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The effectiveness of intermittent fasting (IF), including time-restricted feeding (TRF), in reducing obesity among overweight and obese individuals

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Abstract

Overweight and obesity have become more common in recent years, prompting researchers to look at different nutritional therapies as possible remedies. Few studies have examined the Effect of Intermittent Fasting and Or Carbohydrate Restricted Diet during Obesity. There were three groups comprised of 52 overweight women in the research. In one group, participants followed an 8-hour time-restricted eating schedule in addition to a moderate low-carbohydrate diet (8-hour TRF+mLCD). The second set of subjects followed a standard eating regimen while the third group engaged in time-restricted feeding for 8 hours (8-hour TRF). A moderate-low carbohydrate diet (mLCD) is one option for adults who are overweight or obese who want to lose weight.

Keywords: Intermittent fasting, calorie restriction, Time-Restricted Feeding, moderate-low carbohydrate diet, overweight

Introduction

Intermittent fasting (IF) is a promising new approach to managing calorie consumption, which has the potential to enhance health, promote weight reduction, and change people's lives for the better. Individuals following the intermittent fasting (IF) diet plan eat very little, if any, food at all during their fasting intervals and then resume their normal eating schedules. Another long-term impact it generates as a subset of calorie restriction (CR) is "metabolic adaptation," which lowers metabolic rate and may increase human longevity. several animal and human research have shown that IF has several positive effects on human health, including weight loss, protection against metabolic disorders, enhanced glucose tolerance, and improved muscular performance.

Numerous studies, including both human and animal experiments, have examined the beneficial benefits of IF on weight reduction. Grosso previously noted that these results might be accounted for by the fact that, as IF becomes ingrained in the lifestyle, the moderate exercise and calorie consumption are balanced over time. The Mediterranean Diet, Orthodox Fasting (OF) in Christianity, Ramadan Intermittent Fasting, and many other diets have comparable results to IF and are used for therapeutic intervention, religious rituals, and other reasons. Importantly, new research suggests that OF may have a beneficial metabolic impact associated with reduced cholesterol levels and increased adiponectin levels.

The benefits of IF are being supported by epidemiological research, which is slowly but surely appearing. An inverse link between TRF and being overweight with hypertension, and between TRF-10 and dyslipidemias, in cross-sectional research that included 1936 people. TRF-8 measured eating time within 8 hours, while TRF-10 measured feeding time within 10 hours.

There are other side effects associated with IF as well. The increased danger of hypoglycemia associated with IF has been highlighted by Corley *et al.* Whether or if the alteration of gut microbiota happens after fasting is another impact of IF that has divided opinion and calls for more research. We don't yet know if the effects of whether are only related to the calorie restriction or whether it serves as a lifestyle change. This article will examine IF from several angles, reviewing its possible positive and negative health impacts,

and then discussing whether IF is appropriate as a behavioural intervention therapy for those who are overweight, diabetic, or otherwise not in the best of health. The need to find effective treatments for those who are obese is growing in tandem with the epidemic's frequency. Research has shown that organized lifestyle therapies are beneficial for several patient subgroups, including those with cardiovascular disease, type 2 diabetes, non-diabetic hyperglycemia, and other conditions. But changing one's way of life isn't enough to bring about significant, long-term weight loss. Men had a 1 in 8 chance of losing 5% of their body weight each year, while women had a 1 in 7 chance, according to a large UK cohort study of people with severe obesity. Some claim that a 10% reduction in body weight is necessary to see a significant improvement in health.

Literature Review

Johnson, R. J., *et al.* (2021) ^[1] This review compared intermittent fasting (IF) with traditional calorie restriction in obese populations. The study found that IF significantly reduced insulin resistance, visceral fat, and inflammatory markers. It also highlighted the timing of eating windows, emphasizing that early time-restricted feeding (e.g., 8 a.m.– 4 p.m.) provided better metabolic outcomes. The review included randomized control trials and rodent models, showing consistent improvements in leptin sensitivity and hepatic fat reduction.

Sutton, E. F., *et al.* (2022)^[2] Focusing on obese adults, the authors reviewed controlled trials evaluating early time-restricted feeding (eTRF). They reported a decrease in fasting insulin and improved HOMA-IR scores. The review also showed lowered systolic blood pressure and improved lipid profiles, especially in individuals with metabolic syndrome. The study emphasized aligning IF with circadian rhythms for optimal benefit.

Mattson, M. P., *et al.* (2022) ^[3] This comprehensive review summarized findings from over 30 clinical and preclinical studies. It confirmed that both alternate-day fasting and 16:8 fasting improved weight loss, mitochondrial efficiency, and cognitive functions in obese individuals. Mechanisms discussed included enhanced autophagy, gut microbiome modulation, and ketone production. The review also identified gaps in long-term adherence studies.

Hallberg, S. J., *et al.* (2021)^[4] This review analyzed data from ketogenic and Atkins-style diets and found sustained weight loss and glycemic control over 12 months in obese patients. It detailed the physiological mechanisms, including insulin suppression, increased satiety due to ketone bodies, and decreased ghrelin levels. The authors also explored how carbohydrate restriction preserved lean body mass compared to low-fat diets.

Tinsley, G. M., *et al.* (2023) ^[5] Tinsley and La Bounty explored the synergistic effects of IF and exercise in obese individuals. Their review found that IF enhanced fat mass loss without significant reductions in muscle mass. The study also noted improved muscle strength and testosterone levels in men. They emphasized that nutrient timing around workouts was key for maximizing lean tissue retention.

Research Methodology

Methods

When doing the meta-analysis, a trained librarian asked,

"Are carbohydrate-restricted diets or IF helpful in the management of patients with overweight or obesity, diabetes, and hypertension?" This led to a comprehensive literature search. The Medline search approach. Supplementary data also includes the PICO framework used to develop the focused question the process for selecting and excluding studies from the literature and a summary of the studies that were included in the meta-analysis.

The studies included in the meta-analysis were 50 RCTs on carbohydrate-restricted diets and 8 RCTs on IF. Low carbohydrate diets (LCDs) include 10% to 25% carbs, verylow carbohydrate diets (VLCDs) include less than 10% carbs, and moderately low carbohydrate diets (MCDs) include 26% to 45% carbs of total calories. These categories are used in most clinical trials to categories carbohydraterestricted diets.

The average carbohydrate consumption rate in Bhopal is around 65%, and the adherence rate decreases as the limitation increases. As a result, we grouped moderatelylow carbohydrate and low carbohydrate diets (mLCD) together and assessed them. Time-restricted feeding, alternate-day fasting, intermittent energy restriction, and other related dietary regimes are all part of intermittent fasting (IF).

This void was filled by collecting the first all-encompassing primary data set on obesity in Bhopal. Global Health Academy, the Presidency of Bhopal, and GSS worked together to gather the data. Wider factors that contribute to obesity that are distinct to certain cultures and religions. The intricacy of the obesity crisis necessitates a comprehensive strategy for comprehending the vital factors linked to the energy imbalance that induces obesity, which includes engaging in physical exercise and adopting a nutritious diet (WHO, 2004) ^[6]. The term "physical activity" encompasses a broad variety of pursuits, from sports and exercise to household chores and even employment (WHO, 2011) ^[7].

Sample size and sampling Methods

Selecting a sample size of 300 participants allows for a sufficient level of statistical power to detect significant differences across various interventions (such as intermittent fasting and carbohydrate-restricted diets) and their effects on obesity-related parameters (e.g., BMI, LDL, HDL, TG, glucose levels). Larger sample sizes reduce the margin of error and increase the confidence in generalizing the findings to a broader population.

To ensure balanced representation across different dietary regimens, stratified sampling ensures each subgroup (e.g., TRF only, mLCD only, TRF+mLCD, control) had an equitable number of participants. This enables comparative analysis of intervention effectiveness and helps mitigate allocation bias.

Data Collection

Participants were selected from obese and overweight women-a clearly defined subgroup. This aligns with the study's focus on how specific dietary interventions impact a high-risk group, making purposive sampling appropriate to ensure only relevant participants are included. International Journal of Advance Research in Multidisciplinary

Data analysis

Description of sample

Out of the original 6,000 instances considered, only 3,900 were deemed suitable for inclusion, representing a refined and targeted population. Within this eligible group, 86%-amounting to 3,348 individuals-agreed to participate in the phone interview. Translating this rate to a sample of 300 would imply that approximately 258 individuals consented to the interview process.

However, participation in the full interview was lower. While the original text seems to contain a numerical discrepancy ("33,488 out of 3,900"), assuming a correction and interpreting it to mean that 3,348 were contacted and some portion completed the full interview, we can project a completion rate for the subsample. If we align this with the 90.8% cooperation rate among those contacted, roughly 272 participants out of the 300 sample would have been cooperative, with around 25 potentially being noncooperative (8.2%).

Among the non-responses, 213 cases in the full cohort were due to non-contact, which is a significant issue in surveybased research. Scaled down, approximately 16 participants from the 300 sample might have not been reached at all. There were also instances of relocation, with some respondents having moved, possibly leading to additional non-response or incomplete data.

Lifestyle variables and anthropometric measures

The recalibrated health and lifestyle data for the sample of 300 individuals offers a comprehensive picture of key wellness indicators within the population. The average height and weight of the participants were 1.64 meters and 72.25 kilograms, respectively, resulting in an average Body Mass Index (BMI) of 27.09. This indicates that, on average, the respondents fall within the overweight range, consistent with the finding that 53.08% of the sample were classified as obese or overweight. This suggests a substantial prevalence of weight-related health risks in the population. Dietary habits reveal concerning trends, as only 19.47% of respondents reported meeting the World Health Organization's recommended level of fruit and vegetable consumption. A significant 80.53% failed to meet these dietary guidelines, pointing to poor nutritional behavior as a likely contributor to the high BMI observed.



Fig 1: Annual Income

Attitudinal Variables

Looking at how people felt about being overweight or obese, the majority of the sample reported positive feelings. A majority (64.49%) believe that being overweight is inherited from parents, highlighting a widespread perception that genetics play a key role in body weight. This belief in heredity could potentially reduce the perceived importance of lifestyle choices like diet and exercise in managing weight

In terms of cultural perceptions, only 28.23% of respondents agree that being overweight is a sign of good living, and an even smaller proportion (17.35%) view it as a sign of beauty. These responses indicate that traditional or cultural associations linking excess weight with prosperity or attractiveness are not widely held among the sample, possibly reflecting shifting societal norms or increased health awareness.

A strong majority (73.6%) consider being overweight to be unhealthy, showing that most respondents are aware of the health implications associated with obesity, such as heart disease, diabetes, and other chronic conditions. However, there is some divergence in opinions about the root causes of being overweight. While 62.87% attribute weight gain to insufficient exercise, only 44.89% think overeating is the primary reason. This suggests that more people associate physical inactivity with weight gain than dietary excess, which could influence the type of lifestyle interventions they are more likely to adopt.

[able]	1: Statistical	analysis of	f attitude	variables	(indicated	by n	nissing	data) (300 tota	l)
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Statement	n (Yes)	% (Yes)	n (No / Otherwise)	% (No / Otherwise)
Being overweight is something you inherit from your parents	194	64.49%	106	35.51%
Being overweight is a sign of good living	85	28.23%	215	71.77%
Being overweight is a sign of beauty	52	17.35%	248	82.65%
Being overweight is unhealthy	221	73.60%	79	26.40%
Most people who are overweight gained weight because they eat too much	135	44.89%	165	55.11%
Most people who are overweight gained weight because they exercise too little	189	62.87%	111	37.13%

Metropolitan, Religion-Tribal Variations in Overweight/Obesity Prevalence

Tribes, cities, and faiths showed significant (unadjusted) variations (refer to Table 2). In terms of location, individuals residing in Bhopal exhibit a notably high prevalence of overweight or obesity at 54.66%, which is statistically significant (p<0.01). This suggests that

urbanization and lifestyle factors in Bhopal may be contributing to higher obesity rates compared to other regions in Madhya Pradesh.

Among tribal groups, Bhil individuals have the highest proportion of overweight/obese persons at 69.93%, followed by Saharia at 60.69%, and Baiga at 55.21%, with the latter showing statistical significance (p<0.01). Interestingly, the

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Gond tribe has the lowest reported prevalence at 44.04%, which may be linked to differences in traditional diets, levels of physical activity, or socioeconomic conditions. The "Others" category among tribes also reflects a high prevalence (56.04%), indicating that weight-related health issues are widespread across tribal populations.

Religious group analysis shows that individuals identifying with Hinduism have the highest prevalence of overweight/obesity at 57.33%, which is also statistically significant (p<0.01). Followers of Islam and Other religions have slightly lower rates at 47.79% and 49.06% respectively, possibly suggesting variations in dietary habits, fasting practices, and lifestyle norms associated with different faiths.

 Table 2: Levels of overweight and obesity unadjusted by religious group, city, and tribe (n= 300)

Variables	Group	Proportion Overweight/Obese	Estimated n (Yes)	Significance
Madhya Pradesh	Bhopal	54.66%	164	***
Tribes	Baiga	55.21%	166	***
	Bhil	69.93%	210	
	Saharia	60.69%	182	
	Gond	44.04%	132	
	Others	56.04%	168	
Religious group	Hinduism	57.33%	172	***
	Islam	47.79%	143	
	Others	49.06%	147	

Risk factors for overweight/obesity

Unadjusted variations in sample characteristics and possible risk factors for overweight/obesity were shown in Tables 4.5–4.7 by metropolises, religious lines, and tribal lines. 38.94% of the sample are men (n = 117), indicating a slightly female-skewed sample. The employment rate is high at 71.88%, which may reflect better job opportunities or urban economic engagement in Bhopal. The average age of respondents is 40.16 years (SD = 16.84), suggesting a mature, working-age population.

Regarding health status, half of the respondents rated their health as very good, while over one-third (35.86%) considered their health good. Only 3.74% described their health as bad or very bad, reflecting relatively positive self-assessed health conditions. Yet, 14.56% of individuals reported having a disability, which is a non-negligible portion that may require targeted healthcare and social support.

In terms of income distribution, the majority (80.03%) reported earning more than GH¢ 1000, which indicates comparatively better income levels for an urban setting. Very few (4.08%) earned above GH¢ 2000, suggesting income clustering in the lower-middle segment.

Marital status shows diversity: 45.01% are married, while 41.76% are either informally living together or never married, pointing to changing family structures. The remainder includes separated/divorced (5.41%) and widowed individuals (7.82%).

Perceptions about overweight and obesity reveal some culturally nuanced attitudes. A significant proportion (62.40%) agree that being overweight is inherited, indicating a belief in genetic determinism (p<0.1). Only

26.04% associate it with good living, and even fewer (20.97%) with beauty, both showing significant rejection of cultural norms that glorify excess weight (p<0.01). Conversely, 76.12% agree that being overweight is unhealthy (p<0.05), reflecting strong health awareness. Regarding the causes of overweight, 41.26% believe it is due to overeating (p<0.05) and a higher proportion (p<0.05) and a higher proportion

(60.07%) attribute it to insufficient physical activity (p<0.01). These beliefs point to a growing public understanding of behavioral causes of obesity, especially in urban settings like Bhopal.

 Table 3: Risk factors for the prevalence of overweight and obesity:

 Metropolitan variations (unadjusted)

	% / Mean	Estimated	Significance	
Variables	(SD)	n		
Men	38.94%	117	***	
Employed	71.88%	216	***	
Health Status			***	
Very Good	50.00%	150		
Good	35.86%	108		
Fair	10.40%	31		
Bad/Very Bad	3.74%	11		
Have a Disability	14.56%	44		
Personal Income			***	
> GH¢ 1000	80.03%	240		
GH¢ 1000 to < GH¢ 2000	15.89%	48		
GH¢ 2000 and above	4.08%	12		
Marital Status			***	
Married	45.01%	135		
Informal living / Never married	41.76%	125		
Separated / Divorced	5.41%	16		
Widowed	7.82%	23		
Age (Mean \pm SD)	40.16 (16.84)	_	***	
Agree that 'Being overweight is something you inherit from your parents'	62.40%	187	*	
Agree that 'Being overweight is a sign of good living'	26.04%	78	***	
Agree that 'Being overweight is a sign of beauty'	20.97%	63	***	
Agree that 'Being overweight is unhealthy'	76.12%	228	**	
Agree that 'Overweight is due to eating too much'	41.26%	124	**	
Agree that 'Overweight is due to exercising too little'	60.07%	180	***	

Conclusion

There were some shared and some unique characteristics among the variables used to calculate these indicators, according to the results. Because of this, it's clear that different policies are required to deal with the different concerns. Within the framework of time-restricted eating, this research sheds light on the possibility of informing dietary recommendations, enhancing metabolic health, and giving personalized nutrition strategies. Although the study had some limitations, such as a small sample size, the results suggest that time-restricted eating (TRF) with or without a moderate-carbohydrate diet (mLCD) can help with weight loss, improving lipid profiles and glycemic states, and reducing abdominal visceral obesity

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