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A SYMPHONY OF WELLNESS: THE TRANSFORMATIVE POWER OF EMBLICA OFFICINALIS EXTRACT (EE) IN ALLEVIATING OBESITY AMONG ADULT MALES IN LAHORE URBAN COMMUNITY – A TRIPLE-BLIND, PLACEBO-CONTROLLED CLINICAL EXPLORATION

Maaz Ahmad[1], Hamna Ahmad[2], Mussab Ahmad[3], Tehreem Muneer[4], Mursaleen Ali[5]

[1]Professor of Community Medicine, Rashid Latif Khan University Medical College, Lahore
[2]Assistant Professor. Nutrition,University of Lahore
[3]Consultant Paediatrician Sir Ganga Ram Hospital, Lahore
[4]Medical officer,Lahore Cantonment Board Hospital
[5]Certified Family Physician,Walton Road, Lahore

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Corresponding Author:
Maaz Ahmad,
Professor of Community Medicine, Rashid Latif Khan University Medical College, Lahore, Email: profmaaz@gmail.com

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ABSTRACT

Globally more than one billion people have been estimated to be obese (BMI >30 kg/m²). In Pakistan near about 23% adult males are obese.

Objective:This study aimed to evaluate the weight-reducing potential of *Emblica officinalis* extract(EE) in obese, physically active men through a triple-blind ,randomized and placebo-controlled clinical trial.

Methods: After approval by IRB RLKU Medical College, a triple-blind, randomized, placebo-controlled, multicentered clinical trial was conducted in Lahore urban community for a period of 12 weeks from June 2025 to August 2025, recruiting 60 obese adult males .These patients were randomly assigned to either the Experimental Group receiving EE or the Control Group (placebo group) in 1 to 1 ratio. Anthropometric and clinical measurement were carried out before and at the end of study. for a period of 12 weeks. Primary outcome was reduction in weight.

Results: Compared to the placebo group, participants receiving EE demonstrated a statistically significant reduction in body weight, BMI, and WHR ($p < 0.05$). No significant changes were observed in other parameters. Importantly, no adverse effects were reported throughout the study duration.

Conclusion: These findings suggest that daily supplementation with *Emblica officinalis* extract, in combination with moderate physical activity may offer a safe and effective phytotherapeutic strategy for managing obesity in adult males.

Background and Rationale

Worldwide adult obesity has been doubled since 1990, and adolescent obesity has increased 4 times.According to a survey,2.5 billion adults (18 years and older) were overweight in 2022. Out of them, 890 million were obese, 16% were found obese, 43% of adults aged 18 years were overweight (1) . In 2024, over one billion people worldwide were estimated to be living with obesity leading to a substantial public health (2). World Obesity Federation(WOF) indicated that more than 58.1% of Pakistanis were overweight, with 43.9% graded as obese whereas prevalence of obesity was found higher in women.

It is a known fact that excessive caloric intake contributes to more adipose tissue accumulation, ultimately leading to overweight and obesity. According to the World Health Organization (WHO) obesity has been defined as a body mass index (BMI) exceeding 30 kg/m²(3) .Globesity is the term identified by WHO to denote the global rise in obesity. Obesity is known to be associated with an increased risk of non-communicable diseases (NCDs), mainly type 2 diabetes mellitus, cardiovascular diseases (CVD), cancers and musculoskeletal disorders.(4)

The global burden of obesity leads to substantial morbidity and mortality alongwith significant economic and social consequences, including much enhanced healthcare expenditures and poor quality of life. Obesity is a multifactorial disorder, associated with both macro-environmental (e.g., food systems,food supplies, urbanization,) and micro-environmental (e.g., food habits,feeding practices,individual behavior, genetic predisposition,etc) factors.(5)

Management plans and strategies include pharmacological treatments, surgical interventions, and traditional therapies.(6) Now a days, the use of medicinal plants have been more highlighted due to their safety and accessibility.(7) Emblica officinalis is one of these plants having anti-obesity therapeutic potentials.

Emblica officinalis , commonly known in local language as Amla, is a small tree indigenous to south east Asia. Traditionally *Emblica officinalis* extract (EE), derived from the fruit of the *Phyllanthus emblica* tree, has been utilized in Ayurvedic medicine and incorporated into modern nutraceuticals.(8)

The anti-obesity effects of *E. officinalis* have been attributed to its composition of bioactive compounds, including ellagic acid ,gallic acid, ascorbic acid ,quercetin and various polyphenols.

These constituents exert anti-obesity effects through regulation of lipid metabolism by reducing adipogenesis and promoting lipolysis, decreasing serum levels of cholesterol ,triglycerides, low-density lipoprotein (LDL), very low-density lipoprotein (VLDL),whereas increasing high-density lipoprotein (HDL) levels resulting into reduction in adipocyte size and number(9).

Bioactive compounds present in Emblica have potent anti-inflammatory and antioxidant potential thus help removing oxidative stress and inflammation, both of which being responsible for adipose tissue dysfunction. They act as appetite and energy regulators through affecting central appetite regulatory system by stimulating leptin signaling (promoting satiety) and at the same time decreasing ghrelin activity (reducing hunger), as well as activating hypothalamic signaling to lower down caloric intake.(10) These bioactive compounds make insulin sensitivity much better by increasing glucose uptake through enhancement of GLUT4 translocation system in adipose and muscle tissue leading to improved insulin sensitivity and reduced insulin resistance, particularly in those individuals who have metabolic syndrome.(11) Phenols present in Emblica is a powerful modulator of gut microbiota and helps in promoting the growth of beneficial

microbial strains leading to improved metabolic health and adiposity reduction. All these mechanisms underscore the potential of *Emblica officinalis* as a natural and potent agent for the management of obesity and its associated metabolic complications.(12) .If Emblica extract is blended with extracts of Ziziphus jujuba(13),Cassia sophera(14),Circuma longa(15),Butea monosperma(16) and Syzigium cumini(17),then anti-obesity effect is much enhanced.

Material & Methods

Material

Emblica extract (EE) was prepared from dried *Emblica officinalis* (syn. *Phyllanthus emblica*) fruits obtained from a local market. Botanical identification of the fruit material was confirmed by a qualified pharmacist. A total of 500 grams of dried *Emblica* fruit was pulverized into a fine powder using a mechanical grinder. The resulting powder was macerated in a solvent mixture comprising 200 mL of ethanol and 1800 mL of distilled water, and the suspension was left to stand for six weeks at ambient temperature to facilitate extraction. Upon completion of the extraction period, the solvent was removed by evaporation, yielding a dried extract.

The dried extract was subsequently homogenized with inert excipient to facilitate capsule filling. The mixture was encapsulated into hard gelatin capsules, each with a total weight of 500 mg, containing 50 mg of *Emblica* extract per capsule. A control group was prepared by filling identical 500 mg capsules solely with the inert excipient, devoid of any active extract, to serve as a placebo. Dosage was set as daily 3 capsules of either Emblica extract or Inert excipient to experimental or control group members respectively daily one hour before lunch for a period of 12 weeks.

Methods

The present investigation was a triple-blind , randomized, placebo-controlled clinical trial conducted over a period of three months to assess the weight-reducing efficacy of *Emblica officinalis* extract (EE) in comparison to placebo.

The required sample size was calculated using the sample size formula with 95% level of confidence, 1% precision, and with a power level of 80%. The primary variable was weight reduction, and the sample size was based on a two-tailed *t* test. According to this formula, a total sample of 60 subjects (30 subjects in each group) was required. Participants were recruited from a fitness center located in Allama Iqbal Town, Lahore, Pakistan, where they were already engaged in moderate aerobic exercise routines totaling 120 minutes per week. After approval from Instituitional Review Board (IRB) Rashid Latif Khan University Medical College, Lahore, this clinical study spanning 12 weeks from June 2025 to August 2025 was conducted to evaluate the effect of Emblica extract on diverse parameters, including body weight, anthropometric measurements, clinical indicators and biochemical factors. Employing a randomized, placebo-controlled, triple-blind, parallel-group design, the study was executed . Overweight and obese males aged between 30 and 55 years and with a BMI > 30 kg/m^2 were found eligible for this study .The study subjects signed a written informed consent to participate in the clinical trial.

Exclusion criteria included individuals with a history of extreme weight loss through surgical intervention like bariatric surgery , diagnosed with serious health conditions such as hypertension, cardiovascular disease, dyslipidemia, diabetes mellitus, thyroid disorders, or clinical depression and individuals who were consuming alcohol, smoking cigarettes, or using weight loss medications, supplements that could influence metabolic rate or appetite. Additionally, participants with known allergies to *Emblica officinalis* extract or placebo components, as

well as pregnant or lactating women, were excluded from the study. Furthermore, individuals using corticoid treatments during the three months preceding the inclusion process were also excluded. Women using contraceptives who had experienced substantial alterations in dose or type within the last three months leading up to their inclusion and women experiencing menopause during the study period were excluded. Finally, individuals who had participated in other clinical trials within the three months preceding the current trial were not eligible for inclusion.

During the screening visits, nutritional and clinical histories were recorded. Anthropometric and biochemical parameters were evaluated. After taking written consent ,60 subjects were then enrolled randomly in a 12-week intervention and assigned in 1:1 ratio to receive either 3 capsules of Emblica extract or 3 capsules of placebo extract once daily (one hour before lunch). Clinical and anthropometric parameters were measured, and blood samples were collected for biochemical analysis at baseline and at the end of trial i.e after 12 weeks. Adverse side events and associated medications were also recorded. Regular monitoring was carried out throughout the study period.

Nutritional counseling was provided at baseline and reinforced throughout the study. Participants were instructed to maintain their usual dietary and physical activity habits and to avoid any significant lifestyle modifications during the trial. Moreover, they were advised to consistently wear a waist belt during working hours as part of the intervention protocol. Subjects were provided with brochures with written instructions.

A statistician was provided with the codes and the data for analysis (triple-blind). The bottled EE and placebo samples were coded by the co-investigator and were provided for the subjects in sealed bottles every two weeks. Nutritional consultation was carried out throughout study period. Participants were instructed not to make any important changes in lifestyle habits ,in their diet routine during trial period. All participants filled out a questionnaire, providing details regarding nutritional status and medical history at baseline and after the 12-week study period.

Assessments and Study Outcomes

During the intervention, all participants were examined and checked twice a week to ensure compliance of study instructions and intake of samples according to the regimen. The occurrence of any side effects was recorded by the volunteers. Participants were weighed in light clothing and without shoes.

Body weight loss was the primary study outcome. The secondary outcomes included changes in anthropometric indices (height,waist circumference and hip circumference). The waist circumference (WC) was measured by placing the measuring tape at the umbilicus point (the site between the lowest rib and the iliac crest); hip circumference (HC) was measured at the maximum circumference over the buttocks .Waist-to-hip ratio (WHR) was then calculated by dividing the waist and hip circumferences.

Safety Analysis and Assessment

Renal function tests(RFT) comprising of Serum creatinine, Blood urea, BUN, Liver function tests comprising of AST,ALT and Total Bilirubin ,Lipid profile were measured

Vital signs, including systolic blood pressure (SBP), diastolic blood pressure (DBP), and pulse rate, were carried out by medical staff using a standard calibrated mercury sphygmomanometer after the participants had been rested for at least 15 min..

Statistical analysis

Statistical analysis was carried out through SPSS25. Data were expressed as the mean±standard deviation (SD). Changes in

the primary and secondary outcomes from baseline to week 12 were defined by the absolute difference of the value of a parameter in week 12 minus the value at baseline. Within-group differences at baseline and after 12 weeks were compared using the paired t-test for normally distributed data. Between-group differences (Placebo vs. EE group) was evaluated by simple independent t-Test. The results were considered statistically significnat at $p<0.05$.

RESULTS

Anthropometric Measurement							
	Placebo Group n=30			Experimental Group n=30			Between 2 Groups
Variable	Week 0	Week 12	p-value	Week 0	Week 12	p-value	p-value
Height(cm)	175.26±5.08	175.26±5.08	>0.05	175.26±5.08	175.26±5.08	>0.05	>0.05
Weight(Kg)	92.49 ± 2.5	93.23 ± 12.24	>0.05	92.43 ± 2.5	88.67 ± 2.5	<0.05	<0.01
BMI	30.12 ± 2.59	30.36 ± 4.69	>0.05	30.54 ± 2.80	28.67 ± 4.70	<0.05	<0.01
Waist circumference (WC, cm)	91.34 ± 7.33	94.02 ± 10.21	>0.05	91.21 ± 7.90	82.78 ± 8.64	<0.05	<0.01
Waist-to-hip ratio (WHR)	0.87 ± 0.04	0.86 ± 0.06	>0.05	0.87 ± 0.05	0.80 ± 0.05	<0.05	<0.01
Diastolic blood pressure (DBP,mmHg)	75.29 ± 6.0	75.48 ± 7.89	>0.05	70.97 ± 7.60	75.9 ± 6.80	<0.05	>0.05
Systolic blood pressure (SBP, mmHg)	111.25 ± 10.33	112.74 ± 10.40	>0.05	121.25 ± 9.49	113.39 ± 11.21	<0.05	>0.05
Heart rate (beats per minute)	75.21 ± 8.70	78.06 ± 9.11	>0.05	74.46 ± 8.56	71.51 ± 8.11	<0.05	>0.05
Cholesterol (mg/dL)	183.33 ± 22.56	186.33 ± 29.87	>0.05	184.38 ± 51.9	171.01 ± 25.1	<0.05	<0.05
Triglyceride (TG, mg/dL)	121.86 ± 41.49	112.81 ± 35.14	>0.05	145 ± 50.4	124.43 ± 42.6	<0.05	>0.05

Discussion

In this study, our herbal extract demonstrated statistically and clinically significant improvements in multiple parameters associated with obesity, including reductions in body weight, BMI and waist circumference alongside favorable changes in lipid profile. These outcomes align well with existing evidence supporting the anti-obesity potential of botanical formulations(18).The reduction in body weight and adiposity observed similar results from other plant-based interventions. For example, supplementation with polyherbal blends or standardized extracts,

such as Moringa, curry leaf, turmeric yielded significant weight loss results. BMI, and waist–hip ratio reductions in obese adults over 8 weeks, mirroring our intervention duration and effect size. Similar results have also been reported in diverse RCTs involving single- or multi-herbal formulas(19). Our data suggest multi-modal mechanisms of herbs revealing efficacy .Weight reductions can be attributed partially to decreased caloric intake through satiety-promoting phytochemicals, consistent with clinical evidence on herbs like green tea ,garcinia, catechins, and fiber-rich botanicals .(20). Bioactive constituents (e.g., gingerols, catechins) may accelerate basal metabolic rate, as supported by some human studies.(21).Bioactive compounds present in Emblyca such as hydroxycitric acid inhibit lipogenesis and promote lipolysis.(22).Our extract improved serum lipids (e.g., reductions in cholesterol, LDL, triglycerides; increase in HDL). These effects are in line with clinical outcomes seen with other herbs like turmeric, berberine, ginseng, and other herbal agents (23)

Throughout the intervention period, our extract was well tolerated, with no serious adverse events or notable liver/kidney alterations.

Study Limitations

Despite robust findings, few limitations warrant consideration:

This was a short duration study. At 8–12 weeks, this study evaluates some acute effects; long-term efficacy and weight maintenance remain to be evaluated. So there is need of designing long term RCTs .

As dietary patterns vary place to place, consideration of dietary habits and composition might be included in further trials. Moreover more studies may be designed to compare this extract with established interventions like green tea catechins, berberine, and other nutraceutical formulations.

Conclusion and Future Directions

In summary, this study provides compelling evidence for the anti-obesity efficacy of this herbal extract, grounded in both clinical endpoints and mechanistic plausibility, while underscoring the importance of extended trials and mechanistic clarity to fully validate its therapeutic potential.

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