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Modified Energy Pack Street Snack for Diabetes Mellitus

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Sonu Mishra* and Rupali Sengupta

**Student (MSc CND-2), Department of Clinical Nutrition and Dietetics, Dr. BMN College of Home Science, Matunga (E), Mumbai: 400019, Maharashtra, India*

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ABSTRACT

Diabetes mellitus is a group of diseases characterized by high blood glucose concentrations resulting from defects in insulin secretion, insulin action,or both. There is a significant prevalence of diabetes and IRS (insulin resistance syndrome) in the urban Indian population. Subjects with diabetes as well as IRS have greater prevalence of obesity, central obesity, hypertension, hypertriglyceridemia and low HDL as compared with normal subjects. high protein diet produced a relative improvement in plasma insulin responses for the blood glucose levels for mild diabetic patients. A high intake of dietary fiber, particularly of the soluble type, improves glycemic control and lowers plasma lipid concentrations in patients with type 2 diabetes. Individuals with low fat and high fiber intakes lost more weight compared with those consuming a high-fat, low fiber diet. Dietary fat and fiber intake are significant predictors of sustained weight reduction and progression to type 2 diabetes. The modified energy pack street snack are modified version of original ragda pattice where the modified version are made from cereal pulse combination, high fiber content and low fat in contradiction to traditional ragda pattice which are high in starch, fat and low in fiber and thus can be given to diabetes for better glycemic control.

INTRODUCTION

DIABETES MELLITUS

Diabetes mellitus is a group of diseases characterized by high blood glucose concentrations resulting from defects in insulin secretion, insulin action, or both.

Glucose is an essential nutrient that provides energy for the proper functioning of the body cells and is found in the food. Carbohydrates are broken down into the small intestine and the glucose in digested food is then absorbed by the intestinal cells into the bloodstream and is carried by the bloodstream to all the cells in the body where it is utilized. However, glucose cannot enter the cells alone and needs insulin to aid in its transport into the cells.

Insulin is a hormone produced by the beta cells of the pancreas which is required in the transportation of the blood sugar into the cells.In patients with diabetes, the absence or insufficient production or lack of response to insulin causes hyperglycemia

As per the International Diabetes Federation (2013), approximately 50% of all people with diabetes live in just three countries: China (98.4 million), India (65.1 million) and the USA (24.4 million)

While comprehensive data are not available, smaller studies have been performed in various states of India to study the prevalence of diabetes. Based on these studies, the highest prevalence reported is from Ernakulam in Kerala (19.5%) and the lowest from Kashmir valley (6.1%). Most other areas have prevalence above 10%.

LITERATURE SURVEY

The American Diabetes Association lists five classes within the group of disorders that represent the diabetic syndrome. This include:

1. Type 1 diabetes
2. Type 2 diabetes
3. Diabetes associated with contributing clinical states, diseases, drugs, and/or chemicals
4. Gestational diabetes
5. Malnutrition associated diabetes

Patients with diabetes have an increased incidence of atherosclerotic cardiovascular, peripheral arterial and cerebrovascular disease. Hypertension and abnormalities of lipoprotein metabolism are often found in people with diabetes.

Pulses are foods with very low glycemic index values. Numerous studies have documented the health benefits that can be obtained by selecting foods of low glycemic index. These benefits are of crucial importance in the dietary treatment of diabetes mellitus: glycemic control is improved as well as several metabolic parameters, such as blood lipids. Diets with low glycemic index value improve the prevention of coronary heart disease in diabetic and healthy subjects. Selecting low glycemic index foods has also demonstrated benefits for healthy persons in terms of post-prandial glucose and lipid metabolism.

MATERIALS AND METHODS

DEVELOPING THE FOOD PRODUCT (MODIFIED ENERGY PACK STREET SNACK):

- The potato filling of traditional ragda pattice was replaced by cereal pulse combination khichdi, with vegetables added to it and multiflour added to it.
- The amount of oil for shallow frying was also reduced.
- Various dry masalas like red chili powder, garam masala, dhania powder was added to enhance its taste.
- The white vatana ragda was replaced by multi legume ragda which included chana, vatana, moong and moth beans.

Table no: 1 - Recipes of Traditional and Modified Ragda Pattice

INGREDIENTS FOR TRADITIONAL RAGDA PATTICE		INGREDIENTS FOR MODIFIED ENERGY PACK RAGDA PATTICE	
Poato	200gms	Rice	15gms
Bread crumbs	40gms	Dal	10gms
Ginger	5gms	French beans	5gms
green chilli	10gms	Carrot	5gms
Garlic	5gms	Cauliflower	5gms
oil for shallow frying	20ml	Cabbage	5gms
White vatana	20gms	Peas	5gms
		Ghee	5gms
		Bajra flour	15gms
		Jowar flour	10gms
		rava	to coat
		White vatana	10gms
		moong	5gms
		Moth beans	5gms
		Brown chana	5gms
		oil	10ml
Other ingredients: Salt, Haldi powder, red chilli powder, mustard seeds, lemon juice, coriander leaves, tomato, onion			

Table No: 2 Nutritive Value Table For Traditional Ragda Pattice:

INGREDIENTS	AMOUNTS (GMS)	ENERGY (KCAL)	CHO (GMS)	PROTEINS (GMS)	FATS (GMS)	FIBER (GMS)
Potatoes	200	212	49	3.6	0.2	3.4
Bread crumbs	40	100	20.2	3.3	0.4	-
White vatana	20	66	11.6	4.5	0.4	-
Onion	50	13	2.5	0.6	0.1	-
Tomato	50	12	2.5	0.6	0.1	0.8
oil	25	225	-	-	25	-
	TOTAL:	628kcal	85.8gms	12.6gms	26.2gms	4.2gms

Table No: 3 Nutritive Value Table for Modified Energy Pack Ragda Pattice

NUTRITIVE VALUE TABLE:

SR.	INGREDIENTS	AMOUNTS (GMS)	ENERGY (KCAL)	CHO (GMS)	PROTEINS (GMS)	FATS (GMS)	FIBER (GMS)
1.	Rice	15	50	11	1.3	0.2	0.6
2.	Moong dal	10	33	5.8	2.2	0.2	1.6
3.	French beans	5	1	0.2	0.06	0.01	-
4.	Carrot	5	2	0.5	0.06	-	1.1
5.	Cauliflower	5	1	0.2	0.06	0.01	0.1
6.	Cabbage	5	1	0.2	0.06	0.01	0.1
7.	Peas	5	1	0.2	0.06	0.01	0.4
8.	Ghee	5	45	-	-	5	-
	Vegetable khichdi:total		134kcal	14gms	3.8gms	5.3gms	3.9gms
9.	Bajra flour	15	50	11	1.3	0.2	1.6
10.	Jowar flour	10	33	7.2	0.9	0.1	0.9
11.	Rava	15	50	11	1.3	0.2	-
12.	Oil	10	90	-	-	10	-
	Pattice:total		223kcal	29.2gms	3.5gms	10.5gms	2.5gms
13.	White vatana	10	33	5.8	2.2	0.2	-
14.	Moong	5	5	0.8	0.3	0.03	0.8
15.	Moth beans	5	5	0.8	0.3	0.03	-
16.	Chana	5	5	0.8	0.3	0.03	1.4
17.	Oil	5	45	-	-	5	-
	Mixed vatana:total		93kcal	4.1gms	3.1gms	5.1gms	2.2gms
18.	Tomato	50	12	2.5	0.6	0.1	0.8
19.	Onion	50	13	2.5	0.6	0.1	-
		Garnish:total	25kcal	5gms	1.2gms	0.2gms	0.8gms
		TOTAL:	525KCAL	52.3GMS	11.6GMS	21.1GMS	9.4GMS

Table No: 4 Comparison Between Traditional Ragda Pattice And Modified Energy Pack Ragda Pattice:

SR.NO.	NUTRIENT	UNIT	BAJRA RAGDA PATTICE	TRADITIONAL RAGDA PATTICE	RDA FOR MEN	RDA FOR WOMEN
1.	Energy	Kcal	525	628	2425	1875
2.	Carbohydrate	Gms	52.3	85.8	-	-
3.	Proteins	Gms	11.4	12.6	60	50
4.	Fats	Gms	21.1	26.2	20	20
5.	Fiber	Gms	9.4	4.2	-	-

METHOD OF PREPARATION

- In a cooker, heat ghee and add cumin seeds to it.
- Wash dal and rice and then add to it.
- Wash All the vegetables were and chop finely and add in the cooker.
- Add all the dry masalas.
- Add the Required amount of water to the khichdi and close the lid.
- Put off the flame after two whistle and let the cooker to cool down.

- Bajra flour, jowar flour and the dry masalas were added to the prepared khichdi
- Oil was spread on both the palms and small portion was taken from the above recipe and was given the shape of a pattice.
- All these pattice were then coated with rava and cooked on the tava with little oil on a low flame till they turned golden brown on both the sides.

- Pressure cook the white vatana, moong, moth beans and brown chana
- Add oil to a kadai. Add the mustard seeds, allow it to crackle.
- Add the pressure cooked mixed ragda to it and allow it to come for a boil.
- Turn off the flame. Squeeze lime juice on it.

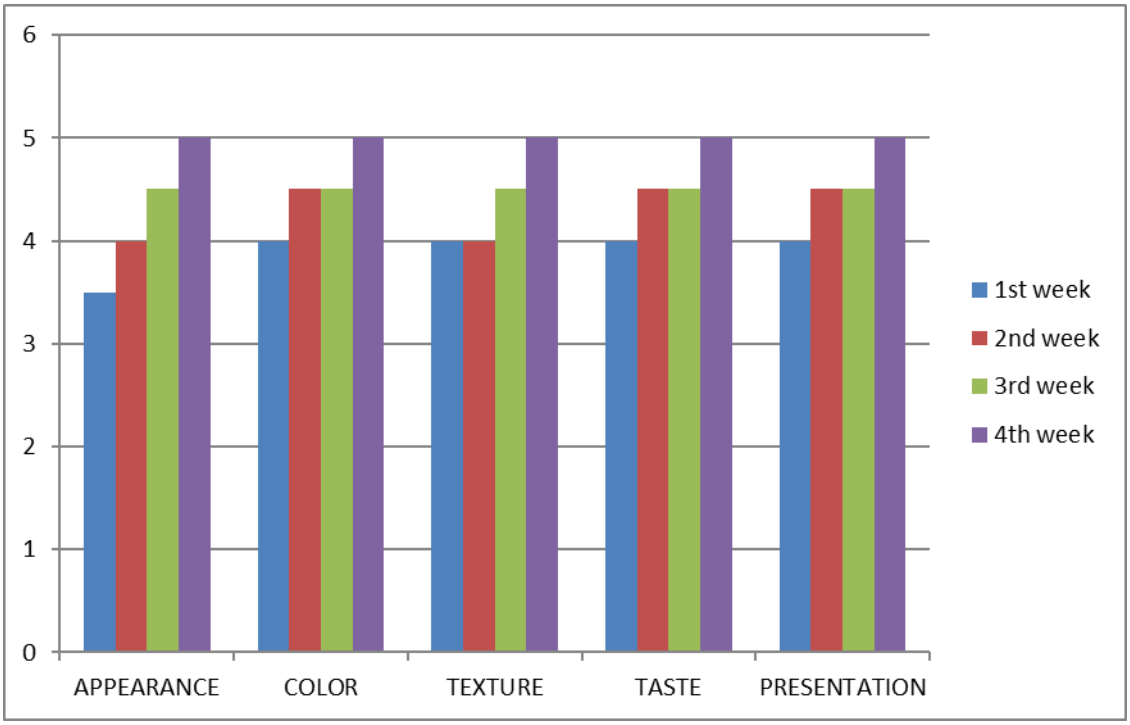
- Place the pattice in a serving dish.
- Pour the cooked mixed ragda on to it.
- Sprinkle finely chopped onion, tomato and coriander leaves to it.
- Add the lemon juice and serve immediately.

EVALUATION OF THE PRODUCT

Modified Energy Pack Ragda Pattice were subjected to sensory evaluation based on 5 point scale for Appearance, Color, 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 native panel members and 3 expert panel members. The product showed a gradual improvement from week after week.

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 high protein and total dietary fiber (TDF). In comparison to the traditional product. Shallow frying method was used with minimum use of oil. In sensory evaluation, the modified product was ranked “very good” by both the panel members. The product was acceptable.



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

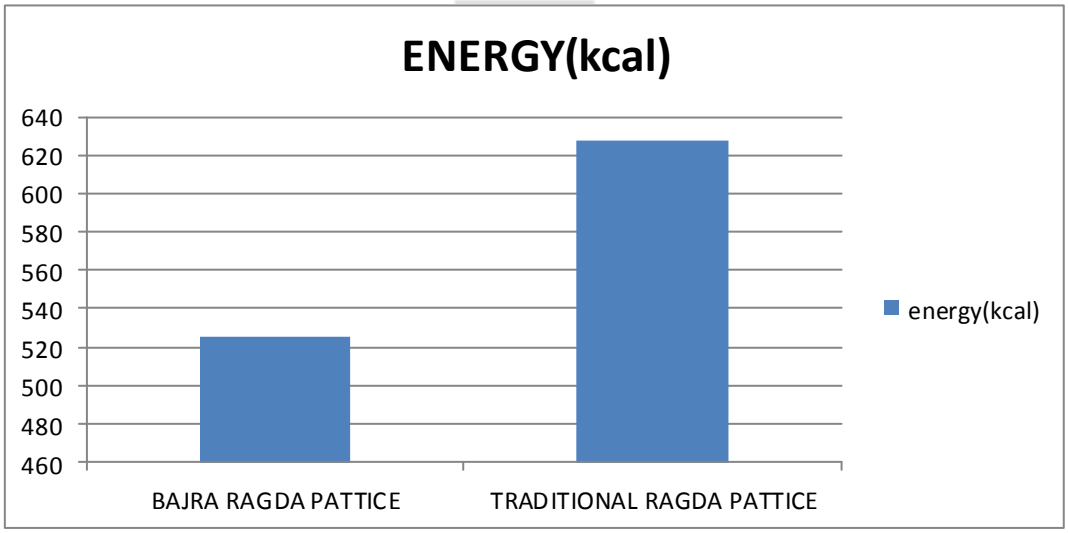


Figure No: 1 energy Content of the Recipe

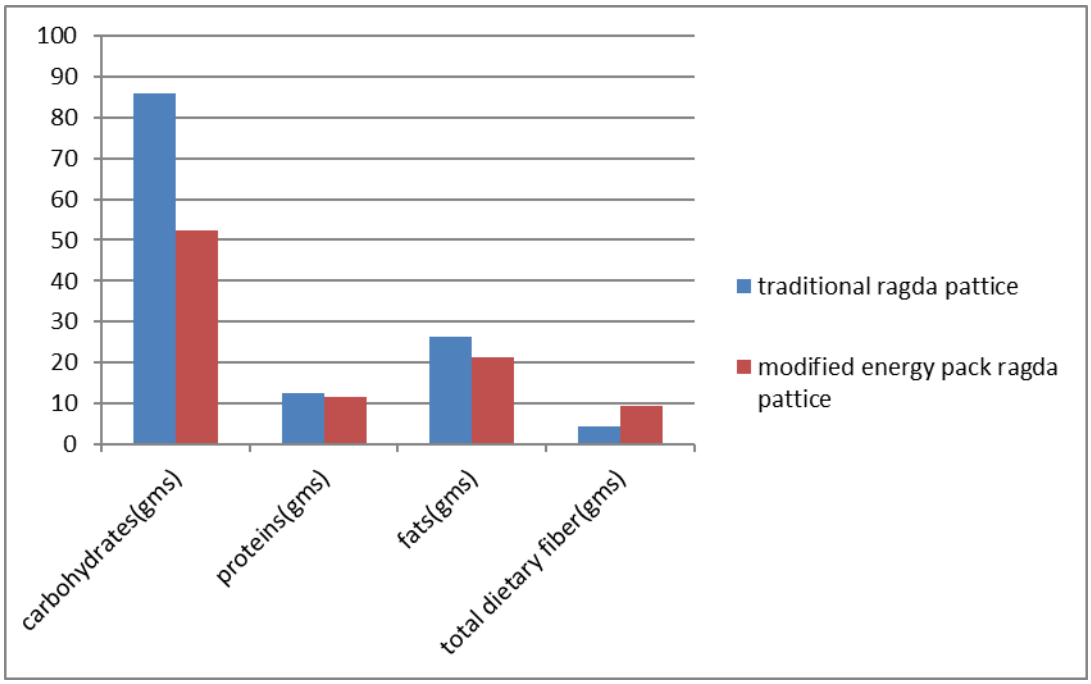


Figure No: 2 nutrient Content of the Recipe

DISCUSSION

The product was modified keeping in consideration the requirement of a diabetic individual. Cereal-pulse combination provided higher protein as compared to traditional version. The modified product was higher in complex carbohydrates and fiber which are useful for glycemic control. It was also lower in fat (due to low-fat roasting) which is an essential consideration in diabetic conditions.

In a study, High carbohydrate diets rich in dietary fiber were fed to 13 hyperglycemic diabetic men; five men required 15 to 28 units of insulin per day, five men required sulfonylureas, and three men required 40 to 55 units of insulin. All 13 men were fed weight maintaining American Diabetic Association diets containing 43% of calories as carbohydrate for 1 week and then were fed 75% carbohydrate diets with 15 g of crude dietary fiber for approximately 2 weeks. Fasting serum cholesterol values were significantly (P less than 0.001) lower and mean fasting serum triglyceride values were 15% lower on the high carbohydrate diet than on the American Diabetic Association diet in these 13 men. Thus, a high carbohydrate diet with generous amounts of

dietary fiber may be the treatment of choice for diabetic patients requiring sulfonylureas or less than 30 units of insulin per day. *(T G Kiehm, et al. 2014)*

In another study it was concluded that increased fiber intake through diets rich in high-fiber or supplements containing soluble fiber, improved glycemic control, indicating it should be considered as an adjunctive tool in the treatment of patients with type 2 diabetes. *(Flávia M Silva et al. 2013)*

An increase in the intake of dietary fiber, predominantly of the soluble type, by patients with type 2 diabetes mellitus improved glycemic control and decreased hyperinsulinemia in addition to the expected lowering of plasma lipid concentrations. *(Manisha Chandalia, et al 2000)*

The glycemic index (GI) and triglyceride response were determined in 30 non-insulin-dependent diabetes mellitus patients who were given 50-g portions of five cereal and cereal-green leafy vegetable combinations conventionally consumed in India. These included rice in the form of flakes and puffs, wheat bhakri (wheat flour kneaded, rolled out and shallow fried), wheat bhakri stuffed with fenugreek and spinach leaves. Compared with the blood glucose response to a 50-g glucose load, puffed rice and wheat bhakri showed a higher GI whereas rice flakes and wheat bhakri stuffed with green leafy vegetables produced a much lower glycemic response. (U. V. Mani et al. 2009)

The glycaemic index (GI) and triglyceride response was determined in 20 non-insulin dependent diabetes mellitus subjects who were given a 50 g carbohydrate portion of the test meal ‘khichadi’ (a steam cooked savoury preparation) made out of the cereal-pulse mix containing wheat grits, soybean, guar seeds, fenugreek seeds, green gram whole, red gram dhal, lentil and black gram dhal. The mean GI value for the test meal is 42.72. Compared with the blood glucose response to a 50 g glucose load, the test meal elicited significantly lower responses at 1 h and 2 h intervals. The test meal also showed a lower triglyceride response. (U. V. Mani et al. 2009)

CONCLUSION

The modified street-snack was found to be nutritionally superior and better suited for diabetic individuals than the conventional version owing to the ingredients used and the cooking method employed also with its cereal-pulse combination and its fiber content is beneficial for diabetes

patients. Thus this product which is an amalgamation of all the above ingredients is widely suitable for people who are suffering from lifestyle disease.

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