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EXTENDED
ABSTRACT

Acute Effect of Intermittent Fasting on Strength and Endurance Performance Among Active Students

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I. INTRODUCTION

Intermittent fasting (IF), particularly the 16:8 method, is widely practiced for improving health, weight management, and physical fitness [1]. This time-restricted feeding method limits food intake to an 8-hour window and involves fasting for the remaining 16 hours [2]. Although IF has shown promising results in terms of body composition and metabolic health, its acute effect on physical performance, especially in terms of strength and endurance, is still unclear and underexplored [3][1].

Most available studies focus on long-term outcomes of intermittent fasting or religious fasting like Ramadan, which differs from a structured IF protocol [3][4]. There is a research gap in investigating the short-term (acute) effects of a controlled 16:8 fasting pattern, especially among non-elite but physically active populations. The question remains whether IF can support or hinder short-term strength and endurance performance.

II. METHODS

This study focuses on twenty active students from UiTM Seremban 3 aged 18 to 26 years, male and female, who regularly engage in physical activity but are not elite athletes exercise at least three times per week. A within-subjects crossover design was used. All participants completed two physical performance trials, one after seven days of intermittent fasting and one during a non-fasting condition.

Strength was assessed using the 1RM bench press test, while endurance was measured through a 2.4 km time trial. This direct comparison allows us to examine immediate changes in performance due to fasting.

The intermittent fasting protocol followed a 16:8 time method for seven consecutive days. Participants fasted from 3.30 a.m. to 7.30 p.m., during which no food or drink, including calorie-free fluids, was allowed. Meals were consumed only during the 7.30 p.m. to 3.30 a.m. window, without any imposed caloric restrictions.

Strength was assessed using a one-repetition maximum bench press test, following standard progressive loading procedures. Endurance performance was evaluated using a 2.4-kilometer time trial. Performance outcomes were compared between fasting and non-fasting trials.

III. RESULTS AND DISCUSSION

A. Descriptive Statistic

Table 1 presents the descriptive statistics for the physical characteristics of the participants, categorized by gender. A total of 20 participants were involved in the study (13 females, 7 males). For BMI, female participants had a mean of 20.9 ± 4.47 , ranging from 15.4 to 29.9, while males had a mean of 24.0 ± 2.97 , ranging from 19.0 to 27.8. In terms of height, females averaged 157 ± 4.94 cm and ranged from 148 to 165 cm, whereas males averaged 173 ± 4.90 cm, with a minimum of 167 cm and a maximum of 180 cm. For age, the female group had a mean age of 23.0 ± 1.08 years, and the male group had a mean of 22.6 ± 0.535 years.

TABLE I
DESCRIPTIVE TABLE FOR BMI, HEIGHT AND AGE

VARIABLES	GENDER	N	MEAN (SD)	MIN	MAX
BMI	FEMALE	13	20.9 (4.47)	15.4	29.9
	MALE	7	24.0 (2.97)	19.0	27.8
HEIGHT	FEMALE	13	157 (4.94)	148	165
	MALE	7	173 (4.90)	167	180
AGE	FEMALE	13	23.0 (1.08)	22	26
	MALE	7	22.6 (0.54)	22	23

B. 1RM Bench Press and 2.4km TT Result

Table 2 and Table 3 show the performance outcomes for strength and endurance under fasting and non-fasting conditions. For strength, the one-repetition maximum bench press was lower during intermittent fasting, with a median of 25.0 kg compared to 27.5 kg in the non-fasting condition. This difference was statistically significant with a p -value of 0.004, indicating that acute intermittent fasting may impair upper-body strength. For endurance, the average 2.4-kilometer run time during fasting was 17.7 minutes, while the non-fasting condition resulted in a faster mean time of 16.6 minutes. The difference was statistically significant with a p -value less than 0.001. These results suggest that short-term intermittent fasting reduces both muscular strength and aerobic endurance. The observed decline in performance may be due to reduced

glycogen availability and limited hydration [2], which affect energy output and stamina. Participants with lower body mass index appeared more affected, highlighting individual variability in response to fasting [4].

TABLE II
1 RM BENCH PRESS SCORE DURING INTERMITTENT FASTING AND NON-FASTING

VARIABLES	MEDIAN (SD)		Z STATISTIC	P VALUE
	IF	NON-IF		
1RM BENCH PRESS	25.0 (15.38)	27.5 (16.30)	-3.96	0.004

TABLE III
2.4 KM TIME TRIAL SCORE DURING INTERMITTENT FASTING AND NON-FASTING

VARIABLES	MEAN (SD)		T STATISTIC (DF)	P VALUE
	IF	NON-IF		
2.4KM TIME TRIAL	17.7 (3.95)	16.6 (3.82)	-4.27 (19)	< 0.001

C. Performance Outcome

Performance outcomes under non-fasting conditions were consistently better than during intermittent fasting. Although no formal subjective measures were collected, observations suggest participants felt more energized and performed better when not fasting [5]. Most participants showed reduced strength and endurance during fasting, especially those with lower body mass index, who may have had less energy reserve. This pattern aligns with earlier findings that intermittent fasting may reduce performance, particularly when carbohydrate availability and hydration are limited [6]. The results suggest that for non-elite active individuals, non-fasting conditions may be more suitable for maintaining peak performance in strength and endurance tasks [7][8].

IV. CONCLUSIONS

This study investigated the acute effects of intermittent fasting using a 16:8 protocol on strength and endurance performance among active students. The findings showed that intermittent fasting significantly reduced both muscular strengths, as measured by one-repetition maximum bench press, and endurance performance, as measured by the 2.4 km time trial. Performance outcomes were consistently better under non-fasting conditions. These results suggest that intermittent fasting may impair short-term physical performance, particularly in non-elite, active individuals, who often experience reduced carbohydrate availability and

hydration, which are critical for sustaining exercise output [9]. Additionally, recent evidence shows that even seven days of fasting can significantly lower performance capacity and alter metabolic responses to exercise, highlighting the physiological strain imposed by acute fasting on active individuals [10]. Therefore, athletes and recreational exercisers should carefully consider their nutritional timing when aiming for optimal performance in training or competition.

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