SENSORY EVALUATION OF NUTRITIOUS HERBAL NOODLES DEVELOPED BY UTILIZATION OF *AEGLE MARMELOS* LEAVES POWDER

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ABSTRACT

The Bael (*Aeglemarmelos*) is one of the most useful medicinal plants of India. All parts of the tree (stem, bark, root, leaves and fruit) have medicinal virtues and have been used as medicine for a long time. The main aim of the study was to develop herbal noodles by utilization of bael leaves and evaluate the sensory as well as nutritional parameters of herbal noodles. The basic recipe of noodles was served as control (T_0). Along with control; three treatments were prepared by incorporating 2 g of bael leaves powder. The Prepared products were served to Panel of seven experienced members. They were tested for different sensory attributes (Taste and Flavour, Colour and Appearance, Consistency and Overall Acceptability) with the help of Nine Point Hedonic Scale (Srilakshmi, 2007).A food composition table given by Gopalan, *et.al,* 2007 was used to determine the nutritional composition of *herbal Noodles.* Statistical analysis was done by applying two way classification of analysis of variance techniques. Incorporation of bael leaves powder with equal proportion of barley and chickpea flour has obtained maximum score for overall acceptability. The results shows that among all the treatments the average sensory score of T_2 (7.98) was highest followed by T_3 (7.76), T_0 (7.58) and T_1 (7.51). The calculated value of F is less than the tabulated value at 5% probability level. Carbohydrate content also decreased with the increase in amount of bael leaves powder i.e.T_1 (78 g), T_2 (75 g) and T_3 (72 g) whereas the energy was found highest in T_1 (382 Kcal) followed by T_2 (363.3), T_0 (347.7) and T_3 (345.5). Protein (ranging from 11-13 g), fat (ranging from 0.9-2.0 g), fibre (ranging from 0.3-2.0 mg), and Iron (ranging from 2.7-3.5 mg) content was more in treatments as compared to control (T_0).Thus it concluded that Herbal Noodles developed by incorporating bael leaves powder have good sensory acceptability as well as nutritional value.

KEYWORDS: Hypoglycaemic, Hypolipidemic, Blood Pressure, Herbal Noodle, Medicinal Plants

INTRODUCTION

Aeglemarmelos belongs to the family rutaceae is highly reputed medicinal tree commonly known as the bael. It is medium sized tree growing throughout the forest of India of altitude 1200 meter. It is found all over India, from sub-Himalayan forest, Bengal, central and south India. It leaves has been used as herbal medicine for the management of diabetes mellitus in Ayurvedic, Unani and Siddha systems of medicine in India (Kar*et.al.*2003).The main usage of the parts of this tree is for medicinal purposes. The different parts of this plant contain number of coumarins, alkaloids, sterols and essential oils. Various parts of this plant such as leaves, fruit and seed possess hypoglycaemic, hypolipidemic and blood pressure lowering property (Lmbole*et.al.* 2010).

Leaf extract of *Aeglemarmelos* (Bilva) was effective in restoring blood glucose, body weight to normal values and significantly reversed the altered (histological and ultra-structural) parameters in tissues of streptozotocin induced diabetic

rats seen by light and electron microscopy to near normal and improved the functional state of pancreatic beta cells. The hypoglycemic effects of this plant drug appear to be mediated through regeneration of damaged pancreas (Dahanukar*et. al.* 2000). Bael leaf enhances ability to utilize the external glucose load in the body by stimulation of glucose uptake similar to insulin. Bael extract significantly lowers blood urea, reduction in lipid peroxidation and cholesterol and increased levels of super dioxide dismutase, catalase, glutathione peroxidase and glutathione level in serum as well as in liver in experimental diabetic animals (Sharma *et. al.* 2007).

The unripe dried fruit is astringent, digestive, stomachic and used to cure diarrhea and dysentery. The different parts of Bael are used for various therapeutic purposes, such as for treatment of asthma, anemia, fractures, healing of wounds, swollen joints, high blood pressure, jaundice, diarrhea healthy mind and brain typhoid troubles during pregnancy (Manik*et.al.,* 2013).Sweet drink prepared from the pulp of fruits produce a soothing effect on the patients who have just recovered from bacillary dysentery. Aqueous extract of *Aegle marmelos*leaves, was evaluated for hypoglycemic and antioxidant effect by using alloxon induced diabetes in male albino rats and it is useful in the long-term management of diabetes (Upadhya*et. al.* 2004). Considering the nutritional as well as therapeutic aspects of bael leaves a study was design to develop herbal noodles by utilizing bael leaves. The main objective of the study was to develop and evaluate the sensory as well as nutritional parameter of herbal noodles.

MATERIALS AND METHODS

Basic ingredients for noodle preparation were procured from the local market of Allahabad. Value added product *herbal Noodles* were developed by using bael leaves powder. Bael leaves are collected from SHIATS campus, healthy leaves are selected and these leaves washed so that all unwanted materials such as dust and insects are removed after that the leaves were blanched and then dried in hot air oven at 60° C till the leaves are completely dried, then these dried leaves are grind to obtain powder was shown in figure 1 (*Mishra et.al. 2012*).

The basic recipe was served as control (T_0). Along with control; three treatments were prepared by incorporating Wheat bran, garlic powder and bael leaves powder with different proportion of wheat, chickpea and barley flour referred as T_1, T_2 and T_3 respectively shown in table 1.

Prepared products were freshly served to taste panel of five experienced members. Panel members were rated the product with the help of nine points hedonic scale card (Srilakshmi, 2007). Nutritional composition of bael leaf and bael leaf *herbal Noodles* was determined by using the standard procedure described by AOAC, 2005. Statistical analysis was done by applying two way classification analysis of variance techniques (Fisher, 1995).

RESULTS AND DISCUSSIONS

The data illustrated in the table 3 shows the average sensory scores for different parameters in control and treated sample of *herbal noodles,* clearly indicates that treatments T_2 (7.73) had the highest score followed by T_3 (7.5), T_1 (7.47) and T_0(7.36) for colour and appearance . The calculated value of F is greater than the tabulated value of F at 5% probability level. Therefore the significant difference was found between treatments regarding the color and appearance of *herbal noodles*. The average sensory scores for body and texture of *herbal noodles,* shows that treatments T_2 (7.76) had the highest score followed by T_1 (7.54), T_0 (7.52) and T_3 (7.44) which indicates that an increase in the amount of wheat flour and having equal proportion of barley and chickpea flour along with bael leaves powder. The calculated value of F is

greater than the tabulated value of F at 5% probability level. Therefore, it can be concluded that there was significant difference between treatments regarding the body and texture of *herbal noodles.* Similarly in case of taste and flavour of *herbal noodles,* the average sensory scores of T_2 (8.16) had the highest score followed by T_3 (7.78), T_1 (7.51) and T_0 (7.37). The calculated value of F is greater than the tabulated value at 5% probability level. Therefore, it can be concluded that there was significant difference between treatments regarding the taste and flavour of *herbal noodles.* The average sensory scores for overall acceptability of *herbal noodles,* indicates that treatments T_2 (7.98) had the highest score followed by T_3 (7.76), T_0(7.58) and T_1 (7.51). The calculated value of F is less than the tabulated value at 5% probability level.

The table 4 presented above shows the nutritive value of herbal noodles of different treatments i.e. control (T_0) without incorporation of bael leaves powder and with incorporation of 3g of wheat bran, 2g of garlic powder and2 g of bael leaves powder in each treatment along with different ratio of chickpea, barley and wheat flour referred as T_1, T_2 and T_3 respectively. Result revealed that the Carbohydrate content also decreased with the increase in amount of bael leaves powder i.e.T_1 (78 g), T_2 (75 g) and T_3 (72 g) whereas the energy was found highest in T_1 (382 Kcal) followed by T_2(363.3), T_0(347.7) and T_3(345.5). It was clearly shown in the table that protein (ranging from 11-13 g), fat (ranging from 0.9-2.0 g), fibre (ranging from0.3-2.0mg), and Iron (ranging from 2.7-3.5 mg) more in treatments as compared to control T_0.

CONCLUSIONS

Therefore, it can be concluded that bael leaves are rich source of dietary fibre, calcium and phosphorus. Chick Pea Noodles developed by incorporating bael leaves powder have good sensory acceptability. This research will provide a new vista in the area of medical science for the development of therapeutic approach for the management of diabetes by simultaneous administration of poly herbal formulation.

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APPENDICES

Table 1: Details of the Treatment

Ingredients	T0	T1	T2	T3
WHEAT FLOUR	100	59	63	58
BARLEY FLOUR	-	10	15	25
CHEAK PEA FLOUR	-	25	15	10
WTEAT BRAN	-	3	3	3
GARLIC POWDER	-	2	2	2
HERB POWDER (Bael Leaf)	-	2	2	2

Table 2: Chemical Analysis of Bael Leaves Powder per 100Gm.

| Nutrients	Chemical Value Per 100g
Moisture(g)	65.6
Ash(g)	9.1
Carbohydrate(g)	1.7
Protein(g)	6.0
Fat (g)	1.6
Fibre(g)	14.7
Iron(mg)	22.8

Table 3: Effect of Incorporation of Bael Leaves Powder on Organoleptic Characteristic *Noodles*

Sensory Attributes	Color and Appearance	Body and Texture	Taste and Flavour	Overall Acceptability
T_0	7.36	7.52	7.37	7.58
T_1	7.47	7.54	7.51	7.51
T_2	7.73	7.76	8.16	7.98
T_3	7.5	7.44	7.78	7.76
F_{cal} (5%)	12.68811*	9.712963*	58.68226*	12.68811*

Significant at 5% probability level

Table 4: Nutritional composition of *Herbal Noodles* per 100g

Nutrients	Treatments			
	T_0	T_1	T_2	T_3
ENERGY(Kcal)	348	233	307	308
PROTEIN(g)	11.0	13	12	11
FAT(g)	0.9	2	1.7	1.5
CARBOHYDRATE(g)	73.9	78	75	72
FIBRE(g)	0.3	2	1.5	1.4
IRON(mg)	2.7	3.5	3.3	3.1

Selection of healthy leaves
↓
Washing and Draining
↓
Drying
↓
Grinding
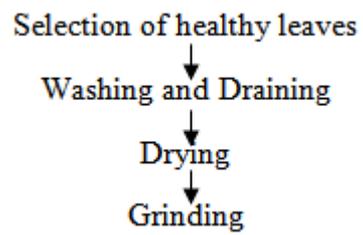
Figure 1: Flowchart Showing Development of Bael Leaves Powder

Source: Mishra et.al. 2012