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Modified Traditional Snack for Overweight and Obesity Subjects

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Abstract: ***Overweight and Obesity are defined as abnormal or excessive fat accumulation that may impair health. Indian people prefer Chiwada in their evening snacks but as Traditional Chiwada has high content of fat so to make it healthy this Chiwada was modified. The comparison was studied between the Traditional Chiwada and the Modified Chiwada and it was observed that the fat content of Traditional Chiwada (55g) was higher than the Modified Chiwada (22.4g).After designing this product, sensory evaluation was conducted by 14 naive panel members and 5 expert panel members using 5 point ranking scale. The product was standardised. The Total Dietary Fibre was calculated and it showed that Modified Chiwada (15g) was higher in Total Dietary Fibre than Traditional Chiwada (3g).***

Keywords: Obesity, Jowar, Nutrition, Fibre, Protein

1. Introduction

Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health. A crude population measure of obesity is the body mass index (BMI), a person"s weight (in kilograms) divided by the square of his or her height (in metres). A person with a BMI of 30 or more is generally considered obese. A person with a BMI equal to or more than 25 is considered overweight.

The fundamental cause of obesity and overweight is an energy imbalance between calories consumed and calories expended. Globally, there has been:

- An increased intake of energy-dense foods that are high in fat; and
- An increase in physical inactivity due to the increasingly sedentary nature of many forms of work, changing modes of transportation, and increasing urbanization.

Overweight and obesity are major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases and cancer. Once considered a problem only in high income countries, overweight and obesity are now dramatically on the rise in low- and middle-income countries, particularly in urban settings.

2. Literature Survey

Facts about overweight and obesity

Some recent WHO global estimates follow.

- In 2014, more than 1.9 billion adults aged 18 years and older were overweight. Of these over 600 million adults were obese.
- Overall, about 13% of the world"s adult population (11% of men and 15% of women) were obese in 2014.
- In 2014, 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. In Africa, the number of children who are overweight or obese has nearly doubled from 5.4 million in 1990 to 10.6 million in 2014. Nearly half of the children under 5 who were overweight or obese in 2014 lived in Asia.

3. Methodology

Developing the Food Product (Jowar Chiwada):

- The Rice Flakes in the Traditional Chiwada was replaced by Puffed Jowar.
- Cashew, Dry Coconut Slices, Groundnuts were removed to lower the fat content.
- Roasted Gram, Pumpkin Seeds, Sunflower Seeds (Honey Flavour) were added as a functional food to balance the ω3 and ω6 fatty acids necessary to prevent cardiovascular diseases.
- Curry leaves, Garlic that are functional food (anti-lipidemic effect) were added to enhance nutritive value of the chiwada.
- Green chilli and Red chilli powder were added to enhance flavour and taste.
- Salt was added for taste.
- Sugar was replaced as it increases calories without other nutritional benefits by honey flavoured sunflower seeds.
- 5g oil used in chiwada.

Table 1: Recipe of Traditional Chiwada and Jowar Chiwada

Traditional Chiwada		Jowar Chiwada	
Rice Flakes	30g	Puffed Jowar	30g
Roasted Gram	15g	Roasted Gram	20g
Cashew	20g	Pumpkin Seeds	30g
Groundnut	20g	Sunflower Seeds	20g
Dry Coconut Slices	20g	Green Chilli	2no.
Green Chilli	2 no.	Curry leaves	10-15no.
Curry Leaves	10 -15 no.	Cumin Seeds	3g
Cumin Seeds	3g	Mustard Seeds	3g
Mustard Seeds	3g	Turmeric Powder	1g
Turmeric Powder	1g	Red Chilli Powder	1g
Oil	15g	Oil	5g
Salt	1g	Salt	1g

Table 2: Nutritive Value Table for Traditional Chiwada

Ingredients	Amount gm	Energy Kcal	Protein Gm	CHO gm	Fat gm	TDF Gm
Rice flakes	30	103	1.98	23.2	0.36	0.7
Cashew	20	120	4.24	4.46	9.38	0.2
Groundnut	20	113	5.0	7.83	8.0	0.6
Roasted gram	15	56	3.12	8.97	0.84	0.1
Coconut slices	20	133	1.36	3.68	12.46	1.3
Oil	15	135	0	0	15	0
	Total	660	15.7	48.14	46.0	3

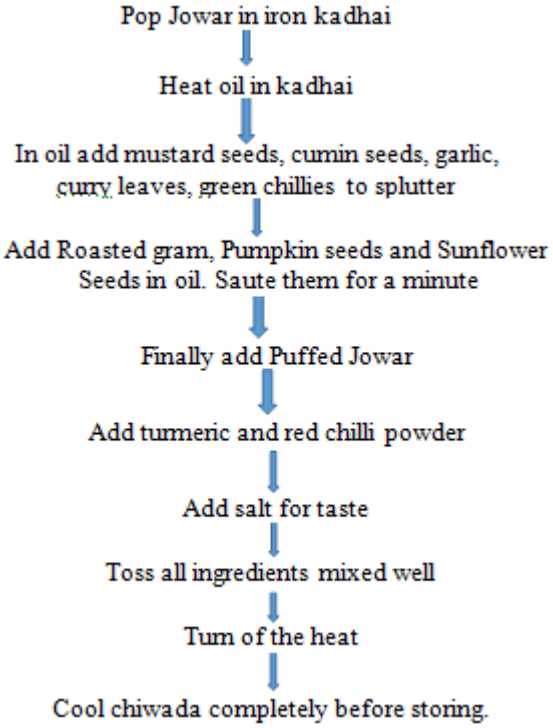
Table 3: Nutritive Value Table for Jowar Chiwada

Ingredients	*Amount gm*	*Energy Kcal*	*Protein Gm*	*CHO gm*	*Fat gm*	*TDF Gm*
Puffed Jowar	30	105	3.12	21.78	0.5	0.48
Roasted gram	20	74.4	4.16	20	1.12	0.24
Pumpkin Seeds	30	180	11.9	3.9	3	5.4
Sunflower Seeds	20	95	3.5	2.5	8	3
Oil	5	45	0	0	5	0
	Total	**455**	**22.68**	**48.18**	**17.62**	**9**

Table 4: Comparison between Traditional Chiwada and Jowar Chiwada

Sr. No.	Nutrient	Unit	Jowar chiwada	Traditional chiwada	RDA for men	RDA for women
1	Energy	Kcal	455	660	2320	1900
2	CHO	Grams	48.18	48.18	-	-
3	Protein	Grams	22.68	15.7	60	55
4	Fat	Grams	17.62	46	25	20
5	TDF	Grams	9	3	-	-

4. Method of Preparation



5. Evaluation of the Product

Jowar Chiwada were subjected to sensory evaluation based on 5 point scale for Appearance, Colour, Texture, Taste, and Presentation. The score was based on the criteria, 5-Very Good, 4-Good, 3-Average, and 2-Poor, 1-Very Poor. This test was done by 30 naïve panel members and 3 expert panel members. The product showed a gradual improvement from week after week.

6. Results and Discussion

Certainly modified food product has lowered the total energy and carbohydrates as compared to traditional recipe. In addition, the modified food product also contains good amount of protein and total dietary fibre (TDF) in comparison to the traditional product. The traditional recipe contain high amount of fat than modified recipe. Modified food product provide ω3 and ω6 fatty acids which come from pumpkin seeds, and sunflower seeds. In sensory evaluation the modified product was ranked "Very Good" by both the panel members. The product was acceptable.

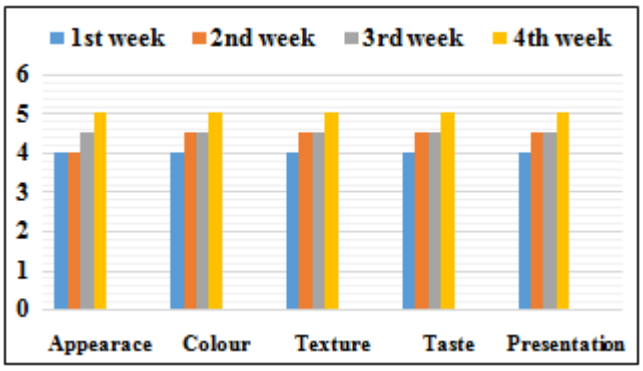


Figure 1: Sensory Evaluation

Improvements were done every week on the product and on the fourth week the product was ranked "very good" by both the panel members.

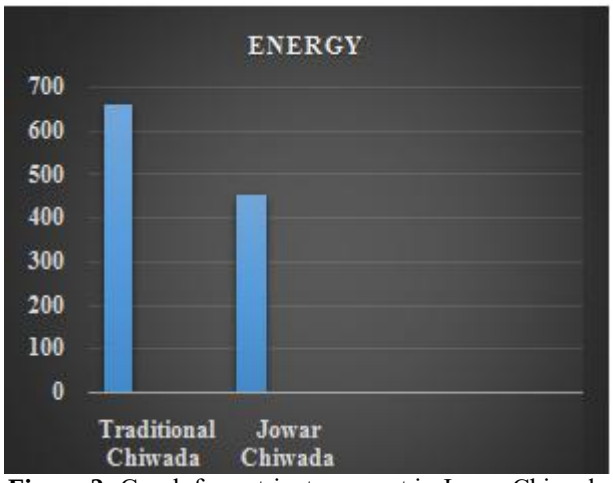
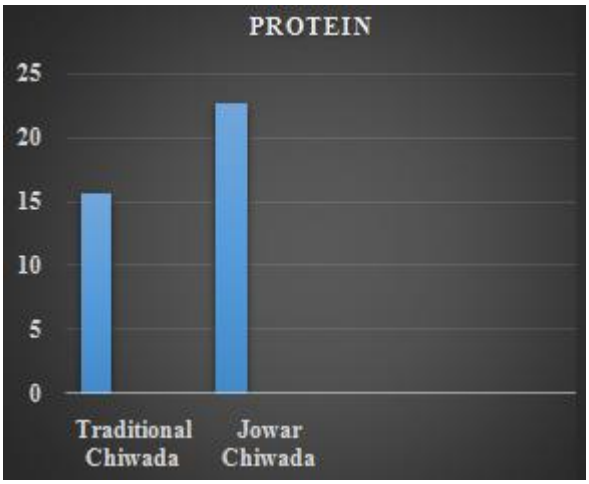


Figure 2: Graph for nutrients present in Jowar Chiwada



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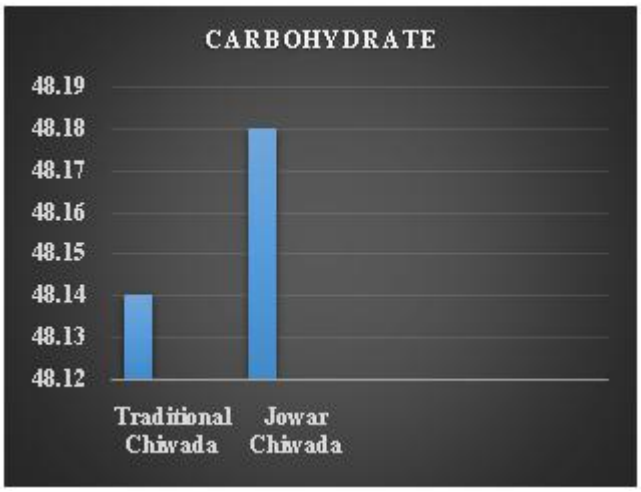

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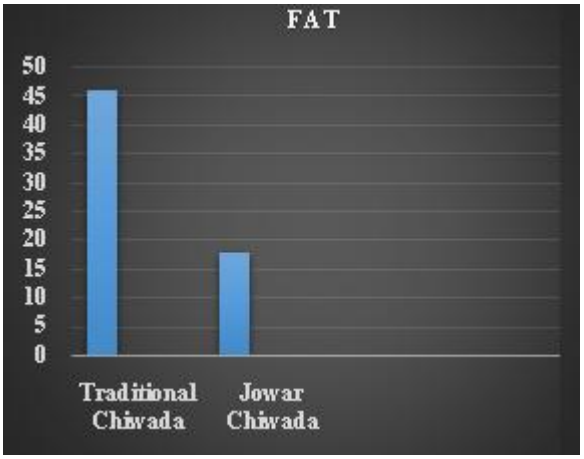

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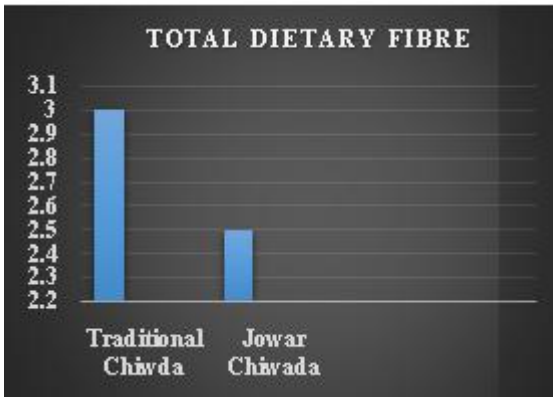

Figure 6

7. Discussion

A 1-cup serving of jowar contains 12 grams of dietary fibre. This amount supplies approximately 48 percent of the Food and Nutrition Board's recommended daily allowance of fibre for the average adult. Compared to other cereal grains like barley or rice, jowar contains a much higher concentration of fibre. According to a 2009 study published in "Nutrition Reviews," a diet rich in high-fibre foods like jowar may lower your risk of obesity, stroke, high blood pressure, heart disease, diabetes, elevated blood cholesterol and digestive problems like diverticular disease, colon cancer, constipation and hemorrhoids.

Pumpkin seeds modulate several cardiovascular disease risk factors. In a recent study published in the *African Journal of Traditional, Complementary and Alternative Medicines*, researchers found that rats induced with atherosclerosis and supplemented with pumpkin seeds for 37 days experienced not only significant increases in protective HDL cholesterol but also a **47%** decrease in total cholesterol and a **78%** reduction in LDL cholesterol.

The antihypertensive potential of pumpkin seed oil was further supported in another study. Egyptian researchers caused hypertension in rats by inhibiting nitric oxide synthase, the enzyme responsible for generating the blood pressure regulating molecule nitric oxide. The hypertensive rats were then administered pumpkin seed oil or the antihypertensive medication amlodipine daily for six weeks. Findings showed that pumpkin seed oil was as effective as

amlodipine in reversing elevated blood pressure in rats by restoring nitric oxide levels close to normal.

Sunflower seeds are rich in omega-3 and -6 fatty acids, which are essential fatty acids that our bodies cannot make themselves. While the main omega-3 fatty acid found in sunflower seeds, alpha-linolenic acid (ALA), is not as potent as the EPA and DHA found in animal products such as fish oil, its benefits should not be underestimated. For example, a study published in the *European Journal of Clinical Nutrition* showed that ALA could help lower glucose and high triglyceride levels in human participants. Another study, published in *Applied Physiology, Nutrition, and Metabolism*, suggested that ALA could help treat symptoms associated with obesity in animal models.

A study published in the *Journal of Agricultural and Food Chemistry* found that sunflower seeds (and pistachios) had the richest levels of phytosterols out of all the nuts and seeds commonly consumed in the United States as a snack. Phytosterols are plant compounds whose chemical structures closely resemble that of cholesterol, and are believed to reduce LDL cholesterol levels in the bloodstream when consumed in sufficient amounts

Curry leaves are also known to reduce bad LDL cholesterol level. Studies conducted at the Department of Biochemistry at the University of Kerala, India have shown that curry leaves have the potential to reduce LDL cholesterol levels. According to a 2016 study published in "the journal of Nutrition", Ravi Varshney and Matthew Budoff., concluded that garlic supplementation has the potential for cardiovascular protection based on risk factor reduction (hypertension and total cholesterol) and surrogate markers (CRP, PWV, and CAC) of atherosclerosis.

8. Conclusion

The product which was modified for overweight people was accepted not just by overweight person but also healthy subjects.. Modified Jowar chiwada is low in fat, high in Calories, Protein, CHO and Fibre which was not only enhancing taste and palatability of the product but also benefits the overweight person. Jowar chiwada contain some functional foods like garlic, curry leaves which have an Anti- lipidemic effect. Jowar chiwada have a loner shelf life. Thus the Jowar Chiwada is better option than Traditional Chiwada.

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