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The Effect of High-Intensity Interval Training on Weight Loss Among Adults with Schizophrenia

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Abstract
High-intensity interval Training (HIIT) has been recognized for its potential to improve weight management and metabolic health, particularly among individuals with mental health conditions such as schizophrenia. This study aims to evaluate the effects of a 10-week HIIT program on weight loss among adults with schizophrenia, addressing the challenges of medication-induced weight gain and sedentary lifestyles. A quasi-experimental study was conducted at the Dadi Regional Special Hospital in Makassar, Indonesia, involving 40 male participants aged 19-49 years. Participants engaged in 25-minute HIIT sessions three times per week for 10 weeks. Weight measurements were taken at baseline and after the intervention. Heart rate monitoring ensured participants reached the anaerobic zone (80-90% of maximum heart rate). Data were analyzed using univariate and bivariate tests. Participants experienced a statistically significant reduction in mean body weight, from 55.800 kg to 55.325 kg ($p = 0.001$). The intervention demonstrated the effectiveness of HIIT in promoting weight loss, even in a psychiatric population. HIIT is an effective strategy for managing weight among adults with schizophrenia, potentially mitigating the adverse effects of antipsychotic medications. This study highlights the feasibility of implementing structured HIIT programs in psychiatric settings to improve both physical and mental health outcomes. Future research should explore long-term sustainability and the integration of dietary interventions to enhance the effectiveness of weight management strategies.

Introduction

High-Intensity Interval Training (HIIT) has emerged as a prominent exercise modality characterized by short bursts of intense activity followed by periods of rest or low-intensity exercise. This training approach has gained recognition for its effectiveness in promoting weight loss and improving cardiovascular fitness among various populations,

including those with mental health conditions such as schizophrenia. Research indicates that HIIT can lead to significant reductions in body fat and improvements in metabolic health, making it a compelling option for individuals struggling with obesity, particularly those on antipsychotic medications that often contribute to weight gain (1,2,3). Given the unique challenges faced by adults with schizophrenia, including medication-induced weight gain and sedentary lifestyles, exploring the impact of HIIT on weight loss in this population is both timely and necessary.

The rationale for conducting this research within a specialized psychiatric hospital setting stems from the high prevalence of obesity and metabolic syndrome among individuals with schizophrenia, exacerbated by the side effects of antipsychotic medications (4,2,3). Patients in psychiatric facilities often experience barriers to engaging in traditional exercise programs due to their mental health conditions, making it essential to tailor interventions that accommodate their specific needs. The selection of this population allows for a focused examination of the effects of HIIT on weight loss, as well as the potential for improved mental health outcomes associated with increased physical activity (5,6,7). Furthermore, the structured environment of a psychiatric hospital provides a controlled setting to monitor adherence to the HIIT regimen and assess its feasibility.

Utilizing an experimental design with a matched-group approach enhances the validity of this study by controlling for confounding variables that may influence weight loss outcomes. By comparing the effects of HIIT within a homogeneous group of patients, the research can more accurately attribute changes in weight and metabolic parameters to the intervention itself rather than external factors (8,7). This methodological rigor is crucial in establishing a causal relationship between HIIT and weight loss, particularly in a population that may exhibit variability in response to exercise due to the effects of their psychiatric conditions and medications (9,3,7).

Despite the growing body of literature on exercise interventions for weight management in individuals with serious mental illness, significant gaps remain in understanding the specific effects of HIIT on weight loss among adults with schizophrenia (1,6,3). Previous studies have primarily focused on traditional exercise modalities or dietary interventions, leaving a limited exploration of the unique benefits that HIIT may offer in this context. Additionally, there is a lack of research examining the long-term sustainability of weight loss achieved through HIIT in this population, as well as its impact on mental health outcomes such as mood and anxiety (10,5,1). Addressing these gaps is essential for developing effective, evidence-based interventions that can improve the overall health and well-being of individuals with schizophrenia.

The primary objective of this study is to evaluate the effect of a 10-week HIIT program on weight loss among adults with schizophrenia who are hospitalized for treatment. Specifically, the research aims to determine whether engaging in HIIT three times a week for

25 minutes can lead to significant reductions in body weight and improvements in metabolic health indicators. By focusing on this specific population and intervention, the study seeks to contribute valuable insights into the potential of HIIT as a viable strategy for managing weight and enhancing the quality of life for individuals with schizophrenia.

Materials and Methods

This study is a quasi-experimental study that involves measuring variables both before and after treatment is administered. The duration of this trial was 10 weeks. The study was carried out in the Dadi Regional Special Hospital in Makassar, South Sulawesi, with a sample size of 40 participants (psychiatric patients). The eligibility criteria for the participants in this study were males between the ages of 19-49 who were physically capable and willing to take part in sports exercise therapy sessions. The exclusion criteria consisted of the presence of serious organic comorbidities. The criteria for dropping out of the study included inconsistent attendance at sports exercise sessions (less than 80% attendance), failure to reach the optimal pulse rate during exercise (Zone 4: Anaerobic zone, which is 80-90% of the maximum pulse rate), refusal to continue participating in the study, or death. Every eligible patient is requested to provide their informed consent to participate in the trial. The participants will be interviewed to gather characteristic data, followed by measuring their weight using the SECA Digital Scale before the commencement of exercise therapy (Week 0) and after its completion (Week 10).

Prior to commencing exercise treatment, the subjects were provided with a clear and concise explanation on the goal and methodology of the study. This involved conducting questionnaire-based interviews and taking measures of weight and height. A follow-up assessment was performed after 10 weeks of exercise therapy.

The assigned workout is High-Intensity Interval Training, specifically focusing on *aerobic* activity. Physical activity is performed on a triweekly basis (Monday, Wednesday, and Friday). Each workout session lasts for a total of 25 minutes. Specifically, the first and last 5 minutes are dedicated to warming up, while the remaining 15 minutes are devoted to core exercises. Exercise sessions are conducted at a level of intensity ranging from moderate to high. Heart rate measurements are conducted before and following a 15-minute core exercise session to verify that the heart rate is within the anaerobic zone. The anaerobic zone for each individual has been precalculated to be 80-90% of their maximum heart rate. Heart rate measurements are done manually and carried out by nurses.

Two types of tests, univariate and bivariate tests, were used to conduct data testing. The age data of the subjects were categorized into two groups: young adults (aged 19-29 years) and middle adults (aged 30-49 years). The educational status was categorized into four levels: elementary school, junior high school, senior high school and bachelor degree. The marital status variable was dichotomised into two categories: married and not married.

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Similarly, the employment status variable was dichotomized into two categories: working and not working. The Ministry of Health (2008) categorized nutritional status into three categories: undernutrition (BMI <18.5 kg/m^2), normal nutritional status (BMI 18.5-25 kg/m^2), and overnutrition (BMI >25 kg/m^2). The data analysis commenced with the implementation of a Kolmogorov-Smirnov normality test. The data that met the assumptions of normality (Shapiro-Wilk test, sample size <50) were analyzed using ANOVA.

Results

The statistics describing the characteristics of the respondents may be found in Table 1 below. The survey included 42 respondents aged between 19-49 years. Most participants, specifically 61%, were between the 19-29 age bracket. Based on the Body Mass Index (BMI), it was determined that 59% of the participants had a favorable (normal) nutritional state. Up to 40% of the participants had completed junior high school, while up to 73% were married.

Table 1. Characteristic of Respondent

Variable	n	(%)
Age		
19 – 29 years old	26	61
30 – 49 years old	16	39
Educational Level		
Elementary School	5	11
Junior high School	7	16
Senior high school	17	40
Bachelor Degree	13	33
Marital Status		
Married	31	77
Not married	11	23
Nutritional Status (BMI)		
Undernutrition	7	18
Normal	25	59
Overnutrition	10	23

The data shown in Table 2 demonstrates a statistically significant reduction in weight following a 2-month exercise program, as evidenced by a p-value of 0.001 (<0.05).

Table 2. Body weight before and after exercise treatment

Body weight	Mean±	P
Initial BW	55.800	
Final BW	55.325	0.0001*
Initial BW-Final BW	0.475±	

**Analysis using T-test*

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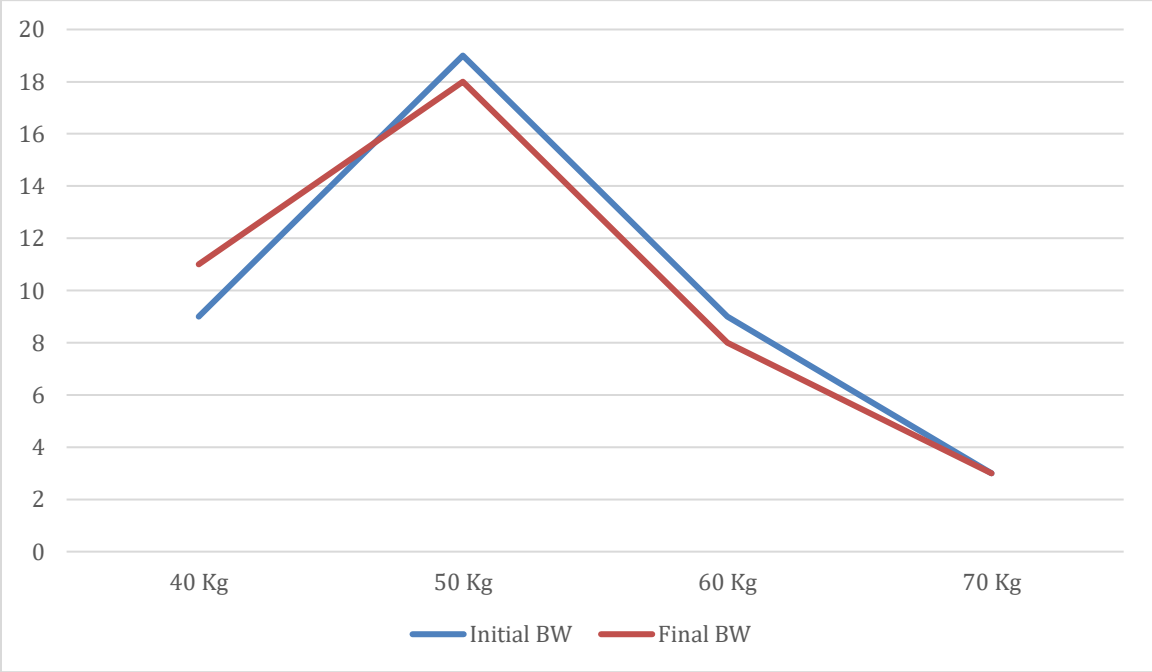

Picture 1. Body weight before and after exercise treatment

DISCUSSION

The findings of this study indicate a statistically significant reduction in body weight among participants who engaged in a two-month High-Intensity Interval Training (HIIT) program. The initial mean body weight of 55,800 kg decreased to 55,325 kg, with a p-value of 0.001, suggesting that the HIIT intervention was effective in promoting weight loss. This aligns with existing literature that supports the efficacy of HIIT in reducing body weight and improving metabolic health. HIIT is characterized by short bursts of intense exercise followed by recovery periods, which has been shown to enhance energy expenditure and fat oxidation more effectively than Moderate-Intensity Continuous Training (MICT) (11,12). Previous studies have demonstrated that HIIT can lead to greater reductions in body fat percentage and waist circumference compared to traditional exercise modalities, reinforcing the notion that HIIT is a potent strategy for weight management (13,14).

The results of this study are particularly relevant for the psychiatric population, specifically adults with schizophrenia. Individuals with schizophrenia often experience weight gain as a side effect of antipsychotic medications, which can lead to obesity and associated comorbidities such as diabetes and cardiovascular disease (15,16). The significant weight loss observed in this study suggests that HIIT could be a viable intervention for managing weight in this population, potentially mitigating some of the

adverse effects of medication. Moreover, the structured environment of a psychiatric facility may provide the necessary support and supervision to enhance adherence to the exercise program, which is often a barrier in this demographic (17,18). The implications of these findings extend beyond weight loss; they may also contribute to improved mental health outcomes, as physical activity has been associated with reductions in depressive symptoms and anxiety among individuals with mental illness (17,18).

The physiological mechanisms underlying the effectiveness of HIIT in promoting weight loss are multifaceted. HIIT has been shown to increase Excess Post-Exercise Oxygen Consumption (EPOC), leading to elevated calorie burn long after the workout has concluded (14,12). Additionally, HIIT can improve insulin sensitivity and glucose metabolism, which are critical factors in weight management and metabolic health (11,19). The intense nature of HIIT may also stimulate hormonal responses that promote fat oxidation and muscle preservation, further contributing to weight loss (14,12). These physiological adaptations are particularly beneficial for individuals with schizophrenia, who may struggle with metabolic dysregulation due to their condition and treatment.

Despite the promising results, this study is not without limitations. One potential source of bias are dietary intake and physical activity levels, which may not accurately reflect participants' behaviors outside of the structured exercise program (11,12). Additionally, the relatively small sample size and short duration of the intervention may limit the generalizability of the findings. Future research should consider larger, more diverse samples and longer intervention periods to better understand the long-term effects of HIIT on weight management in psychiatric populations (17,18). Furthermore, the study design did not include a control group, which makes it challenging to attribute weight loss solely to the HIIT intervention.

Given these limitations, future studies should explore the integration of HIIT with dietary interventions to assess the combined effects on weight loss and metabolic health (12,20). Additionally, investigating the psychological barriers to exercise adherence in this population could provide valuable insights for designing more effective interventions (17,18). Longitudinal studies that track changes in weight, metabolic parameters, and mental health outcomes over time would also contribute to a more comprehensive understanding of the benefits of HIIT for individuals with schizophrenia.

Conclusion

In conclusion, this study contributes to the growing body of evidence supporting the use of HIIT as an effective intervention for weight loss among adults with schizophrenia. The significant reduction in body weight observed in this study highlights the potential of HIIT to address the unique challenges faced by this population. By promoting weight loss and potentially improving metabolic health, HIIT may serve as a valuable tool in the

comprehensive management of schizophrenia, ultimately enhancing the quality of life for individuals living with this condition.

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