acute Triglyceride Response to 60-Minute Jogging Exercise Among Community-Dwelling Adults in Ternate. Jurnal Kesehatan Komunitas Indonesia, 6(1), 180-193. https://doi.org/10.58545/jkki.v6i1.720

1. BACKGROUND

Triglycerides are one of the major types of lipids in the blood that function as the body's energy reserve (Shihab et al., 2024; Roik, 2025; Orlandoni & Di Fede, 2025). Elevated triglyceride levels may contribute to metabolic disorders and increase the risk of cardiovascular diseases (Sattar et al., 2022; Nurieva et al., 2023; Shihab et al., 2024). Modern lifestyle changes characterized by low physical activity, high-fat diets, and sedentary behavior have contributed to the increasing prevalence of lipid-metabolism

disorders in many countries (Naranjo-Díaz et al., 2024; Sahu et al., 2025). According to the World Health Organization, physical inactivity is one of the major risk factors contributing to global health problems, including lipid metabolism disorders (Turmanbaeeva et al., 2025). These conditions highlight the importance of physical activity in maintaining metabolic homeostasis (Dimitriadis et al., 2025).

Aerobic physical activity is known to influence triglyceride metabolism by increasing the utilization of fat as an energy source. One of the most accessible forms of aerobic exercise is jogging (Muscella et al., 2020). Moderate-intensity jogging may increase lipoprotein lipase activity, which hydrolyzes triglycerides in blood plasma, thereby altering triglyceride levels following exercise (Koike et al., 2024). In addition, aerobic exercise enhances fatty acid oxidation and increases the body's energy demands during physical activity (Lyudinina et al., 2024). The American College of Sports Medicine states that moderate-intensity aerobic physical activity provides positive effects on energy metabolism and overall health (Yi et al., 2023).

In Indonesia, low levels of physical activity remain a public health concern, particularly among individuals of productive age. Data from the Basic Health Research survey indicate that the proportion of individuals with insufficient physical activity remains relatively high, potentially affecting metabolic health (Anindya et al., 2022; Tryastuti et al., 2025). Low physical activity may reduce energy expenditure and increase fat accumulation in the body, including triglycerides. Therefore, simple forms of exercise such as jogging may serve as an effective alternative for maintaining normal lipid metabolism (Nurrakhman et al., 2025).

Several previous studies have reported that aerobic exercise may affect triglyceride levels following physical activity. Both continuous and interval aerobic exercise have been shown to induce acute changes in triglyceride concentrations, with continuous exercise demonstrating more pronounced changes immediately after exercise (Santiago et al., 2020). Furthermore, aerobic activity has also been reported to significantly reduce triglyceride levels, particularly in obese individuals (Madan & Sawhney, 2024; Chen et al., 2025). This reduction occurs through the hydrolysis of triglycerides into fatty acids and glycerol, which are subsequently utilized by muscle tissue as energy sources during physical activity (Muscella et al., 2020). However, studies investigating acute changes in triglyceride

levels following one hour of jogging remain limited, particularly among healthy young adult populations in Indonesia. This condition indicates a research gap that requires further investigation.

Given the aforementioned background, this study is important for providing information on acute changes in triglyceride levels following 60-minute of jogging. The findings are expected to provide an overview of lipid metabolic responses to aerobic physical activity and serve as a scientific basis for the development of healthy lifestyle strategies based on physical activity. Therefore, this study aims to analyze acute changes in triglyceride levels following 60-minute of jogging.

2. METHODS

This study employed a quantitative, observational-analytic design with a single-group pre and post-test design to evaluate acute changes in blood triglyceride levels following a standardized 60-Minute jogging session. The research was conducted in 2025 at the Pelabuhan Perikanan Nusantara (PPN) jogging site in Ternate City, North Maluku Province, Indonesia, a location selected for its established community-based exercise programs and high participant adherence. A total of 50 adult participants were recruited through purposive sampling based on predefined inclusion and exclusion criteria. Eligible individuals were adults who regularly engaged in jogging, provided written informed consent, completed the full 60-minute exercise session, maintained a fasting state (water only) prior to testing, and were not using lipid-lowering medications. Participants were excluded if they declined capillary blood sampling, experienced acute illness during data collection, or failed to complete the prescribed exercise duration. Ethical approval was obtained from the Health Research Ethics Committee of Poltekkes Kemenkes Ternate.

The independent variable comprised a continuous 60-minute moderate-intensity jogging session, while the dependent variable was blood triglyceride concentration measured immediately before and after exercise. Triglyceride levels were assessed using a validated Point-of-Care Testing (POCT) analyzer with dedicated capillary test strips. Blood samples were obtained from the fingertip using sterile lancets after standard aseptic preparation with 70% alcohol swabs. Measurements were conducted under controlled ambient conditions, with the pre-exercise assessment performed after a minimum 10-minute rest period and the post-exercise assessment completed

within 5 minutes of exercise cessation. Results were expressed in mg/dL and categorized according to the clinical thresholds established by the Indonesian Ministry of Health: normal (<150 mg/dL), borderline high (150–199 mg/dL), high (200–499 mg/dL), and very high (≥500 mg/dL).

Data were analyzed using both descriptive and inferential statistical methods. Descriptive statistics, including frequencies and percentages, were computed to characterize participant demographics and the distribution of triglyceride categories pre- and post-exercise. To evaluate the statistical significance of the acute changes in triglyceride levels, the Wilcoxon Signed-Rank test was applied to the paired pretest–posttest measurements. This non-parametric test was selected because the outcome variable was clinically categorized and the difference scores were non-normal, as confirmed by a normality test. Effect sizes are used to measure the magnitude of the intervention effect, with thresholds for small (0.10), medium (0.30), and large (0.50). All analyses were conducted using SPSS, with statistical significance set at $p < .05$. Results were reported in tabular and narrative formats in accordance with epidemiological reporting standards.

3. RESULTS

Table 1. Characteristics of Respondents Based on Gender and Age (N=50)

Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	32	64.0
Female	18	36.0
Age		
17–25 years	15	30.0
26–35 years	18	36.0
36–45 years	10	20.0
>45 years	7	14.0

A total of 50 participants completed the study protocol and were included in the final analysis. The demographic characteristics of the sample are summarized in Table 1. The majority of respondents were male (n = 32, 64.0%), while female participants comprised 36.0% (n = 18). The age distribution indicated a predominantly young to middle-aged adult cohort, with the largest proportion in the 26–35 years category (n = 18, 36.0%), followed by the 17–25 years (n = 15, 30.0%), 36–45 years (n = 10, 20.0%), and >45 years (n = 7, 14.0%) groups.

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Table 2. Distribution of Triglyceride Levels Before Exercise (N=50)

Triglyceride Level Category	Frequency (n)	Percentage (%)
Normal (<150 mg/dl)	28	56.0
Borderline High (150–199 mg/dl)	12	24.0
High (200–499 mg/dl)	9	18.0
Very High (≥500 mg/dl)	1	2.0

Baseline triglyceride concentrations prior to the jogging intervention are presented in Table 2. Before exercise, 56.0% of participants (n = 28) exhibited normal triglyceride levels (<150 mg/dL). The borderline-high category (150–199 mg/dL) accounted for 24.0% (n = 12), while 18.0% (n = 9) and 2.0% (n = 1) were classified in the high (200–499 mg/dL) and very high (≥500 mg/dL) categories, respectively.

Table 3. Distribution of Triglyceride Levels After Exercise (N=50)

Triglyceride Level Category	Frequency (n)	Percentage (%)
Normal (<150 mg/dl)	35	70.0
Borderline High (150–199 mg/dl)	9	18.0
High (200–499 mg/dl)	6	12.0
Very High (≥500 mg/dl)	0	0

Following the 60-minute jogging session, a categorical shift in triglyceride distribution was observed (Table 3). The proportion of participants with normal triglyceride levels increased to 70.0% (n = 35), representing a net gain of 14 participants from baseline. Concurrently, the borderline-high category decreased to 18.0% (n = 9), the high category declined to 12.0% (n = 6), and the very high category was eliminated (n = 0, 0.0%). Overall, the intervention was associated with a favorable redistribution of participants toward lower triglyceride thresholds across all clinical categories.

Table4. Wilcoxon Signed-Rank Test Results for Differences in Pre- and Post-Jogging Triglyceride Levels (N = 50)

Variable	Median Pre (mg/dL)	Median Post (mg/dL)	Z-value	p-value	Effect Size (r)	Interpretation
Triglyceride Levels	142.0	128.5	-3.421	<0.001*	0.48	Large effect

To assess the statistical significance of the observed changes, a Wilcoxon Signed-Rank test was conducted on the paired pretest–posttest triglyceride values (Table 4). The analysis revealed a statistically significant reduction in triglyceride levels following jogging ($Z = -3.421$, $p < 0.001$), with a large effect size ($r =$

0.48). These findings indicate that a single 60-minute moderate-intensity jogging session induced a meaningful acute improvement in triglyceride profiles among community-dwelling adults in Ternate City.

4. DISCUSSION

The present study demonstrated that a single 60-minute moderate-intensity jogging session significantly reduced blood triglyceride levels among community-dwelling adults in Ternate City. The proportion of participants with normal triglyceride concentrations (<150 mg/dL) increased from 56.0% to 70.0%, while the high and very high categories declined correspondingly. This categorical shift was statistically significant ($Z = -3.421$, $p < .001$) and exhibited a large effect size ($r = 0.48$), indicating that acute aerobic exercise induces a clinically meaningful improvement in short-term lipid profiles. These findings align with established physiological principles and reinforce the role of moderate-intensity jogging as an accessible, non-pharmacological intervention for rapid triglyceride clearance.

The observed acute reduction in triglycerides can be attributed to enhanced lipid metabolism during sustained aerobic activity. Moderate-intensity exercise upregulates skeletal muscle and adipose tissue lipoprotein lipase (LPL) activity, accelerating the hydrolysis of circulating triglycerides into free fatty acids and glycerol for immediate oxidative energy utilization (Muscella et al., 2020; Hsu et al., 2021). Concurrently, increased mitochondrial β-oxidation and elevated systemic energy demand during prolonged jogging further deplete plasma triglyceride pools (Lyudinina et al., 2024; Liu et al., 2024). The magnitude and direction of these changes are consistent with prior evidence demonstrating that acute aerobic sessions effectively lower fasting and postprandial triglyceride concentrations (Nagayama et al., 2020; Kurti et al., 2021; Chen et al., 2025). Unlike chronic training paradigms that focus on long-term lipid remodeling, this study highlights the immediate metabolic responsiveness to a single, real-world jogging bout, offering practical relevance for community-based health promotion.

Despite the overall favorable shift, a subset of participants remained in the borderline-high and high triglyceride categories post-exercise. This residual elevation underscores the multifactorial nature of lipid metabolism, which extends beyond acute physical activity. Dietary patterns, particularly high intake of refined carbohydrates and saturated fats, can sustain hepatic triglyceride synthesis and

blunt the acute lipid-lowering effects of exercise (Reis-Costa et al., 2024; Luna-Castillo et al., 2022). Additionally, baseline adiposity, insulin sensitivity, genetic predisposition, and habitual sedentary behavior outside structured exercise sessions may modulate individual metabolic responses (Hankinson et al., 2021; Wood et al., 2021). These findings suggest that while acute jogging provides immediate metabolic benefits, optimal triglyceride management likely requires sustained physical activity coupled with comprehensive lifestyle modifications, including dietary optimization and weight management.

The sample composition, characterized by a male predominance (64.0%) and a concentration in early to middle adulthood (26–35 years: 36.0%), warrants contextual interpretation. Males generally exhibit greater visceral adiposity and greater insulin resistance, which may elevate baseline triglyceride levels and alter acute metabolic responsiveness compared with females (Slade et al., 2021; Li et al., 2023). Conversely, reproductive-age females typically benefit from estrogen-mediated cardioprotective effects, including enhanced HDL synthesis and improved triglyceride clearance. The predominance of young to middle-aged adults in this cohort also reflects typical community exercise participation patterns; however, age-related declines in basal metabolic rate and muscle mass can progressively impair lipid homeostasis, emphasizing the importance of early lifestyle intervention (Zampuno et al., 2020; Nguyen & Corvera, 2024). While the current study did not stratify analyses by sex or age due to sample size constraints, these demographic characteristics provide a relevant framework for interpreting the observed triglyceride responses.

Several methodological considerations should be noted when interpreting these findings. First, triglyceride concentrations were assessed using a Point-of-Care Testing device, which, while highly practical for field settings, may exhibit slightly different analytical sensitivity compared to standardized central laboratory enzymatic assays. Second, the study employed a single-group pre and post-test design without a control group, limiting the ability to fully isolate the exercise effect from diurnal variation or hydration status. Third, potential confounding variables, including recent dietary intake, body mass index, smoking status, and genetic lipid disorders, were not controlled, which may have influenced individual triglyceride trajectories. Finally, the acute nature of the intervention precludes conclusions

regarding long-term lipid remodeling or sustained cardiovascular risk reduction.

Despite these limitations, the findings provide robust empirical support for integrating moderate-intensity jogging into community-based cardiovascular prevention strategies. The significant acute reduction in triglycerides, coupled with a large effect size, demonstrates that even a single, accessible exercise session can yield immediate metabolic benefits. Future research should employ randomized controlled designs with longer intervention periods, incorporate centralized laboratory lipid profiling, and systematically control for dietary, anthropometric, and lifestyle confounders. Stratified analyses by sex, age, and baseline metabolic status would further elucidate differential responses and enable personalized exercise prescriptions. Ultimately, these findings reinforce the value of practical, community-driven aerobic interventions as a cornerstone of metabolic health promotion.

5. CONCLUSION

This study demonstrated that a single 60-minute moderate-intensity jogging session significantly improved acute triglyceride profiles among community-dwelling adults, with a statistically significant redistribution toward normal clinical categories. These findings underscore the immediate metabolic benefits of accessible aerobic exercise, primarily mediated by enhanced lipoprotein lipase activity and accelerated peripheral fatty acid oxidation. While acute exercise provides rapid triglyceride clearance, sustained lipid management likely requires integration with dietary optimization and consistent physical activity. Given the study's single-group observational design and uncontrolled lifestyle confounders, future research should employ randomized controlled trials with larger, stratified cohorts, centralized laboratory lipid profiling, and comprehensive metabolic monitoring. Nevertheless, the current evidence supports the incorporation of structured jogging programs into community-based cardiovascular risk reduction initiatives as a practical, evidence-based, non-pharmacological intervention.

AUTHOR CONTRIBUTIONS

FR contributed to manuscript writing, data interpretation, and final manuscript editing. NN contributed to the research process, data analysis, manuscript preparation, and manuscript review. VDK contributed to data collection and research implementation. All authors have read and

approved the final version of the manuscript.

ACKNOWLEDGMENT

The authors express their deepest gratitude to all respondents who participated in this research. They also express their appreciation to the academic institutions and all parties who supported the research and preparation of this manuscript.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest in this research.

DATA AVAILABILITY STATEMENT

The data are available from the corresponding author upon reasonable request.

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