

# Development of Pearl Millet Spaghetti for Diabetics

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## ABSTRACT

*The vast number of children living with diabetes in the country. Children with type 1 diabetes need snacks which is low glycemic and full of micronutrient. In order to combat the present problem, an investigation was undertaken to develop low glycemic spaghetti from composite flour consisting of pearl millet and barley flour with better nutritional and sensory characteristics. The spaghetti were prepared by replacing semolina with pearl millet flour and barley flour. Barley flour was taken to enhance binding capacity. The prepared spaghetti was then evaluated for nutritional and sensory parameters. Moreover, the spaghetti prepared from pearl millet flour and barley flour exhibited the highest score for overall acceptability.*

**Key words:** *Spaghetti, Organoleptic evaluation, Pearl millet flour, Diabetes.*

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## INTRODUCTION

Spaghetti is a convenient food item. Spaghetti is processed grain mixtures and prepared to be ready to cook with very little additional effort. Now day's consumption of spaghetti is common and it brings variety in snacks. Pearl millet (*Pennisetum glaucum* L.) Bajra is the fourth most important cereal of India after rice, wheat and sorghum (Chandrakara, 2013). Millets consist of slow releasing carbohydrates and thus lowers the risk of diabetes. It is a good source of energy, protein, essential minerals and dietary fibre. The chemical analysis of Pearl millet showed that it contains moisture 12%, protein 12 g, fat 5 g, mineral 2 g, fibre 1 g, carbohydrate 67 g, calcium 42 mg, phosphorus 242 mg, iron 8 mg and accounts energy 360 calories (Singh et al., 1993, Michaelraj and Shanmugam, 2013). It may help in anaemia by increasing Hb as the iron and zinc content is 8 mg/100 g and 3.1 mg/100 g respectively. Besides these nutrients, they also have some phytochemicals with nutraceutical properties and hence are also termed as 'nutri-cereal'.

Diabetes mellitus is one of the commonest endocrine and metabolic diseases of childhood. T1DM is a disorder that arises following the autoimmune destruction of insulin-producing pancreatic cells. The disease is most often diagnosed in children and adolescents, usually presenting with a classic triad of symptoms, (i.e. polydipsia, polyphagia, polyuria) along with severe hyperglycemia, necessitating the need for exogenous insulin replacement on a lifelong basis (IDF, 2013). Pearl millet helps in diabetes as it has a low glycemic index (Obilana, 2004). If pearl millet incorporated spaghetti would be acceptable that it could be helpful for consumers as well as for farmers too. So, in this research prepared spaghetti using different amount of pearl millet flour.

## MATERIALS AND METHODS

### Procurement of raw materials

Pearl millet flour, Barley flour, semolina and other ingredients used for spaghetti preparation like spices, vegetables and cheese were bought from the local market.

### Formulation of product

In present investigation spaghetti was developed using pearl millet flour as basic ingredient. For getting an acceptable product from pearl millet flour, several trials were conducted. Modification of the common products was done mainly in the ingredients. The basic ingredient was replaced with pearl millet flour.

### Preparation of spaghetti

Spaghetti was developed using cold extruder machine. Extrusion is the act or process of shaping material by pushing or forcing through a die. The quantity of flour was weighed to determine exact quantity of liquid to be added to obtain the correct consistency of the dough. In order to standardize acceptable quality of extruded products, different permutations and combinations of ingredients were used and trials conducted till same results were achieved in terms of quality of product. Once the reproducibility is assured with acceptable quality of product the processing treatment was considered as standardized.

### Spaghetti

Generally semolina spaghetti was prepared but in present research semolina was replaced by Pearl millet flour, Barley flour and fenugreek powder in different amount. The difference in amount of water used was also different according to ingredient.

**Table 1: Standardization of Spaghetti**

<b>Trials</b>	<b>Basic recipe</b>	<b>Trial I</b>	<b>Trial II</b>	<b>Trial III</b>
<b>Flour</b>	Semolina	Pearl millet flour-40g, barley flour-10g, Fenugreek powder-5g	Pearl millet flour-30g, barley flour-20g, Fenugreek powder-5g	Pearl millet flour-25g, barley flour-25g, Fenugreek powder-5g
<b>Water</b>	25 ml	25 ml	30ml	30ml
<b>Observation</b>	-	Colour were desirable, shape, appearance, texture and taste were not desirable	Shape was desirable. Colour, appearance, texture and taste were not desirable	Spaghetti was at par with basic recipe hence subjected to sensory evaluation

In first trial of Spaghetti 40g pearl millet flour was used but appearance was not acceptable. When Spaghetti was boiled they did not retain their shape may be due to the lack of binding agent. In second trial 30g of pearl millet flour and 10g of barley flour was used to produce the Spaghetti and 30ml of water was used. Amount of barley flour was added to improve the quality and to maintain the shape but this Spaghetti was not acceptable in context to appearance and taste quality. Finally 25g of pearl millet flour and 25g of barley flour was used to produce the Spaghetti and 30ml of water used to make Spaghetti which was found to have a good appearance and also retained a good shape after boiling (Table 4.9).

Spaghetti was served after cooking through proper method as described below:-

**Procedure :** 30g raw spaghetti was added in boiling water and then in cold water for 2min. then toss the spaghetti in puree which was made using cream 2Tbsp, tomato pulp 20g, onion 20g, chilli powder, tomato puree 2tsp, sugar, salt and water. It was garnished with the cheese 2Tbsp.

In first trial of spaghetti was stick to each other because high amount of water and cream and it was not acceptable. In second trial amount of water and cream were decreased hence a non sticky was prepared which was acceptable.

**Table 2: Standardization of cooked spaghetti**

<b>Trials</b>	<b>Basic recipe</b>	<b>Trial I</b>	<b>Trial II</b>
<b>spaghetti</b>	30g	30g	30g
<b>Tomato pulp</b>	30g	30g	20g
<b>Fresh cream</b>	3-4tbsp	3-4tbsp	2tbsp
<b>Water</b>	30ml	30ml	10-20ml
<b>Observation</b>	-	Colour and flavour were desirable and shape, appearance, texture and taste were not desirable	Cooked spaghetti was at par with basic recipe hence subjected to sensory evaluation

#### **Acceptability evaluation**

##### **Consumer panel evaluation:**

Consumer panel evaluation is a organoleptic or sensory evaluation refers to the evaluation of recipes by sense organs. In consumer type panel, the number of respondents was within the range of 40 to 100. It still holds, however that the larger the sample size the better was the expected results. But no matter how large the sample, if it had not been drawn from the cross section of the prospective consumer population, the evaluators are classified as a consumer type panel el (Minoza-Gatchalian, 1981). Therefore, the sensory qualities such as color, flavor, taste, appearance and overall acceptability were got evaluated by 100 randomly selected person by using nine point hedonic scale (Swaminathan, 1987).

## RESULT AND DISCUSSION

### Sensory Characteristics

Spaghetti scores of sensory characteristics (Table no.3) indicated that spaghetti made using pearl millet flour 'Like slightly' in concern of colour, flavour, taste, texture and overall acceptability. When spaghetti was boiled they do not retain their shape may be due to the lack of binding agent. Amount of barley flour was added in to trial I spaghetti to improve the quality and to maintain the shape but this spaghetti was 'Like slightly' in context to appearance and taste, 'Like moderately' in context to colour, flavour, texture and overall acceptability. In trial III spaghetti was 'Liked very much' and have a good appearance and also retained a good shape after boiling and cooking and at par with basic recipe.

**Table 3: Mean  $\pm$  SD acceptability scores of spaghetti**

n=100						
Different types spaghetti	Appearance	Colour	Flavour	Taste	Texture	Overall acceptability
<b>Trial I</b>	6.57 $\pm$ 0.85	6.67 $\pm$ 0.83	6.6 $\pm$ 0.85	6.53 $\pm$ 0.81	6.43 $\pm$ 0.77	6.67 $\pm$ 0.91
<b>Trial II</b>	6.43 $\pm$ 0.77	7.03 $\pm$ 0.76	7.07 $\pm$ 0.78	6.9 $\pm$ 0.87	7.17 $\pm$ 0.78	7.2 $\pm$ 0.8
<b>Trial III</b>	8.84 $\pm$ 0.37	8.85 $\pm$ 0.36	8.88 $\pm$ 0.33	8.91 $\pm$ 0.29	8.92 $\pm$ 0.27	8.95 $\pm$ 0.22

### Nutritional Qualities

Nutrient content of recipes was be evaluated by putting value of ingredients given in the Indian food composition table (IFCT, 2017). Spaghetti contain 5.47g protein, 1.67 g fat, 6.78 g fiber and 393.25 kcal energy. In context of vitamins and minerals, it contains thiamine 0.17 mg, riboflavin 0.10 mg, niacin 0.98 mg, pantothenic acid 0.17mg, biotin 0.83 $\mu$ g, folates 19.47 $\mu$ g, calcium 20.74mg, iron 2.41mg, magnesium 51.59mg, phosphorus 138.5mg, potassium 202.8mg, sodium 4.92mg and zinc 1.25mg.

## CONCLUSION

Undoubtedly spaghetti prepared using pearl millet flour and barley flour in equal quantity was highly accepted in comparison to other spaghetti which was made under this study. This spaghetti also does not contains refined wheat flour and beneficial for Diabetic individual.

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