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Sustaining Weight Loss in Women: The Role of Social Intelligence and Physiotherapy in Optimizing Low Impact Aerobic Exercise and Pilates

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Abstract

The global rise in obesity necessitates effective interventions, particularly for women, who often face unique challenges. This study investigates the comparative effects of low-impact aerobic exercise and Pilates on body fat percentage reduction in obese women, considering the moderating role of age. A quantitative experimental design with pre- and post-tests was employed, involving 40 obese women recruited through purposive sampling. Participants engaged in either low-impact aerobic exercise or Pilates for eight weeks, with body fat percentage measured using skinfold calipers. Two-way ANOVA was used to analyze the data, revealing significant differences between exercise types and age groups. Low-impact aerobics demonstrated a greater reduction in body fat percentage compared to Pilates. Adolescents experienced a more pronounced reduction with aerobics, while adults benefited more from Pilates. These findings highlight the importance of tailoring exercise interventions to age-specific needs. Furthermore, social intelligence, motivation, adherence, and social support were identified as crucial factors in program success. This study underscores the potential of integrating social and psychological elements into physiotherapy practices to enhance weight management outcomes in obese women. The results provide valuable insights for designing targeted exercise programs that consider both physical and social-emotional factors.

Keywords: female obesity; aerobic exercise; pilates.

Introduction

In the context of national development and the formation of well-rounded individuals, exercise plays a crucial role. Development aims to create an advanced and prosperous Indonesian society, both physically and mentally. However, modern lifestyles have brought about changes that impact human health.

The instant, high-calorie, and high-fat food consumption patterns coupled with a lack of physical activity like exercise are blamed for the increase in metabolic diseases, one of which is characterized by central obesity or waist circumference exceeding the ideal size (Widyantara,

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2014). Obesity is a condition of excessive accumulation of body fat tissue. In the last decade, the prevalence of obesity worldwide has increased dramatically, making this nutritional problem one that needs serious attention (Totok et al., 2016). Research conducted by Dewi in 2013 stated that data on obesity in Indonesia cannot yet describe the prevalence of obesity in the entire population, but data on obesity in adults living in provincial capitals throughout Indonesia is quite concerning. External factors are very influential in increasing obesity among pre-adolescents in particular. Obesity tends to persist with age; 50% of obesity in childhood will continue into pre-adolescence and adolescence, and 70% will cause obesity in adulthood. Physical activity means burning calories, which can help with weight management. The health benefits of physical activity and the health risks associated with a lack of activity are not only limited to weight management but also extend to other diseases such as hypertension, diabetes mellitus, and so on (Khomsan, 2014).

Obesity in women has become a global health issue with increasing prevalence in recent decades. This condition not only affects physical health but also has a significant impact on the psychological and social aspects of sufferers. According to the World Health Organization (WHO), the prevalence of obesity in women tends to be higher than in men, especially in developing countries (WHO, 2020). As obesity cases increase, there is an urgent need to find effective and sustainable treatment methods. In this case, modern physiotherapy that combines aspects of social intelligence and Exercise as part of physical therapy becomes a potential approach to overcome obesity in women.

The development of technology and intervention methods in physiotherapy has progressed rapidly, but the challenge of sustainability in this practice remains a major concern. Traditional physiotherapy, which focuses on muscle strengthening and improving mobility, needs to be combined with a more holistic approach, such as social intelligence, to increase the effectiveness of obesity management (Crawford et al., 2018). Social intelligence, which involves the ability to understand and respond to patient emotions and social dynamics, is very important in creating more effective therapeutic interactions between physiotherapists and patients, especially in the context of Exercise which involves high motivation and discipline (Wildman and Miller, 2004).

Exercise is a physical exercise that is deliberately selected and created, arranged systematically with the aim of shaping and developing the individual harmoniously. Aerobic Exercise is a series of movements deliberately chosen by following the rhythm of selected music, resulting in rhythmic provisions, continuity, and a certain duration. The types of aerobic Exercise include low impact aerobics, high impact aerobics, and mixed impact aerobics (Palmer and Williams, 2017). Low Impact Aerobic Exercise is an exercise or aerobic Exercise movement that is carried out continuously for approximately 30-40 minutes, which of course requires more oxygen intake to produce sufficient energy. Low impact aerobic Exercise is low or light in nature, with movements such as the feet always being on and touching the floor at all times. The movements of low impact Exercise are without jumps, so they are safe to do for all ages and do not cause injury to the knees and back, and the variations in the movements are simple and easy to follow. Aerobic exercise is carried out with the aim of increasing cardiovascular endurance

and losing weight. This type of exercise is highly recommended for people who are obese or overweight (Lenny, 2015).

Physical exercise such as gymnastics, which is part of modern physiotherapy, has been shown to have significant benefits in weight management. Physical activity plays an important role in regulating the body's metabolism, especially in burning fat. Low-intensity endurance exercise, such as that found in gymnastics, can effectively help reduce body fat levels.

Social intelligence is a person's ability to effectively navigate and negotiate social interactions and environments. Self-awareness and social awareness help in empathic accuracy to understand the range of emotions, the evolution of social beliefs and attitudes, and the capacity and ability to manage social change. It can measure threats received accurately and act accordingly (Golengan, 2024). The purpose of this study is to identify the challenges of sustainability in modern physiotherapy, in combining social intelligence and Exercise in overcoming obesity in women (WHO, 2020).

This research aims to explore and understand the challenges in managing obesity in women through the integration of Exercise and social intelligence in modern physiotherapy. Obesity is a global health problem that impacts physical, psychological, and social aspects, especially in women. Modern physiotherapy, which has so far focused on restoring movement and functional abilities, requires a new, more comprehensive approach by incorporating patients' social and emotional elements into the therapy program. This research has the following objectives:

1. To identify the main challenges faced by physiotherapists in helping obese women achieve sustainable weight loss through gymnastic exercises.
2. To evaluate the role of social intelligence in modern physiotherapy as a way to enhance patient engagement and ensure the sustainability of exercise programs.
3. To determine the interaction between types of Exercise and age on the body fat percentage of obese women.

Literature Review

Exercise and Obesity

Numerous studies have demonstrated the beneficial effects of exercise on weight management and overall health. Aerobic exercise, in particular, has been shown to increase energy expenditure, promote fat oxidation, and improve cardiovascular fitness (Tremblay et al., 2004). Low-impact aerobic exercise offers a safe and accessible option for individuals with joint pain or mobility limitations, making it a suitable choice for many obese women (Bougie, 2011).

Pilates, a form of exercise that combines flexibility, strength training, and mindful movement, has also gained popularity as a weight management tool. Pilates exercises engage core muscles, improve posture, and enhance body awareness (Punjab et al., 2010). While Pilates may not burn as many calories as high-intensity aerobic exercise, it can contribute to weight loss and improve body composition over time.

Age and Exercise

Age is a critical factor to consider when designing exercise interventions for obese women. Adolescents and adults have different physiological and psychological needs, which may influence their response to exercise. Adolescents, for example, may be more motivated by social factors and peer support, while adults may be more focused on health outcomes and long-term weight management (Ryan et al., 2000).

Studies have shown that adolescents may respond differently to exercise compared to adults. For example, adolescents may experience greater improvements in cardiovascular fitness and body composition with aerobic exercise, while adults may benefit more from resistance training (Faigenbaum et al., 1999). Therefore, it is essential to tailor exercise interventions to the specific needs and preferences of different age groups.

Social Intelligence and Exercise Adherence

Social intelligence, encompassing self-awareness, empathy, and social skills, plays a crucial role in promoting exercise adherence and long-term weight management success (Wildman and Miller, 2004). Individuals with high social intelligence are better able to understand their own emotions and motivations, as well as the emotions and motivations of others. This allows them to build strong social support networks, cope with stress, and overcome barriers to exercise.

Research has shown that social support is a strong predictor of exercise adherence (Bauman et al., 2002). Individuals who have strong social support networks are more likely to stick with their exercise programs and achieve their weight management goals. Social support can come from family, friends, healthcare providers, or other members of the community.

Integrating Social Intelligence into Physiotherapy

Modern physiotherapy practices are increasingly incorporating social and psychological elements to enhance patient outcomes. This holistic approach recognizes that physical health is intertwined with mental and emotional well-being. By integrating social intelligence into physiotherapy interventions, practitioners can build stronger relationships with their patients, improve communication, and foster a more supportive and empowering environment.

For example, physiotherapists can use motivational interviewing techniques to help patients identify their own goals and motivations for exercise. They can also facilitate group exercise sessions to promote social interaction and peer support. By addressing the social and emotional needs of their patients, physiotherapists can improve exercise adherence and promote long-term weight management success.

Research Gaps

While existing research has provided valuable insights into the effects of exercise, age, and social intelligence on weight management, several gaps remain. Further research is needed to:

1. Compare the effectiveness of different exercise modalities (e.g., low-impact aerobics vs. Pilates) on body fat percentage reduction in obese women.
2. Investigate the moderating role of age on the relationship between exercise and body fat percentage.
3. Examine the impact of social intelligence interventions on exercise adherence and weight management outcomes.

This study aims to address these research gaps by comparing the effects of low-impact aerobic exercise and Pilates on body fat percentage reduction in obese women, considering the moderating role of age and the potential benefits of integrating social intelligence into physiotherapy practices.

Method

This study employed a quantitative experimental design using a pre-test and post-test control group approach. Forty obese women, aged 15-45 years, were recruited through purposive sampling from community health centers in Yogyakarta, Indonesia. Participants were randomly assigned to one of two exercise groups: low-impact aerobic exercise (n=20) or Pilates (n=20).

Baseline data, including age, weight, height, and body fat percentage, were collected using standardized procedures. Body fat percentage was measured using skinfold calipers at three sites (triceps, suprailiac, and thigh) by a trained researcher. Participants completed a questionnaire assessing their social intelligence, motivation, and social support.

The exercise interventions were conducted three times per week for eight weeks. The low-impact aerobic exercise group participated in 45-minute sessions consisting of warm-up, aerobic activity, and cool-down. The Pilates group engaged in 45-minute sessions focusing on core strengthening, flexibility, and body awareness. Both interventions were supervised by qualified instructors.

Data were analyzed using SPSS version 25. Descriptive statistics were calculated for all variables. Two-way ANOVA was used to examine the main effects of exercise type and age group on body fat percentage reduction, as well as the interaction effect between these variables. The level of significance was set at $p < 0.05$.

Result and Discussion

The study focuses on examining the weight loss effects of low-impact aerobic exercises and Pilates on adolescents and obese mothers in the Ngampilan area of Yogyakarta City. The study measures the changes in body fat percentage and evaluates the influence of various factors like exercise motivation, adherence, and social support.

Exercise Motivation and Adherence

The data in Table 1 shows the exercise motivation and adherence levels for both the experimental and control groups, before and after the intervention.

Table 1. Description of Motivation, Adherence, and Social Support Data

Variable	Group	Pretest (average)	Post-test (average)
Exercise Motivation	Experimental Group	68.2	82.4
	Control Group	67.3	70.1
Exercise Adherence	Experimental Group	-	92%
	Control Group	-	78%
Social Support	Experimental Group	Strong Support	Significant Weight Loss
	Control Group	Weak Support	Low Weight Loss

The experimental group demonstrated an improvement in exercise motivation (68.2 → 82.4), a higher post-test motivation score than the control group (67.3 → 70.1). Additionally, adherence to the exercise regimen was higher in the experimental group (92%) compared to the control group (78%). The social support received by the experimental group was stronger, which corresponded with a more significant weight loss outcome.

Descriptive Statistics for Adolescents in Low-Impact Aerobic Exercise

In Table 2, we show the descriptive statistics for body fat percentage before and after the low-impact aerobic exercise for the adolescent group (A1B1).

Table 2. Descriptive Statistics of the Adolescent Group and Low-Impact Aerobic Exercise

A1B1	Pretest	Posttest	Difference
N	10	10	10
Min	33.9	28.4	2
Max	41.8	39.8	6.5
Mean	36.65	31.99	4.66
SD	2.27	3.19	1.23

The results of body fat percentage for the low-impact aerobics group show a range from 31.4 to 41.8 in the pretest, with an average (mean) of 36.36 and a standard deviation of 2.63. Post-intervention, the body fat percentage decreased significantly, with a mean of 31.99 and a standard deviation of 3.19.

Descriptive Statistics for Adolescents in Pilates Exercise

The descriptive statistics for the Pilates exercise group (A2B1) are displayed in Table 3.

Table 3. Descriptive Statistics of the Adolescent Group and Pilates Gymnastics

A2B1	Pretest	Posttest	Difference
N	10	10	10
Min	33.2	30.1	1.9
Max	36.4	33.9	3.8
Mean	35.33	32.62	2.71
SD	1.35	1.76	0.60

The Pilates group exhibited a reduction in body fat percentage, with a mean change of 2.71 and a standard deviation of 0.60. The range of the body fat percentage difference was 1.5 to 4.6, indicating a modest but consistent effect of Pilates on fat reduction.

Descriptive Statistics for Adults in Low-Impact Aerobics

For the adult group participating in low-impact aerobics (A1B1), Table 4 shows the statistical data.

Table 4. Descriptive Statistics of the Adult Group and Low-Impact Aerobic Gymnastics

A1B1	Pretest	Posttest	Difference
N	10	10	10
Min	31.4	30.6	0.8
Max	41.8	39.8	3.6
Mean	36.06	33.49	2.57
SD	3.04	2.97	0.77

For the low-impact aerobics group in adults, the average body fat reduction was 2.57, with a standard deviation of 0.77, showing moderate effectiveness.

Descriptive Statistics for Adults in Pilates

The body fat percentage data for adults in the Pilates group (A2B2) are provided in Table 5.

Table 5. Descriptive Statistics of the Adult Group and Pilates Gymnastics

A2B2	Pretest	Posttest	Difference
N	10	10	10
Min	33.9	29.3	1.5
Max	39.2	37.2	4.6
Mean	36.94	33.94	3.00
SD	1.79	2.27	0.90

The Pilates group for adults exhibited a mean body fat percentage change of 3.00, with a standard deviation of 0.90. This demonstrates a significant decrease in body fat percentage, even higher than the low-impact aerobics group.

Preliminary Analysis

1. Normality Test

In Table 6, the normality test results show that the null hypothesis (H0) is rejected for all variables, indicating that the data does not follow a normal distribution. Therefore, non-parametric methods may be more appropriate for further analysis.

Table 6. Normality Test

Sv (Variable)	Db	JK	RJK	F	F table	Conclusion
Age (A)	1	8.10	8.10	9.89	4.11	H0 Rejected
Gymnastics (B)	1	5.78	5.78	7.05	4.11	H0 Rejected
Interaction (AB)	1	14.16	14.16	17.30	4.11	H0 Rejected
Error (Galat)	36	29.47	0.82			
Total	39	57.51				

2. Homogeneity Test

The homogeneity test results in Table 7 indicate that the data is homogeneous, as the chi-square value ($\chi 2 = 0.332$) is less than the critical value ($\chi 2 = 7.815$).

Table 7. Homogeneity Test

$\chi 2$	Value
$\chi 2$	0.332
$\chi 2$ table	7.815
Conclusion	Homogeneous

3. Fat Percentage Difference Results

Table 8 summarizes the average fat percentage changes across different groups.

Table 8. Fat Percentage Difference

Variables	A1 (B1)	A1 (B2)	A2 (B1)	A2 (B2)
Pretest	36.65	36.06	35.33	36.94
Post-test	31.99	33.49	32.62	33.94
Difference	4.66	2.57	2.71	3.00

The study shows significant differences in the body fat percentage of participants in both the low-impact aerobics and Pilates groups. The experimental group, particularly those who adhered to the exercise programs and had strong social support, experienced greater weight loss. These findings suggest that both low-impact aerobics and Pilates are effective methods for reducing body fat, with Pilates showing slightly higher effectiveness in both adolescents and adults.

Closing

Conclusion

Based on the research results and data analysis that have been carried out, the following conclusions can be obtained:

1. Social intelligence (motivation, adherence, and social support) plays an important role in increasing participant adherence to exercise programs.
2. There is a difference in the effect of low impact aerobic exercise and Pilates on the decrease in body fat percentage of obese women. The decrease in body fat percentage with low impact aerobic exercise is better than the decrease in body fat percentage with Pilates.
3. There is an interaction between the type of exercise treatment and age in influencing the decrease in body fat percentage of obese women. At adolescent age, the effect is greater on decreasing body fat percentage using low impact aerobic exercise, while in adulthood, the decrease is greater using Pilates.

The limitation of this study is that this study could not control the food consumed by the respondents.

Sugession and Recommendation

Based on the results of the study, social intelligence, motivation, compliance, and social support have a significant role in the success of physical exercise programs in obese women. Interventions that combine physical exercise with a social approach show better results in terms of weight loss and increased physical fitness. The influence of the interaction between age and type of exercise also provides insight that exercise programs must be adjusted to individual characteristics to achieve optimal results.

In addition, the researchers suggest that low impact aerobic exercise and Pilates can be used as exercises aimed at obese women to reduce body fat percentage because low impact aerobic exercise and Pilates can have an effect in reducing body fat percentage. For further research, it can be combined to get better results in reducing body fat percentage. Both of these exercises can be used as references for variations in conducting teaching and training in an effort to reduce body fat percentage.

The application of low impact aerobic exercise and Pilates needs to pay attention to age because age has an important role in carrying out physical activity. So that the exercise given can be more effective which will have an impact on decreasing body fat percentage. For adolescents, low impact aerobic exercise can be used and for adults, Pilates can be used.

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