



Preparation of *Dal Pakori* by Incorporation of Horse Gram Dal

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ABSTRACT: The present study was undertaken to determine the “Preparation of Dal pakori by incorporation of horse gram dal” was carried out with the objectives to analyse the effect of cooking methods on oxalic and phytic acid content of pulses, to evaluate the organoleptic characteristics of the developed food product, to evaluate the nutritional value of the prepared food product, to evaluate the nutritional composition of the prepared food product. The product namely “Dal pakori” was prepared by incorporation of horse gram which served as treatments- T₁(90g moong dal: 10g of horse gram), T₂(80g moong dal: 20g of horse gram) and T₃ (70g moong dal: 30g of horse gram) respectively for each of the product prepared. T₀ (basic ingredients without incorporation of horse gram) served as control for each product prepared. The organoleptic evaluation of the products with regard to attributes of colour and appearance, body and texture, taste and flavour and overall acceptability were done using the 9-point Hedonic Scale (Srilakshmi, 2011) based score card and their nutritional composition was assessed using the food composition table (Gopalan *et al.*, 2011). The data obtained during the study were analyzed statistically using analysis of variance, C.D. techniques and t-test.

On the basis of findings, result shows that Dal pakori prepared by the incorporation of moong dal and horse gram in the ratio of 90:10 (T₁) was found most acceptable with regards to colour and appearance, body and texture, taste and flavour and overall acceptability. Nutritive value of prepared product indicates that protein, fiber, calcium and energy was found highest in all treatments comparatively control.

INTRODUCTION:

Horsegram [Macrotyloma uniflorum (Lam) Verdcourt (Syn., Dolichos Uniflorus Larn., Dolichos biflorus auct.non L.)] is a pulse and fodder crop native to Southeast Asia and tropical Africa, but the center of origin of cultivated species is considered to be southern India (**Vavilov., 1951**). The name Macrotyloma is derived from the Greek words makros meaning large, tylos meaning knob and loma meaning margin, in reference to knobbly statures on the pods the limited use of dry seeds of horsegram is due to its poor cooking quality. However, it is consumed as soups and sprouts in many parts of India (**Sudha *et.al.*, 1995**). India is the only country cultivating horsegram on a large acreage, where it is used as human food. However, horsegram is a versatile crop and can be grown from near sea level to



1800m. It is highly suitable for rain-fed and marginal agriculture but does not tolerate frost and waterlogging. It is a drought-tolerant plant and can be grown with rainfall as low as 380 mm. Leaf decreases and root rot are major production constraints in high rainfall areas. Being a leguminous crop, it adds nitrogen to the soils where it grows, thus improving the soil fertility. The protein content in cultivated horsegram is reported to be 16.9-30.4 % (**Patel et.al., 1995**). It also has highly lysine content, an essential amino acid. Horsegram is rich in phosphorus, iron and vitamin such as carotene, thiamine, riboflavin, niacin and vitamin C (**Sodani et.al., 2004**). It is known to contain many medicinal and therapeutic benefits, although many of them are yet to be proven long.

Initially horsegram was included in the genus *Dolichos* by Linnaeus but (**Verdcourt, 1980**) reorganized the different species formerly assigned to *Dolichos* and assigned the genus *Macrotyloma* from *Dolichos* (**Verdcourt, 1970**). Most of the wild species of genus are restricted to Africa but some wild species have been reported in Asia and Australia. *M. uniflorum* is only cultivated species grown in the Indian subcontinent. The horsegram plant belongs to the kingdom Plantae.

Horse gram is sharp, bitter and hot. It is beneficial in cough, breathing problem due to phlegm, flatulation, hiccups, stones and fever. It also eliminates germs and worms. It also causes inflammation and checks sweating. Uses of horse gram dal are: - Drinking semi-liquid solution of horse gram powder cures flatulation. If the water in which horse gram had been soaked for the whole night (and is mashed in the same water in the morning) is taken twice a day then it cures "stones". The use of horse gram in a diet relieves the pain of dry piles. Drinking the semi-liquid mixture of powdered horse gram and powdered black pepper cures sore throat. Its use in the diet is good for women as their menstruation is purified. It is harmful for pregnant women, or a person suffering from plethora and tuberculosis. It also causes the formation of excessive bile.



METHODS AND MATERIALS:

The present study entitled “**Preparation of Dal pakori by the Incorporation of Horse Gram Dal**” was conducted in the Nutrition Research Laboratory of the Department **Food Nutrition** and Public Health, Ethelind **College of Home Science, Sam Higginbottom University of Agriculture, Technology & Sciences, Allahabad, U.P.** The development of **Dal pakori** is done by using the **FRYING METHOD** of cooking. This method involves cooking in just enough of oil to cover the base of the pan. The food is tossed occasionally or turned over with a spatula to enable all the pieces to come in contact with the oil and cooked evenly. The heat is transferred to the food mainly by conduction. Taste and texture is improved by this method. By using this method **Dal pakori** was prepared. The basic recipe was standardized and served as control (T_0). Horse Gram Dal which was fried (horse gram flour; used in pakori) for preparing dish. The horse gram flour was then incorporated at T_1 , T_2 and T_3 respectively for each of the one product. Each treatment was replicated 3 times.

Ingredients	Control(%)		Treatments(%)		
	T_0	T_1	T_2	T_3	
Main ingredient	100	90	80	70	
Horse gram	-	10	20	30	

Control and treatment	Colour and appearance	Body and texture	Taste and flavour	Overall acceptability
T_0	8.3 ± 0.05	8.4 ± 0.16	8.6 ± 0.08	8.3 ± 0.05
T_1	8.4 ± 0.05	8.4 ± 0.16	8.5 ± 0.13	8.4 ± 0.05
T_2	7.3 ± 0.13	6.8 ± 0.05	6.9 ± 0.13	6.9 ± 0.11
T_3	6.4 ± 0.11	6.5 ± 0.1	6.1 ± 0.05	5.9 ± 0.2



1. Colour and Appearance

$F = 54.1(4.76)$, significant, $P \leq 0.05$, $CD = 0.43$

2. Body and Texture

$F = 43.7(4.76)$, significant, $P \leq 0.05$, $CD = 0.48$

3. Taste and Flavour

$F = 88(4.76)$, significant, $P \leq 0.05$, $CD = 0.42$

4. Overall acceptability

$F = 24.05(4.76)$, significant, $P \leq 0.05$, $CD = 0.83$

The ANOVA table shows that the calculated value of F (54.1) was higher than the table value F (4.76) at 5% probability level. This shows that there is significant difference between the control and treatments of colour and appearance indicating that the addition of different proportions of horsegram affects the colour and appearance of the prepared product it becomes darker but is best accepted till T_2 after which the acceptability decreases.

The ANOVA table shows that the calculated value of F (43.7) was less than the table value F (4.76) at 5% probability level. This shows that there is significant difference between the control and treatments of body and texture indicating that the addition of different proportions of horse gram affects the body and texture of the prepared products it becomes harder but is best accepted till T_2 (80:20) after which the acceptability decreases.

The ANOVA table shows that the calculated value of F (88) was higher than the table value F (4.76) at 5% probability level. This shows that there is significant difference between the control and treatments of taste and flavour indicating that the addition of different proportions of horse gram affects the taste and flavour of the prepared products, the taste and flavour becomes off flavour or bitter but is best accepted till T_2 (15%) after which the acceptability decreases.

The ANOVA table shows that the calculated value of F (24.05) was higher than the table value F (4.76) at 5% probability level. This shows that there is significant difference between the control and treatments of overall acceptability indicating that the addition of different proportions of horse gram affects the overall acceptability of the prepared products, as the



colour and appearance, body and texture, taste and flavour everything changes as the amount of horse gram increases.

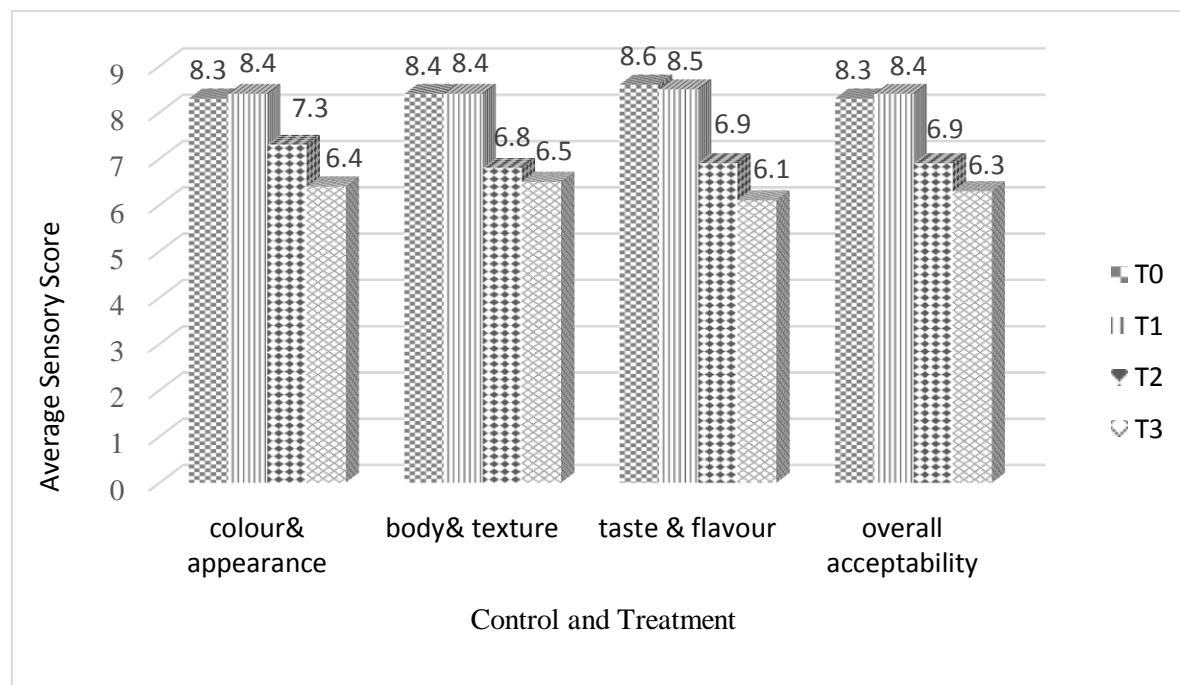


Figure 2: Effect of incorporation of Horse gram dal at different levels on Sensory Attributes of Dal pakori.

NUTRITIONAL COMPOSITION OF THE PRODUCT:

NUTRIENTS	T ₀	T ₁	T ₂	T ₃
Energy(kcal)	618	615	612.6	609.9
Protein(g)	24.5	24.25	24	23.75
Fat(g)	31.2	28.13	30.1	30.15
Carbohydrate(g)	60	59.6	59.3	59.09



Fiber	0.8	1.25	1.7	2.15
Calcium(mg)	75	96.25	117.4	138.6
Phosphorus(mg)	405	395.6	386.2	369.6
Iron(mg)	4	4.1	4.47	4.76

The table shows that the Energy (kcal) content was high in T₀ (618) followed by T₁ (615.3) then T₂(612.6) and then with T₃ (609.9). Protein (g) was high in T₀ (24.5) followed by T₁ (24.25) then T₂ (24) and then with T₃ (23.75). Fat (g) was high in T₀ (31.2) followed by T₁ (28.13) then T₂ (30.1) and then with T₃ (30.15). Carbohydrate (g) was high in T₀ (60) followed by T₁ (59.6) then T₂ (59.3) and then with T₃ (59.09). Fiber was high in T₃ (2.15) followed by T₂ (1.7) then T₁ (1.25) and then with T₀ (0.8). Calcium (mg) was high in T₃ (138.6) followed by T₂ (117.4) then T₁ (96.25) and then with T₀ (75). Phosphorus (mg) was high in T₀ (405) followed by T₁ (395.6) then T₂ (386.2) and then with T₃ (369.6). Iron (mg) was high in T₃ (4.76) followed by T₂ (4.47) then T₁ (4.1) and then with T₀ (4). The control T₀ contained the highest amounts of these nutrients in composition. As the incorporation levels of horsegram dal in *Dal pakori* increased, the nutrients also decreased.

The findings of **Chrastil (1987)**, shows the nutrient content of *Dal pakori* with the incorporation of horsegram flour at three different levels 10% (T₁), 20% (T₂) and 30% (T₃). With the increase in addition level the nutrients like fiber, calcium and iron gradually increased whereas energy, protein, fat, carbohydrate and phosphorus decreased.

CONCLUSION AND RECOMMENDATION:

On the basis of the findings, it is concluded that moong dal and horse gram can be successfully incorporated in the preparation of the product such as *dal pakori*.

Organoleptically, it was found that the treatment T₁ of *dal pakori* (moong dal 90% and horse gram 10%) was found to be most acceptable as compared to other treatments.



Nutritionally, it was found that the nutrients content of best treatment T₁ for ***dal pakori*** of the product, was significantly higher with regards to protein, fibre, energy, calcium, iron, phosphorus, carbohydrate and fat activity as compared to the control T₀.

“Preparation of Dal pakori by the Incorporation of Horse Gram Dal” can be gainfully utilized in enhancing the nutritive value of traditional recipe improving their, macronutrient and micronutrient contents of the food product. In addition to their nutritional benefit, they can provide a variety in the daily dietaries and also can be used out of season. Thus development of value added product (***Dal pakori***) increases the nutritive value and functional properties. It can be utilized in various food products in the diets of people of all age group for health related benefits.

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