

Role of *Lagenaria Siceraria* Fruit Juice in Overweight and Obesity

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ABSTRACT

Objective: Obesity is a global and a major health problem because of the consequent life-threatening complications leading to premature morbidity and mortality. The prevalence of obesity is increasing at an alarming rate throughout the developed and semi-developed countries. Keeping these facts in the account a research work has been framed to evaluate the role of very common and cheap vegetable, *Lagenaria siceraria* (Bottle gourd) fruit juice in Overweight and Obesity.

Methodology: In this present study, total 32 obese individuals were randomly selected and divided into two groups having 16 obese individuals in each group. In Group I patients were advised to take 200 ml of fresh fruit juice of *Lagenaria siceraria* (Bottle gourd) empty stomach at morning and Group II obese individuals were advised for the brisk walk at early morning for 30 minutes daily. Improvement assessed on the basis of change in weight, waist circumference and body mass index (BMI). The total duration of study is 45 days with follow-up of 15 days.

Result: Significant change in weight, waist circumference, and body mass index observed in both group but relatively better result found in group I.

Conclusion: *Lagenaria siceraria* (Bottle gourd) fruit juice effectively controls obesity and overweight. Its antiobesity potential is relatively better than brisk walk group. So, we can conclude that *Lagenaria siceraria* fruit juice is a safe and effective therapeutic measure for obese individuals.

Keywords: Obesity, overweight, *Lagenaria siceraria*, Bottle gourd, BMI.

INTRODUCTION

Overweight and obesity are defined as excessive, abnormal and unhealthy fat accumulation in the body. Now day obesity has become a big problem in the world. The world population is estimated at about 7.4 billion. [1] WHO global estimates that in 2014, more than 1.9 billion adults aged 18 years and older were overweight. Overall, about 13% of the world's adult population (11% of men and 15% of women) were obese, 39% of adults aged 18 years and over (38% of men and 40% of women) were

overweight. The worldwide prevalence of obesity more than doubled between 1980 and 2014. In 2014, an estimated 41 million children under the age of 5 years were overweight or obese. Now overweight and obesity is equally prevalent in the high-income country, low- and middle-income countries, particularly in urban life. [2] Obesity increases the future risk of various diseases, particularly heart disease, type 2 diabetes, obstructive sleep apnea, certain types of cancer, and osteoarthritis. [3] Lee.2009, [4] Haslam.2005, [3] Victoria et al.

2009 [5] and Bray. 2004 [6] reported that the health consequences of obesity are type 2 diabetes mellitus, nonalcoholic fatty liver disease, hypertension and coronary heart disease that adversely impact the quality of life. All these diseases ultimately lead to premature death if not properly treated.

Overweight and obesity are linked to more deaths worldwide than underweight. 65% of the world's populations live in a country where overweight and obesity kills more people than underweight. Globally, 44% of diabetes, 23% of ischaemic heart disease and 7-41% of certain cancers are attributable to overweight and obesity. [2]

The main etiological factor behind obesity is an imbalance between calories consumed and calories expended, extra calories accumulated in the form of fat in adipose tissues. The preventive measures for obesity and overweight are Maintenance healthy weight, reduced consumption of saturated fats, carbohydrates, sugar and salt, increase consumption of fruit, vegetables, pulses, whole grains, nuts etc. and regular physical activity or exercise. Apart from lifestyle modifications anti-obesity and hypolipidemic medicines are used in advance obese subjects also to minimize future complications such cases like orlistat, lorcaserin and a combination of phentermine and topiramate [7] but due to remarkable side effects of modern synthetic antiobesity and hypolipidemic agents, [8,9] there is an urgent need to develop eco-friendly, bio-friendly plant based products to replace synthetic chemicals particularly. Ayurveda has listed a number of medicinal plants with their antidiabetic, anti-obesity and hypolipidemic properties, the *Lagenaria siceraria* (Bottle gourd) are one of them. It possesses very good Cardiotoxic, Hepatoprotective, Immunomodulatory, Antihyperglycemic, Antihyperlipidemic, Analgesic and Anti-Inflammatory, Antibacterial and Diuretic properties. Keeping in view the above concept, the present research work was carried out at OPD and IPD of Kayachikitsa, Sir Sunderlal Hospital, I.M.S., B.H.U., Varanasi to

evaluate the therapeutic role of an ayurvedic plant *Lagenaria siceraria* (Bottle gourd) in obese individuals.

Objective

To evaluate the role of *Lagenaria siceraria* (Bottle gourd) fruit juice in Overweight and Obese individuals.

About Trial drug: Bottle gourd

Bottle gourd or *Lagenaria siceraria* was also known as Lauki or Dudhi in India is an excellent fruit in nature vividly described in all ancient ayurvedic text of India. In ayurveda, it is known as "Alabu" and "Tumbi", and possesses Hridya (Cardio protective), Pittashamaka (Antacid), Balya (General tonic) and Rasayana (Anti aging) properties. *Lagenaria siceraria* fruits are edible and integral part of Indian vegetables. **Pharmacological properties:** Cardiotoxic, Hepatoprotective, Immunomodulatory, Antihyperglycemic, Antihyperlipidemic, Analgesic and Anti-Inflammatory, Antibacterial and Diuretic. [10]

Common Uses: Fruit juice is used in Ulcers, obesity, fever, asthma, bronchial disorders, pain, as cardiotoxic, general tonic, aphrodisiac, diuretic and mild purgative. [11-14] Leaves mixed with sugar given in jaundice. Seeds are nutritive and diuretic, are used in dropsy and as anthelmintic; roots are useful in the treatment of dropsy [15]

Chemical constituent: *Lagenaria siceraria* contains number of active phytoconstituent vitamin B-complex, vitamin C, β -carotene, pectin choline, saponins, essential fixed oils and triterpenoid cucurbitacins B, D, G, H [16-19]

MATERIALS AND METHODS

Total 32 overweight and obese subjects were selected for the present study from the Kayachikitsa OPD and IPD of Sir Sunder Lal Hospital, Institute of Medical Sciences, Banaras Hindu University, Varanasi. The case selection was random regardless of age, sex, occupation and socio-economic conditions. Patients fulfilling the diagnostic criteria of obesity and overweight were included in the present study. The

study was undertaken in the duration of Jan 2015 to May 2015. Subjects were randomly divided into two groups, 16 patients in each group with the care of inclusion and an exclusion criterion has been taken. Before registration of the case, all the individuals were subjected to repeat diagnostic screening for obesity and overweight based on the physical parameter. The cases were recorded with the help of a special pro forma prepared for this purpose.

Body mass index (BMI)

According to the World health organization, BMI is defined as the subject's weight divided by the square of their height and is calculated as follows.

$$BMI = \frac{\text{Weight in kilogram}}{(\text{Height in meter})^2}$$

BMI (kg/m ²)	Classification ^[20]
<18.5	Underweight
18.5-25.0	Normal Weight
25.1-30.0	Overweight
30.1-35.0	Class I Obesity
35.1-40.0	Class II Obesity
>40.0	Class III Obesity

Inclusion criteria

All subjects fulfilling WHO criteria to define overweight and obesity were included in the study.

- Age between: 18-60 years of either sex.
- BMI > 25

Exclusion criteria

- Age <18yrs. and >60yrs.
- BMI <25
- Subjects with an associated disease like Diabetes Mellitus (NIDDM), Hypertension, Heart disease etc.

- Subjects who are taking any kind of anti obesity or hypolipidemic medicines.
- Certain genetic syndromes e.g. Down's syndrome, Klinefelter's syndrome, Turner's syndrome etc.
- Patients suffering from other severe systemic diseases.

Grouping of Patients

Group- I (n=16): Subjects were advised to take 200 ml of fresh fruit juice of *Lagenaria siceraria* (Bottle gourd) empty stomach at morning.

Group- II (n=16): Subjects were advised for the brisk walk at early morning between 5.00 am to 7.00 am for 30 minutes daily.

Improvement assessed on the basis of change in weight, waist circumference and body mass index (BMI). The total duration of study is 45 days with follow-up of 15 days.

Parameter of assessment

- 1) Weight (W)
- 2) Waist Circumference (WC)
- 3) Body Mass Index (BMI)

Statistical analysis

The data obtained was processed on a computer with the help of "SPSS: 16" software package of statistical analysis. Standard statistical methods were used to determine the mean, standard deviation (SD) and the range. Paired t-test was used to compare the results of various biochemical parameters among the patients in the four groups. All value quoted as the mean ± SD and a p-value of < 0.05 was considered to be statistically significant and p-value of <0.01 or p < 0.001 was considered to be statistically highly significant.

Observation

Table 1: Mean change in different physiological parameters of Group-I patients [n=16]

Groups	BT [§]	U1 ^{§§}	FU2	FU3	Paired 't' test BTvs FU3 Mean±SD ^{***}	t value	p value
W*(Kg)	80.59±9.15	75.12±8.83	74.23±8.40	73.63±8.01	6.96±12.80	2.98	0.006
WC ^{**} (cm)	82.56±6.41	79.56±4.34	80.97±6.39	85.42±4.72	-2.86±5.79	-2.70	0.011
BMI [†] (Kg/m ²)	32.42±4.20	30.69±3.02	30.03±3.52	27.97±5.42	4.45±7.29	3.35	0.002

Table 2: Mean change in different physiological parameters of Group-II patients [n=16]

Groups	BT [§]	FU1 ^{§§}	FU2	FU3	Paired 't' test BT vs FU3 Mean±SD ^{***}	t value	p value
W*(Kg)	103.35±5.51	102.12±7.34	99.00±3.60	95.33±4.76	8.02±7.47	5.89	<0.001
WC ^{**} (cm)	103.63±8.12	103.28±4.25	104.41±4.89	102.19±5.30	1.44±9.64	0.82	0.419
BMI [†] (Kg/m ²)	33.82±3.81	33.07±4.35	31.60±4.34	36.15±4.16	-2.32±5.69	-2.24	0.033

[W- Weight, **WC- Waist circumference, †BMI- Body Mass Index, §B.T=before treatment, §§FU- Follow up, ***S.D=Standard deviation]

RESULTS

In the entire course of study, the weight significantly decreased in both group ($p < 0.01$) but it is maximum in Group-II ($t = 5.89$, $p < 0.001$) than Group-I ($t = 2.98$). After the course of study Waist circumference is significantly decreased in Group- I ($t = 2.98$ and $p < 0.05$) than in group-II, Group- II ($p > 0.05$). A similar result has been observed in BMI level, which is significantly decreased in both groups ($p < 0.05$) but better improvement found in Group- I ($t = 3.35$ and $p < 0.05$).

DISCUSSION

The overall study showed significant improvement in all the biophysical indices after treatment with *Lagenaria siceraria* (Bottle gourd) juice. The overall effect of *Lagenaria siceraria* group is better than exercise group. As we see here in the results significant reduction in Weight noted after study in both the groups ($p < 0.05$) but the effect is better in exercise group (II) but the Waist circumference and Body Mass Index significantly decreased in *Lagenaria siceraria* group (I)

A similar result was obtained by, Sayyed Nadeem 2012 [21] in high-fat diet-induced obese rats in which he observed that ethanolic extract of *Lagenaria siceraria* (fruit). Significantly reduces in body weight, fasting blood glucose, serum levels of cholesterol, triglyceride, LDL, VLDL and increase levels of HDL ($P < 0.001$). In human subject similar study has been carried out by Katare C et al. 2014 [22] in which he observed that *Lagenaria siceraria* ethanolic fruit extract in obese human subjects significantly reduces triglycerides and total cholesterol levels ($P < 0.01$) in blood. Cardiac risk ratio, atherogenic coefficient, and atherogenicity index of plasma were also improved. Appreciable reductions in body mass index ($P < 0.01$) and blood pressure (systolic $P < 0.01$, diastolic $P < 0.05$) along with a significant reduction ($P < 0.05$) in fasting blood glucose levels were also observed.

Phytochemical screening confirmed the presence of saponins, glycosides, flavonoids, terpenoids, and phenolic compounds. This phytoconstituent may modulate fat metabolism directly or indirectly resulting in a reduction in gross weight, waist circumference and BMI of obese individuals. [23] On the other hand, exercise directly burns fats and carbohydrates through different mechanisms resulting a reduction in weight and BMI. [24] At last, we can say that *Lagenaria siceraria* (Bottle gourd) juice possesses all the potential which can prevent the process of fat accumulation in the body and its later complications.

CONCLUSION

Obesity is an increase in body weight beyond the limitation of skeletal and physical requirements as the result of excessive accumulation of body fat. It is common but complex multifactorial disorder which develops due to long-term energy imbalance due to excessive calorie consumption, insufficient energy output. Excessive weight gain can lead to major health problems such as Hypertension, Diabetes, nonalcoholic fatty liver disease, malignancies and coronary heart disease. Dietary restriction, exercise, and anti obesity medications are major preventive pillars to combat overweight and obesity. *Lagenaria siceraria* (Bottle gourd) an ayurvedic plant possess novel quality to treat this condition naturally and without any side effects. In this study *Lagenaria siceraria* (Bottle gourd) juice has been screened for their anti obesity effect in overweight and obese human subjects. A significant decline observed in weight, waist circumference and BMI in the individuals taking Bottle gourd juice ($p < 0.05$) which is relatively better than exercise (Brisk walk) group. So we can conclude that *Lagenaria siceraria* (Bottle gourd) juice contains all the possible active ingredients which antagonize the process of fat accumulation in adipose tissue. For the best results, this

juice should be used along with exercise in obese individuals.

Bottom line

The present study is basically a time bound educational pilot study cannot be finally conclusive. This wholesome natural approach of *Lagenaria siceraria* used in this study seems to be effective and completely safe. We sincerely hope that the present study would be a pioneer as an ideal research work in the field of metabolic obesity and related disorders and would provide a useful lead for coming generations and future research workers.

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Conflicts of interest: There are no conflicts of interest.

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