

## RESEARCH PAPER

# Standardization of recipe for preparation of herbal biscuit

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## SUMMARY :

Preparation of herbal biscuits is an innovative, futuristic research in the field of functional food preparation which may enhance the medicinal value without adverse effects to human health. During this research composite flour based herbal biscuits were prepared with different Indian medicinal herbs viz., brahmi, lemongrass, shilajit, makoi, kasni and badiyan and its effect on sensorial quality characteristics were investigated. The biscuits were prepared using defatted soy flour, date paste and stevia. While, after optimizing level of one herb second herbal ingredient was chosen for biscuits preparation. Same procedure was repeated till the selection and optimization of all the herbal ingredients. On the basis of obtained results, it could be concluded that optimum concentration of different herbs viz., brahmi, lemongrass, shilajit, makoi, badiyan, kasni for development of herbal biscuit is 0.5g, 0.5g, 0.5g, 5 ml, 10 ml and 5 ml, respectively.

**KEY WORDS :** Herbal biscuit, Recipe standardization, Brahmi, Lemongrass, Shilajit, Makoi, Kasni, Badiyan

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Herbs are the plants or plant parts that are useful to man for flavor, for fragrance, for medicinal purposes, for magic, for charms and incantations, and for fun (Simmons, 1969). India is the largest producer of medicinal herbs and is called as botanical garden of the world (Grover *et al.*, 2002). A number of medicinal plants, traditionally used for over 1000 years named rasayana are present in herbal preparations of Indian traditional health care systems Ayurveda, which deals with the use of herbs for the treatment of humans (Scartezzini, and Sproni, 2000). In the last few years there has been an exponential growth in the field of herbal medicine and functional foods. The population everywhere desires to eat a healthier diet without changing their conventional dietary patterns (Becker and Kyle, 1998). Eating of healthy food has received more attention in the recent years due to disliking of health concerns such as fat, sugar and salt (Hilliam, 1995). The functional foods provide alternative way to the consumers to have better diets (Ohr, 2005) and should be taken as a part of regular diet. There is, thus, a proliferation of these value-added

products aimed at not only keeping oneself healthy but also prevention/treatment of various ailments ranging from heart diseases to cancer (Syed *et al.*, 2010).

Cereal based food products are part of stable diet of global population, where wheat is leading cereal crop and principally used in bakery products due to its much appreciated rheological characteristics. The growth of bakery industry is about 10% per annum and the products are increasingly becoming popular among all sections of people (Indrani *et al.*, 1997). Among ready-to-eat snacks, biscuits possess several attractive features including wider consumption base, relatively long shelf-life, more convenience and good eating quality (Tsen *et al.*, 1973; Hooda and Jood, 2005). Long shelf-life of biscuits makes large scale production and distribution possible. Good eating quality makes biscuits attractive for protein fortification and other nutritional improvements.

Present dietary scenario necessitates exploring the possible of incorporating novel ingredient is commonly consumed foods rather than developing new food product.

Aleem *et al.* (2012) prepared biscuit using defatted soy flour, in continuation to that work, medicinally proven traditional Indian herbs incorporation could anticipate in justifying the biscuits as a functional food. Therefore, efforts were made to design a research project to formulate herbal biscuit from soy based composite wheat flour.

## EXPERIMENTAL METHODS

The present investigation was carried out at Regional Food Research Analysis Centre, Lucknow (UP) during the academic year 2011-12. All necessary ingredients and herbs were provided by RFRAC, Lucknow (UP).

### Preparation of biscuits:

Biscuit from defatted soy flour was prepared by method standardized by Aleem *et al.* (2012) with incorporation of 20

per cent defatted soy flour using the recipe (Composite flour : 100 g, Milk powder : 10 g, Water : 20 ml Olive oil : 10 ml, Date palm paste : 10 g Stevia leaves powder : 0.25 g, Baking powder : 1 g).

### Formulation for herbal biscuit preparation:

Above stated standardized recipe was used in preparation of herbal biscuits while the incorporation of herbs was considered additional to the recipe and no ameliorations were made in standard recipe during dry herb (*i.e.* brahmi and shilajit) incorporation, while during incorporation of herbal extracts (*i.e.* extract of lemongrass, makoi, badiyan and kasni), same quantity of water was replaced with the quantity of herbal extract. One herbal ingredient at a time was selected for standardization on the basis of sensorial quality characteristics. While, after optimizing level of one herb second herbal ingredient was chosen for biscuits preparation. Same procedure

Table A : Different samples codes using during standardization of herb incorporation in herbal biscuits preparation						
Sample codes	Brahmi (g)	Lemongrass (ml)	Shilajit (g)	Makoi (ml)	Fennel (ml)	Kasni (ml)
B <sub>0</sub>	00	---	--	--	--	--
B <sub>0.5</sub>	0.5	---	--	--	--	--
B <sub>1.0</sub>	1.0	---	--	--	--	--
B <sub>1.5</sub>	1.5	---	--	--	--	--
B <sub>2.0</sub>	2.0	---	--	--	--	--
B <sub>0.5</sub> L <sub>0</sub>	0.5	00	---	---	---	---
B <sub>0.5</sub> L <sub>0.5</sub>	0.5	0.5	---	---	---	---
B <sub>0.5</sub> L <sub>1.0</sub>	0.5	1.0	---	---	---	---
B <sub>0.5</sub> L <sub>1.5</sub>	0.5	1.5	---	---	---	---
B <sub>0.5</sub> L <sub>2.0</sub>	0.5	2.0	---	---	---	---
B <sub>0.5</sub> L <sub>0.5</sub>	0.5	0.5	---	---	---	---
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub>	0.5	0.5	0.5	---	---	---
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>1.0</sub>	0.5	0.5	1.0	---	---	---
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>1.5</sub>	0.5	0.5	1.5	---	---	---
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>2.0</sub>	0.5	0.5	2.0	---	---	---
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub>	0.5	0.5	0.5	---	---	---
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub>	0.5	0.5	0.5	5	---	---
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>10</sub>	0.5	0.5	0.5	10	---	---
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>15</sub>	0.5	0.5	0.5	15	---	---
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>20</sub>	0.5	0.5	0.5	20	---	---
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub>	0.5	0.5	0.5	5	---	---
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub> F <sub>5</sub>	0.5	0.5	0.5	5	5	---
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub> F <sub>10</sub>	0.5	0.5	0.5	5	10	---
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub> F <sub>15</sub>	0.5	0.5	0.5	5	15	---
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub> F <sub>20</sub>	0.5	0.5	0.5	5	20	---
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub> F <sub>10</sub>	0.5	0.5	0.5	5	10	---
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub> F <sub>10</sub> K <sub>5</sub>	0.5	0.5	0.5	5	10	5
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub> F <sub>10</sub> K <sub>10</sub>	0.5	0.5	0.5	5	10	10
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub> F <sub>10</sub> K <sub>15</sub>	0.5	0.5	0.5	5	10	15
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub> F <sub>10</sub> K <sub>20</sub>	0.5	0.5	0.5	5	10	20

was repeated till the selection and optimization of all the herbal ingredients. The different samples codes using during standardization of herb incorporation in herbal biscuits preparation is given in Table A.

#### Organoleptic quality of biscuits:

The sensory evaluation of prepared herbal biscuits was carried out by a 25 member trained panel comprising of postgraduate students and academic staff members of faculty who had some previous experience in sensory evaluation of bakery products. The panel members were requested in measuring the terms identifying sensory characteristics and in use of the score. Judgements were made through rating products on a 9 point Hedonic scale with corresponding descriptive terms ranging from 9 like extremely' to 1 dislike extremely.

## EXPERIMENTAL FINDINGS AND ANALYSIS

The results of the present study as well as relevant discussions have been presented under following sub heads:

#### Standardization of herbal biscuits preparation:

In present investigation, efforts were also made to enhance the medicinal properties of biscuits by incorporated medicinally proven Indian herbs *viz.*, brahmi, lemongrass,

shilajit, makoi, kasni and badiyan. In order to standardize the recipe, one ingredient at a time, was selected and its effect on sensorial quality characteristics were observed for optimization. The results pertaining to effect of incorporation of different Indian herbs on sensorial profile of biscuits were summarized under following suitable headings.

#### Brahmi (*Bacopa monnerei*) incorporation in herbal biscuits:

Brahmi (*Bacopa monnerei*) has an established reputation as an effective and powerful brain and nerve tonic, amongst all the Indian ayurvedic herbal therapies used to this end. As reviewed in literature, a number of disorders related to this deterioration of brain functioning is treatable using brahmi, these includes the well-known Alzheimer's disease, the nervous disorders called ADD-Attention Deficit Disorder, different types of memory problems and disorders such as Parkinson's disease. In present investigation, different trials were taken to incorporate brahmi in preparation of herbal biscuits. Primary unorganized trials showed that brahmi being extensive bitter in taste, could not be used even at the level of 5g and hence further trials were planned from 0.5 to 2.0g of brahmi per 100g of standardized composite flour. The obtained results with respect to sensorial quality characteristics of brahmi incorporated herbal biscuits are summarized in Table 1.

The results pertaining to sensorial evaluation of brahmi incorporated biscuits showed that 0.5 per cent of brahmi

**Table 1 : Sensory evaluation of brahmi incorporated herbal biscuits**

Sample	Level of brahmi (g)	Appearance	Colour	Flavour	Texture	Taste	Overall acceptability
B <sub>0</sub>	--	8.29	8.31	8.14	8.65	8.49	8.37
B <sub>0.5</sub>	0.5	8.28	8.27	8.11	8.65	8.48	8.35
B <sub>1.0</sub>	1.0	8.26	7.85	6.14	8.65	4.57	7.09
B <sub>1.5</sub>	1.5	8.22	7.14	4.14	8.65	3.08	6.24
B <sub>2.0</sub>	2.0	8.20	6.02	3.14	8.65	2.96	5.79

**Table 2 : Sensory evaluation of lemongrass incorporated herbal biscuits**

Sample	Level of lemongrass (g)	Appearance	Colour	Flavour	Texture	Taste	Overall acceptability
B <sub>0.5</sub> L <sub>0</sub>	--	8.28	8.27	8.11	8.65	8.48	8.35
B <sub>0.5</sub> L <sub>0.5</sub>	0.5	8.28	8.25	8.11	8.64	8.48	8.35
B <sub>0.5</sub> L <sub>1.0</sub>	1.0	8.18	8.02	8.04	8.64	7.75	8.12
B <sub>0.5</sub> L <sub>1.5</sub>	1.5	7.93	7.59	7.79	8.63	6.98	7.78
B <sub>0.5</sub> L <sub>2.0</sub>	2.0	7.12	6.02	7.35	8.63	5.03	6.83

**Table 3 : Sensory evaluation of shilajit incorporated herbal biscuits**

Sample	Level of shilajit (g)	Appearance	Colour	Flavour	Texture	Taste	Overall acceptability
B <sub>0.5</sub> L <sub>0.5</sub>	--	8.28	8.25	8.11	8.64	8.48	8.35
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub>	0.5	8.28	8.25	8.11	8.64	8.45	8.34
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>1.0</sub>	1.0	8.28	8.25	7.79	8.64	6.54	7.88
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>1.5</sub>	1.5	8.28	8.25	7.04	8.64	5.86	7.61
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>2.0</sub>	2.0	8.28	8.25	7.35	8.64	4.03	7.31

incorporated do not significantly affects the taste characteristics while if the concentration of brahmi is further increased the product is becoming extensively bitter and hence not acceptable by the panellist members. Besides, incorporated brahmi also affecting on color characteristics and hence the appearance is also slightly decreasing. The textural characteristics of biscuits are not affected by the incorporated of Brahmi.

On the basis of sensorial evaluation it could be concluded that 0.5g of brahmi incorporation is acceptable. The standardized formulation containing 0.5g of brahmi is further used for incorporation of other herbal ingredients.

**Lemongrass (*Cymbopogon citratus*) incorporation in herbal biscuits:**

Lemongrass is native to India. It is widely used as an herb in Asian cuisine. Lemongrass is commonly used in teas, soups, and curries. Lemongrass incorporation in biscuits will enhance its flavour profile as it resembles citrus flavour.

During preliminary trials, it was found that higher concentration of lemongrass results in imparting astringent taste and green colour, which is undesirable in biscuits and hence further trials were planned from 0.5 to 2.0g of lemongrass per 100g of standardized composite flour. The obtained results with respect to sensorial quality characteristics of lemongrass incorporated herbal biscuits are summarized in Table 2.

The results pertaining to sensorial evaluation of

Lemongrass incorporated biscuits showed that 0.5 per cent of Lemongrass incorporated do not significantly affects the taste characteristics while if the concentration of Lemongrass is further increased the product is becoming extensively astringent and hence not acceptable by the panellist members. Besides, incorporated Lemongrass also affects colour characteristics and hence the appearance is also slightly decreasing. The textural characteristics of biscuits are not affected by the incorporated of Lemongrass.

On the basis of sensorial evaluation it could be concluded that 0.5g of Lemongrass incorporation is acceptable. The standardized formulation containing 0.5g of lemongrass is further used for incorporation of other herbal ingredients.

**Shilajit (*Bitumen mineral*) incorporation in herbal biscuits:**

Shilajit is accepted as a health booster worldwide. It improves health and stamina, give more energy, relieve digestive problems, increase sex drive, improve memory, etc. With the passage of time traditional health practitioners established the methods to purify the substances. During present investigation, 0.5 to 2.0g of shilajit was used and the effect of shilajit incorporation of sensorial quality characteristics of herbal biscuits is given in Table 3.

The results pertaining to sensorial evaluation of shilajit incorporated biscuits showed that 0.5 per cent of shilajit incorporated do not significantly affects the taste characteristics while if the concentration of shilajit is further

**Table 4 : Sensory evaluation of makoi incorporated herbal biscuits**

Sample	Makoi (ml)	Appearance	Colour	Flavour	Texture	Taste	Overall acceptability
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub>	–	8.28	8.25	8.11	8.64	8.45	8.34
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub>	5	8.28	8.25	8.30	8.54	8.48	8.37
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>10</sub>	10	8.27	8.25	8.16	8.23	8.51	8.28
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>15</sub>	15	8.27	8.24	8.05	8.01	8.53	8.22
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>20</sub>	20	8.27	8.24	7.97	6.84	8.57	7.97

**Table 5 : Sensory evaluation of badiyan incorporated herbal biscuits**

Sample	Badiyan (ml)	Appearance	Colour	Flavour	Texture	Taste	Overall acceptability
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub>	–	8.28	8.25	8.30	8.54	8.48	8.37
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub> F <sub>5</sub>	5	8.28	8.25	8.37	8.54	8.49	8.38
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub> F <sub>10</sub>	10	8.27	8.25	8.45	8.53	8.51	8.40
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub> F <sub>15</sub>	15	8.28	8.25	8.31	8.54	8.37	8.35
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub> F <sub>20</sub>	20	8.27	8.25	8.28	8.54	8.28	8.32

**Table 6 : Sensory evaluation of Badiyan incorporated herbal biscuits**

Sample	Kasni (ml)	Appearance	Color	Flavor	Texture	Taste	Overall acceptability
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub> F <sub>10</sub>	–	8.27	8.25	8.45	8.53	8.51	8.40
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub> F <sub>10</sub> K <sub>5</sub>	5	8.27	8.25	8.42	8.52	8.43	8.37
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub> F <sub>10</sub> K <sub>10</sub>	10	8.26	8.24	8.24	8.51	8.32	8.31
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub> F <sub>10</sub> K <sub>15</sub>	15	8.27	8.25	8.11	8.50	8.01	8.22
B <sub>0.5</sub> L <sub>0.5</sub> S <sub>0.5</sub> M <sub>5</sub> F <sub>10</sub> K <sub>20</sub>	20	8.25	8.24	7.84	8.48	7.56	8.07

increased the product is becoming extensively bitter and hence not acceptable by the panellist members. Besides, incorporated shilajit also affecting on flavour characteristics is also slightly decreasing. The textural characteristics of biscuits are not affected by the incorporated of shilajit.

The standardized formulation containing 0.5g of Shilajit is further used for incorporation of other herbal ingredients.

#### **Makoi (*Solanum nigrum*) incorporation in herbal biscuits:**

Makoi was obtained in the form of extract which was transparent in colour and slight sweet in taste. In order to retain the basic formulation, during incorporation of makoi, water was reduced to the level of makoi extraction addition. Primary unorganized trials revealed that higher levels up to 20 ml could be incorporated in biscuits and the systematic results related to effect of makoi extract on organoleptic quality is summarized in Table 4.

The results pertaining to sensorial evaluation of makoi incorporated biscuits showed that 0.5 per cent of makoi incorporated do not significantly affects the taste characteristics while if the concentration of makoi is further increased it results in drastic affect on the texture of the product.

On the basis of sensorial evaluation it could be concluded that 0.5g of makoi incorporation is acceptable. The standardized formulation containing 0.5g of makoi is further used for incorporation of other herbal ingredients.

#### **Badiyan or fennel (*Foeniculum vulgare*) incorporation in herbal biscuits:**

Badiyan or fennel (*Foeniculum vulgare*) is a highly aromatic and flavorful herb with culinary and medicinal uses. In present investigation, different trials were taken to incorporate fennel in preparation of herbal biscuits. Primary unorganized trials showed that fennel being good in taste could be used even at the level of 10 ml and hence further trials were planned from 0.5 to 2.0 ml of fennel per 100g of standardized composite flour. The obtained results with respect to sensorial quality characteristics of fennel incorporated herbal biscuits are summarized in Table 5.

The results pertaining to sensorial evaluation of fennel incorporated biscuits showed that 10 ml per cent of fennel incorporated significantly affects the taste characteristics and the taste characteristics of the herbal biscuits is increased while if the concentration of fennel is further increased the product is showing the specific taste of the Fennel.

Besides, incorporation of the 10 ml of fennel also showed an increase in the flavour characteristics of herbal biscuits.. The textural characteristics of biscuits are not affected by the incorporated of fennel.

On the basis of sensorial evaluation it could be concluded that 10 ml of fennel incorporation is acceptable. The

standardized formulation containing 10 ml of fennel is further used for incorporation of other herbal ingredients

#### **Kasni (*Chicory intybus*) incorporation in herbal biscuits:**

In present investigation, different trials were taken to incorporate kasni in preparation of herbal biscuits. Primary unorganized trials showed that kasni being very bitter in taste, cannot be used even at the level of 10 ml and hence further trials were planned from 0.5 to 2.0 ml kasni per 100g of standardized composite flour.

The obtained results with respect to sensorial quality characteristics of kasni incorporated herbal biscuits are summarized in Table 6.

The results pertaining to sensorial evaluation of kasni incorporated biscuits showed that 10 ml per cent of kasni incorporated significantly affects the taste characteristics and the taste characteristics of the herbal biscuits is decreased if its concentration in increasing beyond 5 ml. The textural characteristics of biscuits are not affected by the incorporated of kasni.

On the basis of sensorial evaluation it could be concluded that 5 ml of kasni incorporation is acceptable. The standardized formulation containing 5 ml of kasni is further used for incorporation of other herbal ingredients.

Preparation of herbal biscuits is an innovative, futuristic research in the field of functional food preparation which may enhance the medicinal value without adverse effects to human health. During this research composite flour based herbal biscuits were preparation with different Indian medicinal herbs and its effect on sensorial quality characteristics were investigated. The overall results summarized that natural herbs could be utilized in enhancing the medicinal values of biscuits at lower concentrations, without significant effect on sensorial quality profile.

Brahmi (*Bacopa monnerei*) incorporation at the level of 0.5 g showed to be superior in terms of sensorial quality compared to other treatments, while lemongrass (*Cymbopogon citrates*) incorporation up to the level of 0.5 g found to possess similar overall acceptability compared to control sample. Shilajit incorporation up to the level of 0.5g was also acceptable and more or less similar to that of control sample. Makoi (*Solanum nigrum*) extract up to 5 ml incorporation showed enhancement in flavour and overall acceptability while badiyan (*Foeniculum vulgare*) also found to be improving flavour profile up to the level of 10 ml incorporation. Kasni (*Chicory intybus*) extract, due to its bitter taste characteristics, drastically reduced the sensorial quality above the level of 5 ml.

#### **Conclusion:**

On the basis of obtained results, it could be concluded that optimum concentration of different herbs viz., Brahmi, lemongrass, shilajit, Makoi, badiyan, kasni for development of

herbal biscuit is 0.5g, 0.5g, 0.5g, 5 ml, 10 ml and 5 ml, respectively.

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