

EXPLORING THE IMPACT OF INTERMITTENT FASTING ON WOMEN WITH POLYCYSTIC OVARY SYNDROME IN SIALKOT, PAKISTAN: A COMPARATIVE STUDY

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ABSTRACT

Polycystic Ovary Syndrome (PCOS) is an endocrine disorder that affects the reproductive health of women, with an estimated occurrence of 52% in Pakistan. The objective of the research is to determine the possible effect of intermittent fasting (IF), particularly the 16:08 and 12:12 time-restricted fasting (TRF) patterns, to improve the body's weight, body mass index (BMI), and other physical attributes in women struggling with PCOS. A total of sixty PCOS subjects with ages 21-42 from Sialkot, Pakistan, took part in the randomized study and were allocated into two groups. Group A (n=30) pursued a 16:08 dietary routine, whilst the B Group (n=30) practiced the fasting window of 12:12 for eight weeks in total. After executing statistical analysis, paired t-tests revealed a significant decline in anthropometric parameter in both groups. The 16:08 fasting group undergo an average weight loss of 6.68 kg and a BMI decrease of 2.03 units ($P < 0.05$), along with the 12:12 fasting group who observed a weight loss of 7.01 kg and a BMI fall of 2.43 units, both with significant p-values < 0.001 . The results suggest that time-restricted feeding might work as an outstanding strategy with no side-effects to tackle PCOS correlated with obesity. However, upcoming studies should look into the long-term implications of intermittent fasting in regulating metabolic and hormonal factors to cope with PCOS.

Keywords: Time-Restricted Fasting (TRF), Intermittent fasting (IF), Anthropometric parameters, Obesity, Polycystic Ovary Syndrome (PCOS), Hormonal imbalance

INTRODUCTION

Polycystic Ovary Syndrome (PCOS) is a prevailing endocrine condition among premenopausal women, with an incidence range at 6–21% in reproductive age (Cienfuegos *et al.*, 2022). It is characterized by an imbalance in the sex hormones that lead to the growth of multiple cysts in the follicles of the ovaries. This causes reproductive anomalies such as irregular periods, hyperandrogenism and infertility. PCOS also results the several metabolic issues like overweight, resistance to insulin, high cholesterol level, and hyperinsulinemia (Hasan *et al.*, 2022), which have potential to cause serious complications include cardiovascular disease (Floyd *et al.*, 2022). Research have proven that PCOS may also detrimentally affect the physical and mental health of the patient (Lin *et al.*, 2021). Earlier investigations discovered that the more body fat raises the insulin resistance rate among women who suffers with PCOS (Authier *et al.*, 2020). Some believe that PCOS has an association with genetics, or it may be a consequence of choices and a bad lifestyle so, it might be a combination of both.

The existing treatment modalities for PCOS are confined to drugs that target androgens and improve insulin sensitivity. However, there is no agreement on their preferred usage as the primary treatment option (Feyzioglu *et al.*, 2023). Nowadays, changes in lifestyle such as eating habits and physical exercise are considered as the first course of action for PCOS management (Li *et al.*, 2021). One solution that has drawn a substantial attention due its breakthrough impacts is intermittent fasting (IF), which has been reported to lead to metabolic adaptations capable of improving PCOS along with other aspects of human health (Hoeger *et al.*, 2021).

Intermittent fasting is a dietary strategy that concentrates on voluntary abstinence of food for shorter intervals, which is followed by periods of regular consumption. Humans have been fasting since the beginning of time. It mirrors the nature of feast and famine era in which our forefathers navigated across evolution (Harris *et al.*, 2018). This kind of approach revolves around the question of when to eat regardless of what to eat. It can lead to glycogen deprivation, enhance insulin sensitivity, decrease fat mass, and restore the balance of glucose (Abdullah *et al.*, 2022) in response to specific mechanisms such as increased autophagy, biogenesis of mitochondria, and the expression of amp-activated protein kinase (AMPK) (Talebi *et al.*, 2023). Moreover, intermittent fasting has also manipulated many of the PCOS-driving hormones such as insulin, leptin, adiponectin, and estrogen (Asdaq *et al.*, 2020). These

fluctuations in hormones are likely advantageous for the ovarian function, periods regularity and androgen profiles of PCOS women and may enhance fertility outcomes (Ribeiro *et al.*, 2020).

Intermittent fasting possesses various methods such as alternate-day fasting, time-restricted fasting, and periodic prolonged fasting. A number time-restricted patterns are 16:08 (16 hours of fasting, 8 hours of free eating), and 12:12 (12 hours of fasting, 12 hours of free eating) as suggested by Tagde *et al.* (2022). The time span of the fasting and consumption period can be tailored corresponding to the requirements and the overall existence of the person (Marschalek *et al.*, 2023). Further, intermittent fasting modulates blood sugar levels (Salma *et al.*, 2023), and alleviate the desire for sweet and high-carb-containing foods (Sadeghian *et al.*, 2021). The present study intends to explore the promising effect of IF with 16:08 and 12:12 fasting windows on reducing body fat and BMI. Moreover, we determine the potential anthropometric and metabolic outcomes of time-restricted fasting in women having PCOS.

MATERIALS AND METHODS

Selection of participants

The randomized controlled trial of 60 adult females having polycystic ovary syndrome (PCOS) which is recruited from Pakistani population mainly from Sialkot was included in the study. The participants were classified into two groups: a control group and the experimental group, comprising 60 subjects in each group. The control group was subjected to following their previous eating habits. The participants of experimental group had to follow time-restricted feeding and eating that best suited their energy demands and they kept their physical activity as usual throughout the research.

Inclusion Criteria

Women diagnosed with PCOS according to Rotterdam criteria (Group, 2004) and aged between 21 to 42 years were eligible, and they were subjected to fasting according to recommended window for two months. Females are included who have voluntarily given consent for the participation in this research study.

Exclusion Criteria

Females younger than 18 years and older than 50 years of age and those with any major diseases like type-2 diabetes mellitus, hypertension, hyperthyroidism or any other severe illness are excluded from this research. Pregnant females and lactating mothers are also excluded.

Interventions

The interventions in the experimental group involved two types of time restricted feeding: 16:8 (16 hours of fasting, 8 hours of free eating), 12:12 (12 hours of fasting, 12 hours of free eating). The 60 subjects of experimental group were divided into two groups (Group A and Group B) that comprises of 30 in each group. For 8 weeks, Group A individuals were designated to specific intervention of 16:8-time restricted feeding and the Group B followed the 12:12 time restricted feeding.

Anthropometric parameters

The following physiological dimensions were recorded at the beginning and the end of the study, when 8 weeks of intermittent fasting had been completed.

Body weight

Weight was measured in kilograms by using digital weighing machine.

Height

Height was measured in centimeters using a stadiometer while the participant stood straight with flat feet and their back touching the measuring scale.

BMI calculation

The body mass index (BMI) of each participant was calculated initially (Deurenberg *et al.*, 1991). According to the national institutes of health standards, body weight status was categorized into overweight (BMI between 25 and 29.9 kg/m²) and obese (BMI \geq 30 kg/m²).

$$\text{Formula of Body mass index} = \frac{\text{weight in kg}}{\text{Height in m}^2}$$

The BMI of participants was also calculated after two months to mark the notable changes in weight status.

Waist circumference

Waist circumference of subjects was measured by non stretchable measuring tape where the midriff is narrowest when the person is standing in an upright and relaxed position (Molarius *et al.*, 1999).

$$\text{Waist to hip ratio} = \frac{\text{Waist circumference}}{\text{Hip Circumference}}$$

Hip circumference measured using non stretchable measuring tape with person standing with feet together over the buttocks where girth is largest.

Statistical Analysis

The data was recorded in Microsoft Excel 2021 and the statistical analysis was done by using the IBM SPSS software V.25.0 version. We used MS Excel to organize data by sorting it into categories and tables and then importing the file into the IBM SPSS software program. The values of the data were then analyzed by applying the paired sample t-test on the fasting values to get the results. A P value of < 0.05 will be statistically significant (Greenland *et al.*, 2016).

RESULTS AND DISCUSSION

This study examined the impact of two different intermittent fasting patterns, the (16:8 and 12:12) on body weight, BMI, and other anthropometric measurements in women diagnosed with polycystic ovary syndrome (PCOS). The following are the results of the study and its discussion.

Impact of the 16:08 Fasting Window

The data of Table 1 presents the statistical results for the Group A following a 16:8-time restricted fasting window. This evaluation demonstrates significant reduction in body weight, BMI, and other physical measurements, leading to the validation that 16:8 intermittent fasting protocol had a statistically significant impact upon the weight and physical wellbeing of women with polycystic syndrome.

There was a marked difference in body weight, with the mean reduction of (M ± SD: 6.68 ± 2.3kg), is statically significant (p<0.001), and confidence interval between 5.79 to 7.58kg that indicates the continuous change in body weight among subjects. This finding proposes that 16:8-time restricting feeding led to considerable weight loss. The pilot study by Martínez-García *et al.* (2024) also corresponds to this result, showing that intermittent fasting reduces caloric intake and promotes fat metabolism leading to weight reduction.

Table 1. Pre-Fasting and Post-Fasting changes in Body weight and Anthropometric Measurements of 16:8 fasting window

		Paired Samples Test					t	df	Sig. (2-tailed)
		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre Fasting Weight – Post Fasting Weight	6.6833	2.3943	.4371	5.7893	7.5774	15.289	29	.000
Pair 2	Pre Fasting BMI – Post Fasting BMI	2.033	1.752	.320	1.379	2.687	6.358	29	.000
Pair 3	Pre Waist Circumference – Post Waist Circumference	7.2667	2.5822	.4714	6.3025	8.2309	15.414	29	.000
Pair 4	Pre Waist to Hip ratio –Post Waist to Hip ratio	.04467	.02417	.00441	.03564	.05369	10.120	29	.000

Prolonged fasting period enhances lipolysis (fat oxidation) and insulin sensitivity that led to the significant weight reduction (Cui *et al.*, 2021). Moreover, this metabolic shift is the key benefit of intermittent fasting as insulin resistance is the core problem among women with polycystic ovary syndrome (Arbour *et al.*, 2021). Similarly, BMI was also significantly reduced by ($M \pm SD: 2.03 \pm 1.75$ units), statistically significant result ($p < 0.001$), with confidence interval ranging between 1.3 to 2.6 units. This BMI reduction is the direct demonstration of the observed weight loss among group A subjects. Similarly, Cowan *et al.* (2023) reported the reduction in BMI after following specific time restricted intervention of 16:8 that leads to weight loss and reduces risk of diabetes and cardiovascular anomalies. Therefore, intermittent fasting leads to the potential drop in BMI reflecting the weight loss that also helps effectively in managing PCOS symptoms; metabolic and reproductive issues by improving hormones levels (Yuliyanasari *et al.*, 2024).

Additionally, Table 1 indicates that intermittent fasting of 16:8 windows also has notable impact on anthropometric measurements; waist circumference and waist to hip ratio that showed significant reduction leading to the positive effect on overall fitness and body composition of females subjected in Group A. As shown in table 1, waist circumference and waist to hip ratio showed significant reduction of ($M \pm SD: 7.27 \pm 2.58$ cm), $p < 0.001$ and ($M \pm SD: 0.04 \pm 0.02$), $p < 0.001$, respectively. These findings align with the research of including 69% of females suggests intermittent fasting leads to the central fat reduction which is due to reduced waist and arm circumference (Correia *et al.*, 2021). Furthermore, Women with polycystic ovary syndrome are more likely to develop abdominal fat due to high insulin resistance. The present findings are similar to Zhu *et al.* (2024) research, indicating that intermittent fasting effectively leads to fat mass reduction and visceral fat loss among women with PCOS (Polycystic ovary syndrome).

Impact of the 12:12 Fasting Window

The Table 2 displays the results for Group B followed the fasting window of 12:12 each day. It suggests that this type of fasting creates similar effects in women with PCOS as to body measurements and weight management, with significant decreases in each measured variable.

Table 2 indicates the reduction in body weight, which is statistically significant ($p < 0.001$) with a mean difference of 7.0 kg ($M \pm SD: 7.0 \pm 1.7$ kg). The results within the confidence interval (CI) of 6.3–7.6 kg, also suggest a fairly consistent response among subjects. According to Fagundes *et al.* (2023) fasts of at least 12 hours decline the number of ingested calories and promote metabolic adaptations. This could be due to increased insulin sensitivity and lower hunger hormones such as ghrelin and leptin (Hoover, 2023), leading to weight loss.

The 12:12 fasting elicited similar results showing a mean reduction in BMI (Body Mass Index) by $M \pm SD: 2.43 \pm 0.7$ units ($p < 0.001$). The effect of the 12:12 fasting regimen on body composition is dramatic, as indicated by its confidence interval (2.16 to 2.70 units). The decrease in BMI after the weight loss suggests a large reduction of fat mass (Guimarães *et al.*, 2023).

Table 2. Pre-Fasting and Post-Fasting changes in Body weight and Anthropometric Measurements of 12:12 fasting window

		Paired Samples Test					t	df	Sig. (2-tailed)
		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
			Lower	Upper					
Pair 1	Pre Fasting weight – Post Fasting Weight	7.0167	1.7394	.3176	6.3672	7.6662	22.095	29	.000
Pair 2	Pre Fasting BMI – Post Fasting BMI	2.433	.728	.133	2.162	2.705	18.309	29	.000
Pair 3	Pre Waist Circumference – Post Waist Circumference	8.1167	2.5720	.4696	7.1563	9.0771	17.285	29	.000
Pair 4	Pre Waist to Hip ratio – Post Waist to Hip ratio	.05800	.02469	.00451	.04878	.06722	12.866	29	.000

Similarly, a study by Jamshed *et al.* (2022) on the impact of time-restricted fasting (TRF) only by imposing specific hours of intake led to a corresponding change in energy metabolism and fat utilization. These modifications play a major part in nutritionally managing Polycystic Ovary Syndrome (PCOS) as well, which may help to alleviate problems like irregular periods and reproductive issues that frequently appear along with metabolic health problems in women (Li *et al.*, 2021).

Waist circumference significantly reduces to the level of 8.11 ± 2.57 cm ($M \pm SD$) in Group B participants, with P value < 0.001 and decrease in waist-hip ratio to 0.05 ± 0.02 ($M \pm SD$), with a p -value < 0.001 (Table 2). In conclusion, the results of the study suggest that a 12:12 fasting regimen can be equitably effective to the 16:08 regimen in the reduction of abdominal fat, hormonal balance, and reduction hyperandrogenism in women with PCOS. Research by Alexandraki *et al.* (2021), suggests that intermittent fasting is associated with reductions in visceral fat and improvements in insulin sensitivity and cardiovascular health.

Conclusion

Women dealing with PCOS experienced significant changes in their body measurements by following time-restricted feeding. Both the 16:8 and 12:12 fasting protocols lead to substantial reductions in body weight, BMI, waist circumference, and waist-to-hip ratio. It provides a viable and convenient solution for women to manage weight and alleviate symptoms of PCOS. The study reduces bias and offers strong evidence on the impact of time-restricted feeding in women with PCOS. Although the results are promising, it is necessary to recognize the limitations of the study. First, the study was only conducted for eight weeks and longer-term studies are a necessity to determine that the benefits observed during the research are maintained over time. Further the study only took physical measurements and did not assess metabolic or hormonal parameters.

Future perspectives

Future studies should consider using longer durations of intermittent fasting and measuring variety of biochemical markers, including insulin sensitivity, glucose level and lipid profiles to examine the effect PCOS management. Furthermore, research could assess the impact of intermittent intervention upon reproductive health of women suffering from PCOS by finding the effect on menstrual regularity and fertility. Studies would also predict the treatment of certain metabolic disorders, psychological disorders, anxiety, wound healing, cancer and aging with IF as it has been a milestone in human history and research.

Conflict of interest:

The author declares no conflict of interest.

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