



MULTIGRAIN LAYERED HANDVO WITH FLAXSEED CHUTNEY

Avani Shah

Department of Clinical Nutrition and Dietetics, Dr. BMN College of Home science, 338, R.A Kidwai road, Matunga, Mumbai.400019

Dr.Rupali Sengupta

Department of Clinical Nutrition and Dietetics, Dr. BMN College of Home science, 338, R.A Kidwai road, Matunga, Mumbai.400019

ABSTRACT

"MULTIGRAIN LAYERED HANDVO WITH FLAXSEED CHUTNEY" is developed as a meal for a diabetic individual. Handvo is one of the Gujarati savoury dish. The batter is prepared from rice and lentils usually fermented overnight. It is also called as vegetable cake. It is often made with bottle gourd filling. The traditional recipe is modified in aspects to lower carbohydrate and GI, and improve its fiber, protein, antioxidant and mineral content with the use of ingredients such as oats, bulgur, green gram dal etc. Functional foods such as flaxseeds, oats, sesame seeds were also used in this recipe. Coriander chutney was replaced by flaxseed chutney to improve fiber content. All this beneficial effects make this recipe suitable for diabetic patients. Ranking test using 5 point scale was used. It was conducted by 28 naive panel members and 5 expert panel member. The product was ranked "excellent" during the first sensory evaluation test, hence further modifications were not done. The product was then standardized.

KEYWORDS : handvo, flaxseeds, diabetes, meal, vegetables, curry leaves

Aim:

To develop a food product suitable for a Diabetic individual.

Objectives:

- To innovate traditional recipe with slight modification
- To design a **DIABETIC** friendly and nutritive rich product
- To standardize an innovative and healthy meal.
- To understand the product well and to do research based study on the ingredients

Introduction:

Diabetes is a chronic, metabolic disease characterized by elevated levels of blood glucose (or blood sugar), which leads over time to serious damage to the heart, blood vessels, eyes, kidneys, and nerves. According to Diabetes Atlas published by the International Diabetes Federation (IDF), there were an estimated 40 million persons with diabetes in India in 2007 and this number is predicted to rise to almost 70 million people by 2025. In 2014 the global prevalence of diabetes was estimated to be 9% among adults aged 18+ years. (1) In 2012, an estimated 1.5 million deaths were directly caused by diabetes. (2) More than 80% of diabetes deaths occur in low- and middle-income countries. (2) WHO projects that diabetes will be the 7th leading cause of death in 2030. (3) Healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco use can prevent or delay the onset of type 2 diabetes. (4)

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Methodology: Designing a food product.

following modifications are done to modify traditional recipe.

- Rice was replaced by bulgur, oats which is a low GI food and high in fiber
- Sugar was removed to sudden hyperglycemia and empty calories
- Flaxseeds and sesame seeds were added to incorporate intake of  $\omega$  omega 3 &  $\omega$  omega 6 in the diet.
- Instead of using only bottlegourd, various other vegetables such as tomato, peas, capsicum are used to increase fiber content and mineral content
- Vegetable stuffing is layered inbetween to make recipe more acceptable and palatable
- Amount of fat was reduced in order to make recipe low in fat but rich in w-3 and w-6.
- Coriander chutney was replaced by flaxseed chutney to improve fiber content

Table no: 1 - Recipe of Traditional Handvo And Multigrain Layered Handvo

Traditional handvo		LAYERED HANDVO	
Red gram dal	10g	Green gram dal	10g
Black gram dal	5g	Bengal gram dal	10g
Green gram dal	5g	Bulgur	10g
Bengal gram dal	5g	Semolina	5g
Rice	20g	Oats	10g
Curd	30ml	Curd	15ml
Bottle gourd	100g	Bottle gourd	25g
Oil	20g	Tomato	25g
soda bi-carb	A pinch	Capsicum	25g
		Pumpkin	25g
		Green peas	10g
		Oil	10g
		flaxseed, sesame seeds, fennel seeds	1tsp
Common ingredients : Salt , Cumin seeds, coriander seed, turmeric, asafetida, green chilies, mustard seeds			

Table no: 2 - Recipe Of Coriander chutney And Flaxseed chutney

Coriander chutney		Flaxseed chutney	
Coriander leaves	50g	Flaxseeds	10g
Groundnuts	15g	Tomato	50g
Lemon	Few drops	Red gram dal	5g
Green chilies	1	Black gram dal	5g
Salt	To taste	Red chili	5g
		Curry leaves	Few leaves
		Green chilies	1
		Salt	To taste

**Method:**

- Clean, wash and soak the dals in enough water for atleast 4 to 5 hours. Drain and keep aside.
- Blend the dals, rice and whole wheat in a mixer to a smooth mixture. Transfer the mixture to a bowl, add the curds and mix well. Cover and keep aside to ferment overnight. Soak semolina ,oats and bulgur 1/2 hour before cooking
- Mix both the mixture and add all vegetables except bottle gourd and pumpkin. Add tempering of 1/2 tsp oil, asafoetida, green chilies, curry leaves and keep it aside
- Heat 1/2 tsp oil in non-stick pan and keep circular cake mould which is open from both sides. Add 1tsp oil, flaxseeds, and fennel seeds, coriander seeds, til seeds, cumin seed, mustard seed, and asafoetida. Then pour half of the batter and layered flaxseed chutney, bottlegourd and pumpkin mixture and pour remaining batter. Cook both sides till it urn golden brown.
- For flaxseed chutney dry roast flaxseeds, black ram dal, Bengal gram dal, curry leaves, red chilies and add tomato, salt and cook it for 5 minutes. Then grind it when it is cooled.

**Evaluation of the product:** Sensory evaluation was done at every step to find whether it is acceptable for consumption considering its taste and overall appearance. Ranking test using 5point scale was used. It was conducted by 28 naive panel members and 5 expert panel member.

Rank	Remark
1	Poor
2	Fair
3	Good
4	Very good
5	Excellent

**Table 3 – sensory evaluation report**

Characteristics	Naive panel members (average)	Expert panel members (average)	Out of
Appearance	4.5	5	5
Texture	4.5	5	5
Taste	4	4.5	5
Aroma	4.5	5	5
Overall Acceptability	5	5	5
Total	22.5	24.5	25
Percentage	90%	98%	100%

The product was ranked “excellent” by both the panel members and no further modification was done. The product was then standardized.

**Detailed Calculations for both the recipes:**

**TRADITIONAL HANDVO**

Ingredients	Amount	Energy (kcal)	Carbohydrates (g)	Protein (g)	Fat(g)	TDF(g)
Red gram dal	10g	12	2.8	1.1	-	0.9
Black gram dal	5g	19	2.9	1	0.2	0.5
Green gram dal	5g	17	2.9	1.2	-	0.4
Bengal gram dal	5g	19	2.9	1	0.25	0.7
Rice	20g	70	15.3	1	0.2	0.8
Curd	30ml	18	0.8	1	1.2	-
Bottle gourd	100g	12	2.5	0.2	0.1	2
Sugar	10g	40	10			
Oil	20g	180	-	-	20	-

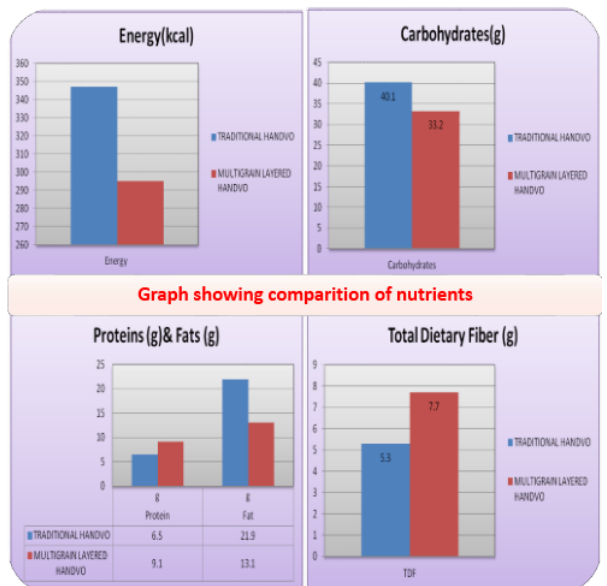
**MULTIGRAIN LAYERED HANDVO**

Ingredients	Amount	Energy (kcal)	Carbohydrates (g)	Protein (g)	Fat(g)	TDF(g)
Green gram dal	10g	34	5.9	2.4	0.5	0.8
Bengal gram dal	10g	37	5.9	2	0.5	1.4

Bulgur	10g	26	5	1	0.3	0.6
Semolina	5g	17	3.6	0.5	-	-
Oats	10g	36	6.4	1.2	-	2
Curd	15ml	9	0.4	0.5	0.6	-
Bottle gourd	25g	3	0.6	-	-	0.5
Tomato	25g	4	1	-	-	0.4
Capsicum	25g	6	0.8	-	-	0.6
Pumpkin	25g	5	1	-	-	0.4
Green peas	10g	9	1.5	0.7	-	0.8
Oil	10g	90	-	-	10	-
Flaxseeds	2	9	0.6	0.5	0.4	-
Sesame seeds	2	11	0.5	0.3	0.8	0.3

**Comparison between traditional handvo and modified MULTI-GRAIN LAYERED HANDVO:**

Sr No.	Nutrients	Units	Traditional handvo	MULTIGRAIN LAYERED HANDVO	RDA for sedentary male	RDA for sedentary female
1	Energy	kcal	347	295	2320	1900
2	Carbohydrates	g	40.1	33.2	-	-
3	Protein	g	6.5	9.1	60	55
4	Fat	g	21.9	13.1	25	20
5	TDF	g	5.3	7.7	-	-



Ingredients	Amount	Energy (kcal)	Carbohydrates (g)	Protein (g)	Fat(g)	TDF (g)
Coriander leaves	50g	22	3.1	1.7	0.3	2.1
Groundnuts	15g	85	3.9	3.7	6	2.1
Sugar	5g	20	5	-	-	-

Ingredients	Amount	Energy (kcal)	Carbohydrates (g)	Protein (g)	Fat(g)	TDF(g)
Flaxseeds	10g	54	3	2	3.8	2.74
Black gram dal	5g	19	2.9	1	0.2	0.5
Green gram dal	5g	17	2.9	1.2	-	0.4
Tomato	50g	10	1.8	0.4	0.1	0.8

**Comparison between Coriander chutney And Flaxseed chutney:**

Sr No.	Nutrients	Units	Coriander chutney	Flaxseed chutney
1	Energy	kcal	127	100
2	Carbohydrates	g	12	10.6

3	Protein	g	5.4	4.6
4	Fat	g	6.3	5.9
5	TDF	g	4.2	4.4

## Results And Discussions

Fiber (50g) is shown to be beneficial for better glycaemic control in Diabetes. (*MNT for Diabetes Mellitus and Hypoglycaemia of Non diabetes origin, Krauss and Mahan- 12<sup>th</sup> edition*) the product provides around 12g of dietary fiber. According to Harvard medical school fiber helps in slow release of blood glucose in the blood. Fiber also lowers blood cholesterol levels and also improves blood glucose control.

Flax seeds not only are high in alpha- linolenic acid (omega-3 fatty acid) but also in fiber, lignans and micronutrients. Flaxseeds have shown to improve fasting blood sugars, triglycerides, cholesterol, and haemoglobin A1c levels in diabetics patients. American Diabetic Association recommends intake of moderate amounts of flaxseeds in diet Flax lignan complex and secoisolariciresinol diglucoiside (SDG) have a great potential for reducing the incidence of type 1 diabetes and delaying the development of type 2 diabetes in humans. (Prasad, Kailash et al, January 2016)

To make this product oats, bulgur ,semolina is used instead of using only rice. Diets with a high glycemic load and a low cereal fiber content increase risk of NIDDM in men. Oats is well known since years for its cholesterol lowering properties. The soluble fiber s beta-glucan increases transit time and thus lowers rate of digestion, thus oats have lower Glycaemic index. This is beneficial in Diabetes. 3g of beta-glucan/day from high molecular weight oats given to hypercholesteraemic individuals lowered their LDL cholesterol significantly. (Wolever et al, 2010).

Sesame contain high levels of natural antioxidants like sesamin, sesamol and sesamol which prevent it from oxidative free radical damage to a great extent. Sesame is rich in omega-6 polyunsaturated fatty acids. Sesame seed contain almost 25% of its weight as protein and is also rich in calcium. Patients with prediabetes and mild to moderate hyperlipidemia treated with sesame extract for 6 weeks are likely to realize positive changes in their lipid profiles and blood glucose levels. It may be beneficial for maintaining healthy lipid and glucose levels in patients with prediabetes and mild to moderate hyperlipidaemia. *Journal of Food Research (2013) shiv prasad*

## CONCLUSION

Certainly Modified product had lower total energy, fat and carbohydrates as compared to Traditional recipe. It contains good amounts of protein, total dietary fiber, as compared to traditional recipe. It does not contain any added sugar which was there in traditional recipe. and was low in glycemic index Although traditional recipe is only little higher in fats than modified product but the fats in traditional recipe are more of saturated as it is provided by groundnut but modified product contain fat from flax seeds, sesame which provide omega-3 and omega-6 fatty acids. In sensory evaluation the product was ranked 'excellent ' (4.5/5) and > 80% from both members. The product was acceptable.

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