

# Preparation of Cost Effective, Sensory and Nutritionally Evaluated Mix Grain Flour with Oat Biscuits and Its Nutritional Impact on Adult Women

Archana Kumari<sup>1</sup>, Pragati Desai<sup>2</sup>, Manoj Mishra<sup>3</sup>, Mamta Rathore<sup>4</sup>, D.P.Singh<sup>5</sup>, Khalil Khan<sup>6</sup>  
H.G.Prakash<sup>7</sup>,

Department of Food and Nutrition<sup>1,2</sup> Directorate of Research<sup>3</sup>, Department of Agriculture Biochemistry<sup>4,7</sup>,  
Department of Vegetable Science<sup>5</sup> Department of Soil Science<sup>6</sup>, C.S.A.U.A&T. Kanpur-U.P.

**Abstract:** Oat based product has been increased due to increased knowledge about the many nutritional benefits of oats. Increased consumer awareness towards health has emphasized on intake of high fibre diet. Oats as a functional food having physiological benefits like hypoglycemic effect, hypocholesterolemic effect, has effect on reduction of hypertension. Oat has a well-balanced nutritional composition; it is a good source of Iron and quality protein with good amino acid balance. The unique composition of oats, combined with their subsequent processing, add to the unique organoleptic and nutrient experience accompanying the consumption of oat biscuits. However, the processing of oats into foods accepted by consumers can result in changes in their nutritional composition. Moisture and Ash and Iron has similar Homogeneity of Variance then Moisture, Protein and Calcium is having higher difference of variance then other factors. The study was carried out for determination of the highest sensorially acceptable level of the added oat flour to biscuits. Blends were carried out using concentrations of 20%, 40%, 60%, 80% oat flour and 80%, 60%, 40%, 20% (w/w) added wheat flour. Mean of post feeding BMI of adult women is higher than the pre feeding BMI of adult women. The Paired Samples Correlation adds the information that BMI of adult women, pre and post feeding scores are significantly positively correlated ( $r = .989$ ).

Keywords: Functional foods, nutrients, FOSHU, Health, etc.

## Introduction

There has been an increasing interest in the health enhancing role of specific foods or physiologically active food components, so-called functional foods 1. Actually, all foods are functional, as they provide taste, flavor, or nutritive value. Recently, the term functional when applied to food has adopted a different connotation, which of providing an additional physiological health benefit beyond that of meeting basic nutritional needs. The term functional foods was first of all introduced in Japan during mid-1980s and refers to processed foods containing ingredients that aid specific bodily functions in addition of being providing nutrients. Today, Japan is the only country that has formulated a specific regulatory approval process for the functional foods, which is called as Foods for Specified Health Use (FOSHU), these foods are eligible to bear a seal of approval from the Japanese Ministry of Health and Welfare. Currently, 100 products are licensed in Japan as FOSHU foods. Functional foods are not

recognised legally in the USA. Instead of this, there are many organizations that have given importance for this new and emerging area of the food and science of nutrition. Functional foods have been defined by The Institute of Medicine's Food and Nutrition Board as "any food or food ingredient that may provide a health benefit beyond the traditional nutrients it contains within it." Functional foods have been made by Health-conscious baby boomers as the leading trend in the Food industry of United States .

Oats are generally regarded as a minor cereal crop when considered in terms of grain produced annually, or areas sown for production. Traditionally, most of the crop has been used as animal feed. However, UK figures on the usage of oats 5 sees slightly more of the crop (44%) going towards human and industrial uses, compared to the animal feed sector (38%). Oats have been linked to the health claims attributed to the use of  $\beta$ -glucans and are valuable sources of  $\beta$ -glucans. As harvested; oats retain their hull, which accounts about 25-30% of the seed. Oats for food use are first dehulled, because hulls are not suitable for humans' without processing although readily digested by ruminants. However, properly processed makes it useful fibre ingredient for the food industry . Oat has recently attracted its research and commercial attention mainly due to its high nutritional value . Oats is a good source of antioxidant vitamin E (tocols) , phytic acid, phenolic. Oat belongs to the family *Poaceae* and genus *Avena*. *Avena sativa L.* is the species that is currently cultivated (**McMullen, 2000**). Among cereals, oats are unique for their high protein as well as iron contents. Oats are among the world's healthiest grains. Oats also contain large amounts of unique soluble fibers called beta-glucans, which provide numerous health benefits. The most important beneficial effects of  $\beta$ -glucan are their contribution to a lowering of serum blood cholesterol as well as moderating blood glucose in diabetics. Oat products however have a high content of phytate which may interfere with the absorption of non-haem iron. The iron balance situation is critical in several groups but especially in women. Almost one third of total fatty acids present in oats are polyunsaturated which are required for good health. In recent years, demand of oat based product has been increased due to increased knowledge about the many nutritional benefits of oats. Increased consumer awareness towards health has emphasized on intake of high fibre diet. Oats as a functional food having physiological benefits like hypoglycemic effect, hypocholestrolemic effect, has effect on reduction of cancer and hypertension. Soluble fibres have been known to lower blood cholesterol levels. Oat fibre has been associated with reduced risk of heart diseases. Oat compounds provide various opportunities for incorporating oats in functional food products. There is a great need to

determine the bioavailability of antioxidants from oat and other food sources and to determine various effects on human and animal health. In the stomach and small intestine, oat-soluble fibre  $\beta$  - glucan acts primarily by increasing the viscosity of the gastric and intestinal contents, and the action is mediated via the neuro-hormonal systems involving both endocrinal and gastrointestinal hormones. Oligosaccharides produced from  $\beta$  -glucan have been demonstrated to act as selective factors, favouring growth of at least some known probiotic bacterial strains. The favourable effect on colon function is based partly on the enhanced production of microbial mass with good water retention properties, partly by the bulking effect of the insoluble components of the fibre. Oat has a well-balanced nutritional composition. It is a good source of carbohydrates and quality protein with good amino acid balance. Colour is one of the most important sensory attribute that affect directly the consumer preference of any product. Special attention should be given to bakery products to attract the consumers' attention. The word Biscuit derived from Latin word Biscoctum means twice baked. Biscuits are one of the low cost processed foods, which are most widely consumed.

The unique composition of oats, combined with their subsequent processing, add to the unique organoleptic and nutrient experience accompanying the consumption of oat biscuits. However, the processing of oats into foods accepted by consumers can result in changes in their nutritional composition. Recent studies by **Zhang et al.** into the impact of processing and storage on fortified oat flour with milks highlighted that ultra-high temperature pasteurisation (5–20 s at 140°C) required to ensure microbiological stability had minimal impact on vitamin content. However, prolonged storage up to 12 months resulted in the degradation of linolenic acid and vitamins A, D3 and B12. In addition, oat tocopherols and tocotrienols (in combination known as tocopherols, of which  $\alpha$ -tocotrienol comprises 57–99 % of total oat tocopherols) suffer degradation due to elevated temperature-processing operations such as baking. The main intention is to bring health benefits to consumers. Biscuits samples with different percentages of oat whole flour were elaborated.

## **Material and Methods**

The method and procedure to be adopted to conduct the present study entitled “**Preparation of cost effective, sensory and nutritionally evaluated mix grain flour with Oat biscuits and its**

**nutritional impact on Adult women”.** Nutritional evaluation of biscuits includes protein, Iron and fiber. The sensory evaluation of biscuits obtained includes such traits as: taste and aroma, appearance and the structure of crumbs.

Area for this Research was KVK Lab. (Kasturbagram), Directorate of Soybean Research Khandwa Road, Indore.

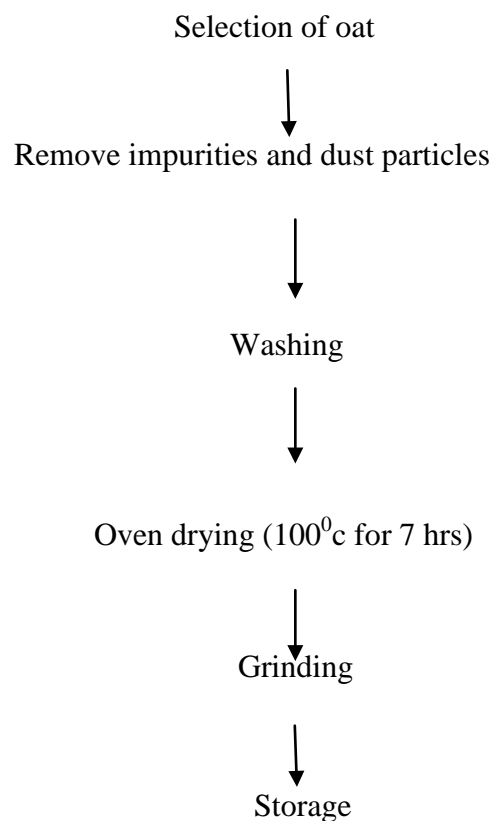
**Size of the sample:** 150

**Age:** 20-35 years adult women.

**Control group:** 50

**Tools & Techniques:** hedonic scale, proximate analysis of products, BMI.

**Flow chart of preparation of Oat sample: -**



**Ingredients for biscuits:**

**Amount of ingredients (in g): -**

<b>Ingredients</b>	<b>T1 (%)</b>	<b>T2 (%)</b>	<b>T3 (%)</b>	<b>T4 (%)</b>
<b>Oat flour</b>	20	40	60	80
<b>wheat flour</b>	80	60	40	20
<b>Sugar ground</b>	50	50	50	50
<b>Hydrogenated fat</b>	50	50	50	50
<b>Coconut powder</b>	10	10	10	10
<b>Milk</b>	25	25	25	25

**Sensory evaluation:**

❖ The study was carried out for determination of the highest sensorially acceptable level of the added oat flour to biscuits. Blends were carried out using concentrations of 20% (T1), 40% (T2), 60%(T3), 80% (T4) oat flour and 80%, 60%, 40%, 20% (w/w) added wheat flour.

❖ The panellists were from only female and from different ages, they were requested to taste each sample separately without comparing it with another sample. The samples were evaluated for desirability in appearance, colour, texture, taste, flavour and overall acceptability using a 9- point hedonic scale test.

❖ Water was used to neutralize the taste between samples testing.

❖ Nutritional evaluation of biscuits includes protein, Iron and Calcium. It is a good source of Iron and quality protein with good amino acid balance.

❖ Nutritional and health impact of oat biscuits was done on parameters like Height, Weight, Body mass index (BMI) had been calculated (weight in kg/ height<sup>2</sup> in meter).

❖ **RESULTS AND DISCUSSION:**

❖ The study deals with chemical analysis of prepared Oat flour and sensory evaluation of recipes as biscuits fortified with oat flours. Therefore the results are presented and discussed under the following heads:

❖ **Nutritional evaluation:**

❖ **ANOVA Nutritional Analysis (Generalised Linear Model)**

❖ **Table No. 1.**

	N	Mean	Std. Deviation	Std. Error
Moisture	5	9.8600	10.48402	4.68860
Ash	5	10.0960	10.48972	4.69115
Protein	5	10.4180	10.65652	4.76574
Iron	5	10.6700	10.64370	4.76001
Calcium	5	10.1310	10.36410	4.77591
Total	20	11.3610	9.70376	2.16983

Moisture, Ash, Protein, Iron and Calcium are the factors for Nutritional Analysis of four varieties of biscuits in T1, T2 T3 and T4. Lower mean is observed in Moisture and higher in Iron. Moisture and Ash and Iron has similar Homogeneity of Variance then Moisture, Protein and Calcium is having higher difference of variance then other factors.

### Refernces

1. AACC (1999) Definition of whole grain. Association of Cereal Chemists International, St. Paul, Minnesota, USA
2. AACC The definition of dietary fibre. Report of the dietary fibre definition committee to the board of directors of the American association of cereal Chemists. *Cereal Foods World*. 2001;46:112–129.
3. Aigster A, Duncan SE, Conforti FD, Barbeau WE. Physicochemical properties and sensory attribute of resistant starch-supplemented granola bars and cereals. *LWT-Food Sci Technol*. 2011;44:2159–2165.
4. Amundsen AL, Haugum B, Andersson H. Changes in serum cholesterol and sterol metabolites after intake of products enriched with an oat bran concentrate within a controlled diet. *Scand J Food Nutr*. 2003;47(2):68–74.
5. Anderson JW, Bridges SR. Hypocholesterolemic effects of oat bran in humans. In: Wood PJ, editor. *Oat bran*. St. Paul, Minnesota, USA: American Association of Cereal Chemists International; 1993. pp. 139–157. ]

6. Bradshaw J (2005) Developments in semolina milling. *Grain Feed Mill Tech* 14–17
7. Capouchova I, Petr J, Krejcirova L. Protein composition of sorghum and oat grain and their suitability for gluten-free diet. *Agriculture*. 2006;93(4):271–284.
8. Caton PW, Potheary MR, Lees DM, Khan NQ, Wood EG, Shoji T, Kanda T, Rull G, Corder R. Regulation of vascular endothelial function by procyanidin-rich foods and beverages. *J Agric Food Chem*. 2010;58:4008–4113.
9. Chillo S, Civica V, Lannetti M, Suriano N, Mastromatteo M, Del Nobile MA. Properties of quinoa and oat spaghetti loaded with carboxymethylcellulose sodium salt and pregelatinized starch as structuring agents. *Carb Polym*. 2009;78:932–937.
10. Crehan CM, Hughes E, Troy DJ, Buckley DJ. Effects of fat level and maltodextrin on the functional properties of frankfurters formulated with 5 %, 12 %, and 30 % fat. *Meat Sci*. 2000;55:463–469.