The nutritional values of papaya and the challenging role of yoga practices for weight loss in a society of Mumbai

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Abstract

Introduction: Obesity is a Curse in our society. It has caused one of the major fatalities in the world. Papaya belongs to the giant herbaceous small family Caricaceae. It originated in the historical era of Meso-America, which is currently known as southern Mexico and Central America. In India, it came from the Caribbean through the Spanish explorers around 1550 AD. The nutritional value of the papaya provides an amazing result for weight loss. Yoga is mentioned in several oldest Hindu religious books, such as Rig Veda in Sanskrit. Yoga has been described in Upanishads as well by our Rishis and Monies since ancient times. Therefore, researchers have traced these yogic practices such as asanas to over a thousand years ago. Yoga asanas have benefited in several ways to reduce the weight among the obese. Yoga along with low-calorie fruits such as papaya uniquely reduces BMI. Obesity is a major concern not only in India but also causing severe damage to society and overall health issues all across the rich and the developed world. **Method:** We selected a large society with a yoga club in a suburb of Mumbai, Andheri having 189 active members of different ages of 16 to 59 years old male and female with a rich background. We identified 95 obese members with a high BMI. We have conducted a small conference on the values of yoga and the nutritional value of Papaya in the club. We performed a BMI and lung function test after the post-corona period from 15th July 2021 to 20th June 2022 for 11 months. The selection of 75 members was performed prudently with their consent. **Result:** The addition of papaya and regular Yoga Asanas at least thrice per week till 11 months post BMI result was amazing. **Conclusion**: The use of papaya and regular use of Yoga yields a powerful message as a concomitant therapy for our medical community and will help to reduce obesity as an alternative therapy.

Keywords: BMI, Obesity, Papaya, RDI, Weight loss, Yoga Asanas

1.0 INTRODUCTION

1.1 Obesity

Obesity is one of the highest risks for global deaths among the top five factors, as reported by a European statistical organization **(1)**. Approximately 2.8 million adults die each year as a result of being overweight or obese as reported in the article on the pandemic of overweight and obesity in the book of http://link.springer.com **(2)**. As per 2022, statistics from National Health and Nutrition Energy Survey (NHANES), 42% of American adults have obesity (3). In India as well, it has reached epidemic proportions with morbid obesity affecting 5 % of the country's population **(4).** NFHS 5 data for 2019-2021 is more alarming in India, where nearly one in four every person is overweight compared to one in every five of NFHS 4 in 2015-16. Obesity in Maharashtra is quite high and 24% of people are obese above 15 years of age **(5) (Table 1**).

1.2 Papaya

Papaya in India, as illustrated in **Figure 1,** has been used for 400 years as a meat tenderizer and as an ingredient in Ayurveda and Unani drug manufacturers. The nutrition of the papaya is regarded as a curative agent for several diseases such as malaria, dengue, chicken guinea, and diabetes **(6).** The seeds and fruits contain many vitamins such as thiamine, ascorbic acid, tocopherols, menadiol, niacin, folic acid, protein, Carpaine, myosin enzyme, benzyl glucosinolate, and various other phytochemicals **(7,8).** The fruits of the papaya contain 35% of the seeds and the rest 65% are the pulps. According to the US Department of Agriculture (USDA) nutrient database, 100 gm of papaya gives 39 kcal with the following ingredients, as described in **Table 2**.

Table 1: Obesity in Maharashtra as per National Family Health Service (NFHS 5) 2019-21. **(9)**

State (India)	Male	Rank	Female	Rank
Maharashtra	23.87%	14	23.4%	18

Papaya-**tree** Papaya **leaves** ripened **fruits.**

Figure 1: Papaya plant with leaves and ripened fruits. (10)

Table 2: **Nutrient value of ripe papaya pulp as per USDA (11).**

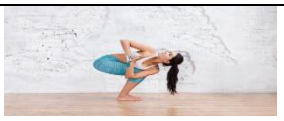
Number	Nutrient	Weight	RDI (REFERENCE daily Intake
1	Carbohydrates	9.2 gm.	3%
2	Fibers'	2.4 gm.	7%
3	Protein	0.64 gm.	1%
4	Retinol (Vit A)	1094 IU	22%
5	Ascorbate (Vit C)	62 mg	103%
6	Tocopherols (VitE)	0.7 mg	4%
7	Menadiol (Vit K)	2.6 mg	3%
8	Vitamin B1	0.039 mg	2%
9	Riboflavin	0.049 mg	2%
10	Pyridoxine	0.1 mg	0.8%
11	Vitamin B3	0.3 mg	2%
12	Folate	37.6 mg	10%
13	Pantothenic acid	0.2 mg	2%
14	Calcium	24 mg	2%
15	Magnesium	10 mg	2%
16	Potassium	257 mg	7%
17	saturated fat	0.98 gm.	0%
18	Iron	0.20 mg	1.4%
19	Total fat	0.24 g	0%

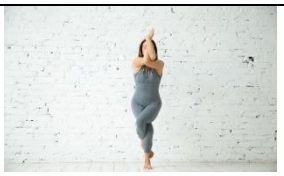
It is reported as well in the Indian vegan.blogspot.com **(12).**

1.3 Yoga Asanas.

Yoga asanas are among the best body weight loss interventions and are highly effective in reducing weight in our obese population **(13)**. Obesity is threatening the lives of our societies and the country. Yoga asanas **(14)** have helped us to reduce weight according to Body mass index (BMI) analysis. Several forms of yoga asanas must be adopted during our morning strict workout. Ardha Chandrasana or the half of the moon pose Bhujangasana, or the pose of Cobra is one of the great selections of yogic intervention asanas for the toning of the buttocks and the muscles of the abdomen. Dhanurasana. It is a pose-like bow that helps to reduce the fat from the arms and legs. It helps the toning of those parts of our body. Garudasana is the pose of an eagle. It reduces our weight from the thighs, legs, arms, and hand body. Navasana is the pose like a boat which is the simple power yoga for the reducing the weight. Pawanmuktasana.This pose is like a wind-releasing pose which helps to shed extra weight from the belly. Savasana is the pose of a corpse. It is the pose to end your session that helps to relax your muscles and prevent the damage of muscle. Trikonasana is the pose of intense side stretching to reduce the fat from the sides. Other asanas such as Uttanpadasana or the pose of the raised feet and Veer bhadrasana like a pose of the warrior are considered powerful yogic asanas for weight loss intervention and preventing obesity.

Yoga asanas different poses for weight loss (15,16).

Virabhadrasana – Warrior Pose	
Trikonasana – Triangle pose	
Adho Mukha Svanasana – Downward Dog Pose	
Sethu Bandha Sarvangasana – Bridge pose	
Parivrtta Utkatasana – Twisted Chair pose	
Dhanurasana – Bow Pose	
Cobra pose (Bhujangasana)	

Eagle pose or Garudasana.	
Pawanmuktasana **or Gas release pose for removing Blotting**	
Uttanpadasana **or raised Leg pose**	

1.4 BMI

The concept of Body mass index (BMI) was developed by Belgian statistician Lambert Adolph Jacques Quetelet in the 1830s **(17).** It is an important tool for the analysis of weight reduction and thus evaluates overweight and obesity in the population. How to calculate BMI manually? It depends on the weight and height of the adult. BMI is calculated by dividing the weight of the adult person in kilograms by height in square meters as per WHO and CDC guidelines **(18).** Weight (kilograms) / height in squared meters per the WHO's latest guidelines in the Lancet 2004 which gives the BMI Western and American cut-off, also illustrates the BMI cut-off guideline for Asians as well. So, we are following Asian guidelines for our Indian population. BMI cut-off guidelines for Hispanic, European, and American populations as per WHO based on the distribution of accumulated fat in the body, which is classified as follows:

1. Underweight based on Nutritional status have a BMI < 18.5 of adults which was reviewed by the University of Florida Health in 2022.
2. The normal population is 18.5-24.9.
3. The overweight population has a BMI of 25-29.9
4. Obese >= 30.

Obese has been further categorized as Obese 1 with a BMI of 30-40, Obese 2 with a BMI of 40.1-50, and Obese 3 with a BMI > 50. The BMI cut-off based on Nutritional value for Asians is as follows.

1. Underweight BMI cut-off <18.5**. (19)**
2. Normal-weight people have 18.5-22.9.
3. Overweight populations have a BMI cut-off of 23-25.9.
4. Pre-obese population has a cut-off BMI of 25.9-29.9
5. Obese populations have a BMI cut-off of >= 30.

Therefore, obesity is defined as a BMI index of more than 30 or its equivalent **(20)**. BMI is one of the gold standards for measuring body fat and has been proven by many researchers worldwide **(21).**

1.5 Challenging Role of Yoga with the Nutritional value of papaya

Yoga is a very effective intervention when it is being used with the regular intake of high no of Fiber with a low-calorie diet such as papaya has a huge impact on reducing BMI of the obese and overweight patients. Through this study, we can highlight

the impact of concomitant therapy on the reduction of BMI.

2.0 LITERATURE REVIEW

The Nutritional impact of the pulp, leaves, and seeds of papaya on the metabolism of obese rats and those factors that cause heart diseases, obesity, cholesterol, high blood pressure, etc. has been described **(22).** Therefore, the use of papaya as a juice or fruit in obese people helps to reduce obesity and other contributing factors.
The reduction of obesity in the high-fat diet fed to rats by the use of papaya juice **(23).** When papaya juice has been given to these obese rats, the level of cholesterol and weight has been reduced drastically.
Papaya fruits have the highest quantity of polyphenols which contribute to the protective effect on the health of humans, so it needs to be studied extensively **(24).** The human lifestyle is very complex, so with the rise of obesity, diabetes is also growing exponentially. The close relationship between the two conditions has given rise to a new term true diabesity **(25)**. So, papaya has several other bioactive components that contribute to anti-diabetic effects and got lots of interest in studying the human model for the decrease in obesity **(26).**

3.0 RESEARCH METHODOLOGY

3.1 Research Strategy:

Body mass index (BMI) is the gold standard for measuring fat deposited in the adipocytes of the obese population. This is a statistical determination of the height and weight of the body. The WHO recommendation of BMI for our Asian communities, it guides us to the healthy trend of the society and the population. Sometimes it plays a challenging role to decide and determine the obesity in some of the cases for our clinician, but there are very few. To evaluate the present study in our obese communities pre- and pro-effect of papaya fruit consumption alone and another design of experiment with Yogic asanas intervention and the usage of papaya, BMI will help our clinician to decide the therapeutic future.

3.2 Data Selection:

To study the impact of a low-calorie diet with high-fibrous papaya fruit as a single experiment and another experiment as the Yoga intervention with this diet we have selected a rich and middle-class society's sports and Yoga club with 189 members in the western suburb of Mumbai, Andheri. We conducted this study after a corona period of over 11 months for the weight loss program from 18th July 2021 to 15th June 2022. We selected 75 obese members over the age of 25 years to 49 years old after BMI measurement manually and lung function test (LFT) through a peak flow meter in that society. Before going BMI and LFT camp in that society we conducted a small presentation on the importance of a Nutritional medicinal diet such as Papaya fruits and Yogic exercises to reduce weight for a healthy society and disease-free population.

3.3 Selection criteria:

Pre and Post Body mass Index were analyzed through a chart of WHO-recommended BMI. We have selected 50 members doing Yogic intervention at least three times a week with extreme diet-controlled Papaya every day religiously in this weight loss program for 11 months and another designed with 25 members who consumed Papaya alone over 11 months. To analyze this study through statistics parameter <0.05 was set as the significance level described **(27)** in this statistical calculation of the Exact test and a paired t-test was calculated to test this study.

4.0 RESULT AND DISCUSSION

In this study null hypothesis is rejected and so as per the level of significance, this proves our hypothesis. Our result gives a strong idea for the alternative hypothesis which favors the strong change in the population after the use of Papaya and Yoga asana formulated in **Table 4** and **Chart 2** and compared the result with the alone use of papaya as a control in **Table 3** and

chart 1 for the weight loss in the obese population of one locality in Mumbai suburb. Change in BMI was not very significant after usage of Papaya only as reported in **chart 1** and **Table 3**. But the use of papaya and yoga asana altogether reduced the BMI very significantly as reported in **Chart 2** and **Table 4**.

The role of low-calorie diet, high-fiber papaya, and different asanas of Yoga play a vital role in our obese adults. For this quest, we have accommodated one design of experiment with 25 members for the usage of papaya only and another set of designs with 50 members for the both use of papaya and asanas of Yoga for 11 months irrespective of any gender above the age of 25 years to 49 years obese adult. This experiment found that BMI for these recruited groups was reduced amazingly within 11 months of a long period. The reason was very obvious for this reduction of body fat in the long trial period of 11 months as per the past trial of a short time with a small number of obese people. Our research was significant and encouraging which reduced obesity through this BMI test which has some exceptions to overrule. This has created a positive impact on our society for good health through yoga and a low-calorie nutritious diet.

5.0 TABLE and Graphs

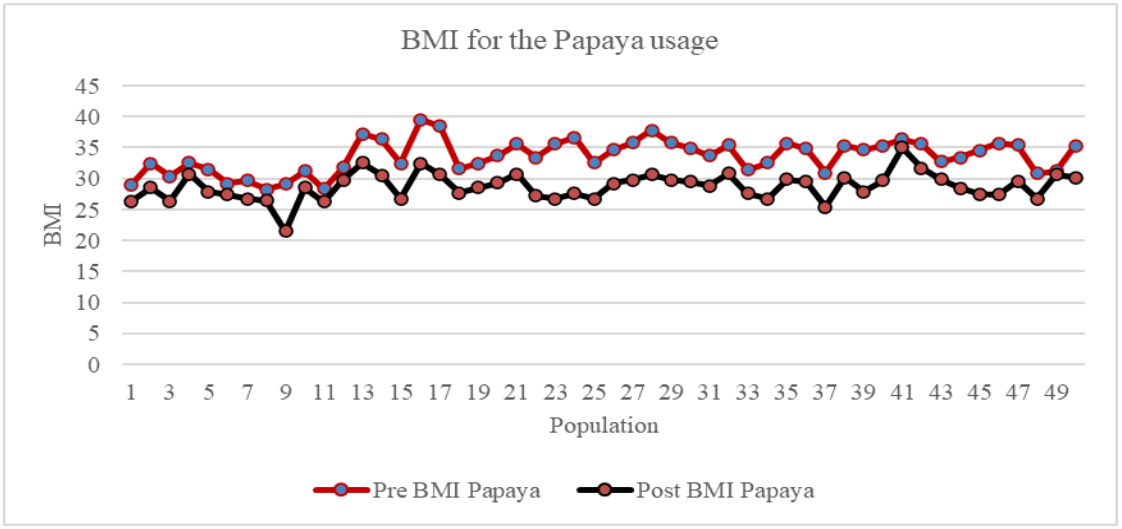
This result is only for those obese group who were taking only Papaya for weight loss.

Table 3: Statistical analysis of the pre-and post-BMI for the usage of papaya only

Test Parameter	BMI Analysis	Sample size	BMI Total	Mean	SD	r	Sed	DF	T test	P level Significance
Papaya usage only	Pre	50	1680.39	33.61	2.69	0.69	0.49	49	9.9	<0.05
	post	50	1437.68	28.75	2.2					

SD =standard deviation r=coefficient correlation Sed=standard error in difference
DF=degree of freedom

Graphical representation of pre and post-BMI in the population for papaya consumption

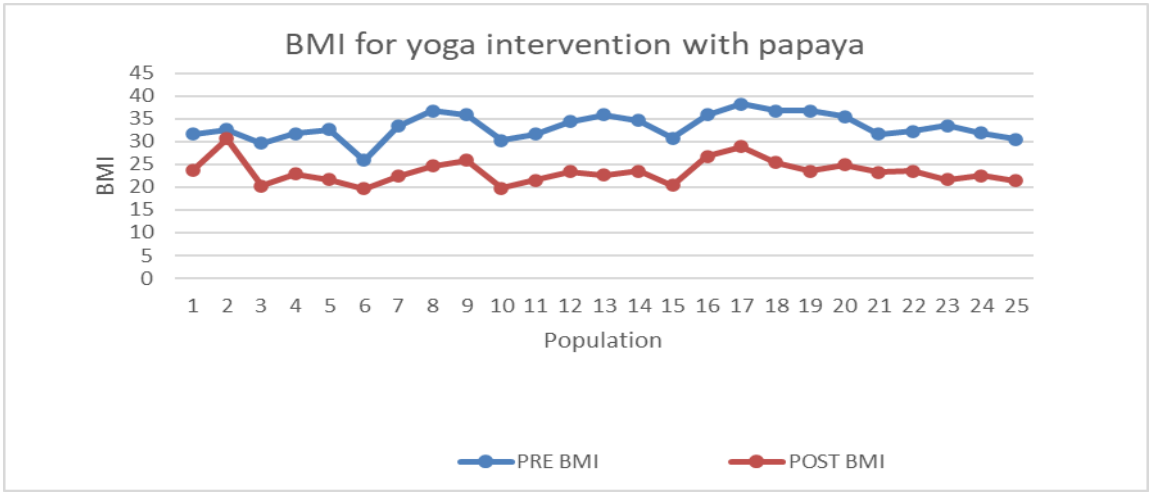


Graph 1: BMI has been recorded pre-consumption of papaya and post BMI after papaya alone

Table 4: Statistics analysis of the pre and post-BMI for the usage of papaya and Yogic intervention

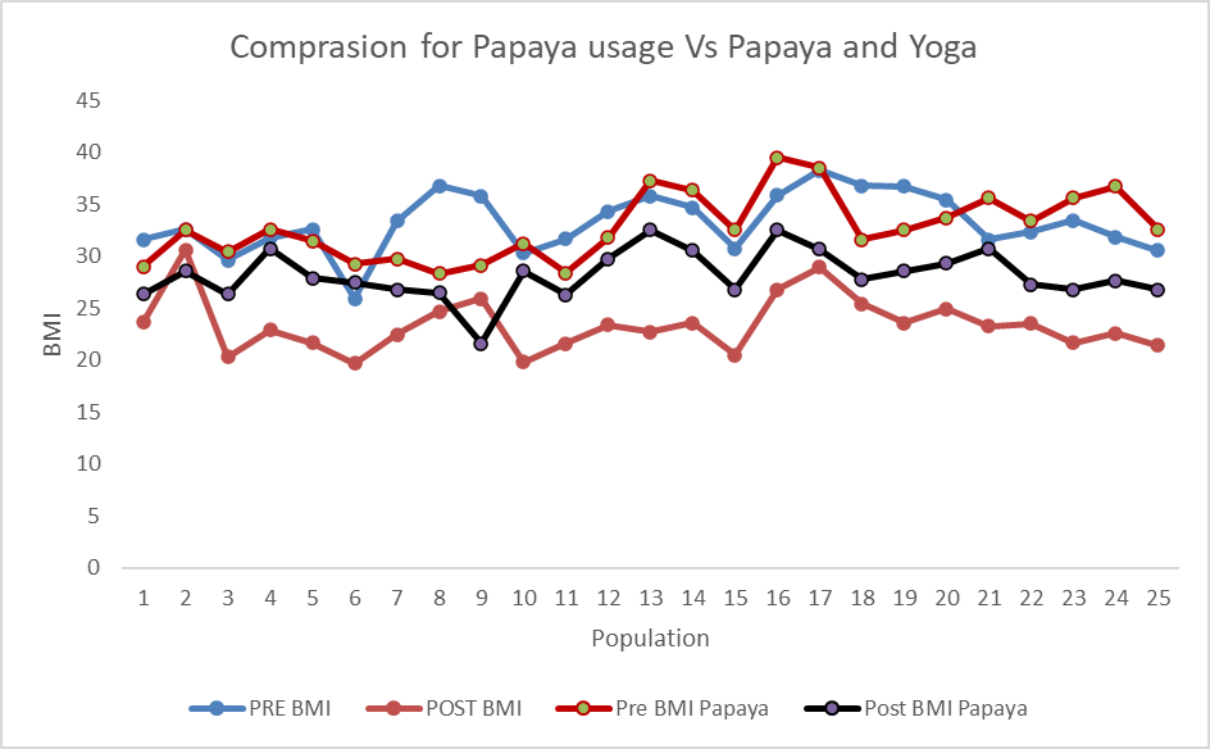
Test parameter	BMI Analysis	Sample size	BMI Total	Mean	SD	r	Sed	Df	T test	P level Significance
Yoga &Papaya	Pre	25	830.15	33.21	2.85	0.65	0.78	24	12.56	<0.05
	post	25	585.28	23.4	2.66					

SD =standard deviation r=coefficient correlation Sed=standard error in difference
DF=degree of freedom
This result was analyzed for those obese members who were doing yogic exercises along with a strict diet of papaya



Graph2: BMI has been recorded for Pre BMI before

Consuming papaya and yoga asanas and post BMI after consuming papaya and practice of yoga asana



Graph 3- Comparison of both papaya consumption versus Papaya and Yoga Intervention
1. Pre-BMI before consuming papaya and Yoga intervention
Post BMI after consuming papaya and Yoga intervention.

2. Pre-BMI before consuming Papaya
post-BMI after consuming papaya.

6.0 CONCLUSION

In India, the lifestyle of our urban population especially metro cities is threatening us. Obesity is growing among the age of all adults including children. Normal BMI is a good indicator for the clinician to decide the mode of therapy for obese and diabetic patients. So, the concomitant use of a low-calorie diet with a high content of fiber such as papaya with regular asana in Yoga has proved to maintain health by decreasing the fat from the adipocyte cell. This study will open an unopened window for reducing morbidity and mortality among the obese population. This study will encourage our obese people to adopt a healthy diet as well as Yoga in their lifestyle to make a healthy community. So, a big group of participants is needed to research this trial to improve the outcome and effectively applied all across society.

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8.0 Conflict of Interest
No conflict of Interest

9.0 Author contributions

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Writing - review & editing: Islam Mazahirul, Mukul Sharma, Ahmed.S. Mabrouk

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