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# A Comparison Study between Orlistat and Moringa Oleifera as an Appetite Suppressant in Case of Obese Patients

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**ABSTRACT:** Obesity is a disease in which excess accumulation of fat occurs in the adipose tissues of the body. Obesity is the main cause of many diseases such as type- 2 diabetes, cardiovascular diseases, and mental health disorders such as depression. In recent studies, Moringa oleifera have been found to have antilipidemic activity by reducing the levels of total cholesterol, triglycerides and low density lipoprotein. This review compares the therapeutic effect of herbal drug to orlistat, a lipase inhibitor. The mechanism of action of Orlistat is to prevent the intestinal absorption of fat present in food resulting into excretion of the unabsorbed fat from the body in the stool.

**KEYWORDS:** anti-obesity, appetite suppressant, Obesity, lipid profile, M. oleifera leaves.

## INTRODUCTION

Obesity is a serious health problem that affects at least 13% of the global populace, numbers that are increasing dramatically in both low- and high-income countries (1). Obesity is a chronic metabolic disease that is the pathological result of interactions between environmental and genetic factors, leading to an energy imbalance among calorie intake and spending (2). The high consumption of energy-dense diets, such as high-fat diets (HFD), with reduced physical activities, is believed to be the leading cause of obesity in susceptible individuals (3). Obesity is associated with various phenotypic and metabolic alterations, including increased body weight, abdominal and visceral obesity, low-grade inflammation, insulin resistance (IR), hyperinsulinemia, hyperleptinemia, hyperglycemia, hyperlipidemia, systemic inflammation, and hepatic steatosis (4). Therefore, obesity represents a major medical and socio-economic burden that leads to chronic metabolic development and psychological disorders like diabetes mellitus (DM), hypertension, coronary artery disease (i.e., atherosclerosis), liver failure, cancer, rheumatoid arthritis (RA), osteoarthritis, and depression (5). Hence, management and treatment of obesity are essential to achieve a better quality of life.

Currently approved strategies to treat obesity involve lifestyle modifications and medications that reduce dietary lipid absorption and/or alter lipid mobilization and utilization (6). However, the use of anti-obesity drugs is limited by the numerous clinical side effects, including mouth dryness, insomnia, adverse cardiovascular and cerebrovascular effects, anxiety, and constipation (7). Accordingly, searching for safer plant-derived drugs that produce fewer side effects has received much attention; several plant extracts showed anti-obesity potencies (8).

Obesity treatment differs based on the conditions of the individual (with reference to the BMI), usually the treatment can start by altering the lifestyle of the individual, followed by body weight (bw) management programs and nutrition counselling, then pharmacotherapy (drugs such as Bupropion-naltrexone, Liraglutide, and Orlistat) can be introduced, and finally, in severe conditions, bariatric surgery is the last choice. Some plants and herbs (such as green tea, roselle, St. John's wort, rosemary, and dandelion) have been used in the treatment of obesity, either based on folk medicine or advanced research (9).

Some bioactive compounds have been reported for their anti-obesity potential such as polyphenols, gallic acid, catechins, oleuropein, capsaicin, quercetin, anthocyanins, and caffeine (10). Many plants and herbs have helped in improving the lipid profile by decreasing the levels of total cholesterol, triglycerides, and low-density lipoprotein, and decreasing adipose tissue by lowering adipocytes differentiation and proleiferation (9).*Moringa oleifera* (MO) is a common highly nutritious herb that has been widely used in folk medicine, due to its numerous pharmacological potentials, it is known as “the miracle tree” (11). MO belongs to the family of Moringaceae and is native to India, it has been primarily cultivated in Asia, Africa, and other parts of the world (12). MO is a fast-growing evergreen plant that can tolerate poor soil and limited availability of water (13). MO contains high amounts of proteins, carbohydrates, oils, vitamins, minerals (such as potassium and calcium), amino acids, and phenolic compounds (14).

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Phenolic compounds such as gallic acid, chlorogenic acid, caffeic acid, rutin, kaempferol, *p*-coumaric acid, vicenin-2, and quercetin were detected in MO leaf extract (15). Some unique isothiocyanates were also extracted from MO leaves (16).
MO has been reported for several pharmacological properties such as antioxidant, anticancer, anti-diabetic, anti-obesity, anti-inflammatory, anti-allergic, antiasthmatic, anti-ulcer, antiepileptic, and antipyretic effects (17). Most of the pharmacological activities of MO are due to the high flavonoid, glucoside, and glucosinolate content in this plant (18).
An important pharmacological activity of MO is its anti-obesity potential. A combination of in-vitro, in-vivo, and clinal studies have been conducted to explore the anti-obesity potential of MO extracts or specific compounds isolated from MO. Compounds such as quercetin, isoquercetin, quercetin-3-*O*-malonylglucoside, astragalin have been identified in MO extracts showing anti-obesity activity (19). This systematic literature review focuses on the reported in-vitro, in-vivo, and clinical studies concerning the anti-obesity potential of MO and its mechanisms.

## MECHANISM OF ACTION

### ORLISTAT:

Orlistat acts by reversibly inhibiting the gastric and pancreatic lipases. These lipases have an important role in the digestion of dietary fat. They work by breaking down the triglycerides into absorbable free fatty acids and monoglycerides. Orlistat covalently binds to the serine residues of active sites of lipases and inactivates them. The inactivation of lipases prevents the hydrolysis of triglycerides, and thus free fatty acids are not absorbed (20). Orlistat inhibits the lipases at the gut site. Therefore it acts as local lipase inhibitors.

### MORINGA OLEIFERA:

The M. oleifera leaves have a variety of modes of actions pertaining to different body parts.
Administration of *Moringa oleifera* seed oil and LYC to HFD fed rats significantly ameliorated the elevated leptin and resistin levels, and caused a reduction of inflammatory cytokines levels. These effects are attributed to their fat mass reducing effect that is the main source of adipokines, as well as their potential in adjusting lipid metabolism (21). Administration of *Moringa oleifera* seed oil and LYC significantly ameliorated obesity related increase in HFABP which may be due to their antioxidant potentials and lipid lowering effects observed in this study. (22)
Hydroalcoholic extract of MO leaves has shown promising pancreatic lipase inhibition ($IC_{50}$ = 437.1 µg/mL) based on an in-vitro study (23).

## SIDE EFFECTS:

### ORLISTAT:

The most common side effect of orlistat use is steatorrhea, which occurs because of the impaired absorption of dietary fat. Other side effects include fecal spotting, diarrhea, abdominal pain, and anal fissures. (24) Orlistat can increase the risk of acute kidney injury; this occurs because the unabsorbed fat binds with calcium in the intestinal lumen resulting in excessive oxalate, which is absorbed and deposited in the kidney leading to oxalate nephropathy and increased risk of renal stones.(25) Orlistat inhibits the absorption of fat-soluble vitamins and other fat-soluble nutrients. Patients should use a multivitamin tablet containing vitamin A, D, E, K, and beta-carotene once daily.[26] Animal studies have shown an increased risk of colorectal cancer with orlistat.(24)

### MORINGA OLEIFERA:

Leaves of moringa have laxative properties. When eaten in large quantities they may cause stomach upset, heart burn, gaseous distension, and diarrhea. An overdose of moringa may cause high accumulation of iron. High iron can cause gastrointestinal distress and hemochromatosis. Hence, a daily dose of 70 g of moringa is suggested to be good and prevents over accumulation of nutrients (27)

## CONCLUSION

In this review article, we can conclude that on one hand Moringa oleifera has a variety of uses such as anti-obesity, anti-diabetic, anti-oxidant, etc with minimum side effect when taken in a quantified dose prescribed by the physician. On the other hand, Orlistat even in minimum dose has a major side effect like steatorrhea which results into faecal staining. Therefore, Moringa oleifera can be a potent appetite suppressant used in case of weight reduction by obese patients with minimum side effects.

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