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Studies on development and organoleptic evaluation of porridge mix

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Abstract

The study was conducted to develop porridge mix with oats, finger millet and pearl millet in various proportions such as (60:10:30), (60:20:20) and (60.30:10) were used for T₁, T₂ and T₃ respectively and evaluated with reference oat based porridge mix alone (100:0) T₀. T₃ was found to be the most preferred variant with respect to the sensory quality such as colour, flavour, taste and overall acceptability. Porridge with different proportion of grains improves the nutritional benefit of the product. Overall, it can be concluded that oats, finger millet and pearl millet in proportion of (60.30:10) exhibits good sensory attributes.

Keywords: Porridge mix, convenience food, ready-to-cook, oat, millet

Introduction

In recent years, a wide range of processed foods in ready-to-eat form has been marketed with increased interests in health foods. Consumers also now believe in health benefits or nutrition as being desirable food qualities. Breakfast cereals have potential to contribute as nutritious food because of dietary fibre and other health significant bioactive compounds in whole grains. In addition to whole grain benefits, multigrain concept can provide breakfast foods with number of benefits associated with these grains. This multigrain blends helps to mix different whole grains to maximize their nutritional, functional and sensory properties. Apart from health significance, convenience is also a recent trend in international as well as Indian food market. Convenience products are quick and easy to prepare, thus, saves cooking time and require few cooking skills (Mandge *et al.*, 2011) [19].

Porridge produced from various cereals and coarse cereals like wheat, oats, maize, sorghum etc. are widely consumed owing to their ease of making and acceptability among all age groups. Porridges are used as breakfast foods for adults as well as complimentary foods for infant and are also dietary adjuncts for convalescents (Michaelsen, 1998; Ojjo and Shimoni, 2004) [20, 22].

Porridge is easy to chew, swallow, digest and absorb as it is a semi-fluid food (Zhang *et al.*, 2003) [31]. Cereal porridges are based on common grains, such as rice, maize, wheat, oat, or sorghum. They are often combined with large volumes of water and swell during cooking, making them very viscous (Rombo *et al.*, 2001; Helland *et al.*, 2002) [24, 13].

At present porridges are made from cereals most of the time, thereby restraining their nutritional benefits. However due to their ease in preparation, flexibility in terms of ingredients used, and convenience in terms of time taken for cooking and serving they can offer exceptional advantage to incorporate multigrain concept in ready-to-eat food.

A healthy food is well balanced with respect to quality and quantity of ingredients from different food groups and not just concentrating on one food group, giving rise to a concept of multigrain foods. Whole grains are reported to be rich in nutrients, nutraceuticals, and have number of health beneficial effects. They have high concentration of dietary fibres, resistance starch, and oligosaccharides. They are also rich in antioxidants including trace minerals and phenolic compounds and these compounds have been linked to disease prevention. Whole grain feeding studies in human subjects also found improvement in biomarkers such as weight loss, blood lipid improvement and antioxidant protection (Hameeda *et al.*, 2012) [12].

Oats (*Avena sativa* L.) is a cereal consumed at lower rates than wheat and rice all over the World. However the dietary fiber content and nutritional value of oats are high. Oats contain many essential amino acids (methionine, cysteine, threonine, isoleucine, tryptophan, valine, leucine, histidine, methionine, phenylalanine, and tyrosine) necessary for human body

(Biel *et al.*, 2009) [3] and high antioxidant activity components such as tocopherols, tocotrienols, and flavanoids (Koenig *et al.*, 2014) [17]. Oats are an important source of nutrients; they contain protein, digestible carbohydrates and dietary fiber fractions required for a balanced human diet. Likewise, oats were mainly used as feed for animals, but recent findings had pointed out new possibilities for the health-promoting properties of oats and oat products (Brennan and Cleary, 2005) [4]. Many positive effects of oats are associated with beta-glucan, due to its beneficial effect on serum cholesterol levels, and recently the European Food Safety Authority approved health claims for beta-glucan (EFSA, 2009) [8].

Oat was found to be distinct among the cereals due to its multifunctional characteristics and nutritional profile. It is a good source of dietary fiber especially β -glucan, minerals and other nutrients. Oat and oat by products have been proven helpful in the treatment of diabetes and cardiovascular disorders (Butt *et al.*, 2008) [5].

Ragi (Finger Millet; *Eleusine coracana*) is in use since time immemorial, and a large number of its traditional food preparations are in practice in the rural areas. It contains high levels of fibre, minerals and vitamins and has eight times more calcium (344 mg/100 gm) than other cereals (Verma and Patel, 2013) [28]. It contains important amino acids *viz.*, isoleucine, leucine, methionine and phenylalanine which are deficient in other starchy meals. It is comparable to rice with regards to protein (6-8%) and fat (1-2%) and is superior to rice and wheat with respect to minerals and micronutrient contents (Verma and Patel, 2013) [28]. Ragi has gained importance because of its slowly digestible and resistant starch (Wadikar *et al.*, 2007) [29] and has low glycemic index which makes it suitable for diabetic patients (Pradhan *et al.*, 2010) [23].

Finger millet (*Eleusine coracana* L.) is one of the minor cereals, which is nutritionally significant in terms of high calcium, phosphorous, iron and zinc. Ten per cent of the world's 30 million tonnes of millet produced is finger millet (Dida *et al.*, 2008) [7]. In India, finger millet occupies the largest area under cultivation among the small millets (Chandra *et al.*, 2016) [6].

Pearl millet had higher protein (14.0 per cent), fat (5.7 per cent), fiber (2.0 per cent) and ash (2.1 percent) content (Sade, 2009) [25] when compared to the major cultivated cereal crops such as wheat (Kavitha and Parimalavalli, 2014) [16], sorghum (Awadelkareem *et al.*, 2015) [2]. Superior protein quality in term of its tryptophan and threonine content (Elyas *et al.*, 2002) [9] along with higher content of calcium, iron as well as zinc (Yadav *et al.*, 2014; Sade, 2009; Lestienne *et al.*, 2007) [30, 25, 18] makes this crop very useful for human. Energy content of pearl millet is greater than sorghum and equivalent to brown rice due to its rich unsaturated fatty acids (75 per cent) and linoleic acid (46.3 per cent) contents (Jaybhaye *et al.*, 2014) [14].

Pearl millet contains high amount of Iron (8mg/100g) and Zinc (3.1mg/100g), (NIN, 2003) [21] which may help to increase the Hb levels. However the presence of several non-nutrients such as phytates and polyphenols may decrease the bioavailability of iron. Use of household processing technologies such as popping, germination, fermentation as described above may lead to reduction of these non-nutrients and further leads to increase in bioavailability of iron and zinc (Sharma and Kapoor, 1996) [26].

The nutritive value of pearl millet is comparable to other staple cereals like wheat, rice and even better with regard to

average protein, fat and mineral contents (Gopalan *et al.*, 2000) [11]. In spite of several advantages, its use is limited due to its color and flour quality which deteriorates rapidly (Fasasi, 2009) [10].

Materials and Methods

Materials

The raw material were obtained from local village market, Parbhani. The proposed research was carried out in Department of Food Engineering, College of Food Technology, VNMKV, Parbhani.

Methods

Preparation of porridge mix

For the preparation of porridge mix, multi-nutrient grains was first roasted at 120°C for 2-3 min then grinded in analytical mill at high speed and sieved through 600 micron sieve and packed in a suitable packaging material. For further preparation of porridge, boiling water was added to the mixture with simultaneous mixing to prevent lump formation; this was followed by heating for time specified by experimental design.

Formulation for development of porridge mix

Table 1: Formulation for development of porridge mix

Ingredient	Control	T ₁	T ₂	T ₃
Oats (g)	100	60	60	60
Finger millet (g)	-	10	20	30
Pearl millet (g)	-	30	20	10
Sugar	20	20	20	20

Organoleptic evaluation of porridge mix

Organoleptic evaluation of porridge mix for colour and appearance, flavour, after taste and overall acceptability was carried out by using standard method of (Amerine *et al.*, 1965) [1]. For these 10 semi-trained judges were used and 1 to 9-point hedonic scale was used for rating the quality of the porridge mix. The mean of ten judges was considered for evaluating the quality.

Preparation of porridge mix (Shinde *et al.*, 2017; Johari A., 2016) [27, 15].

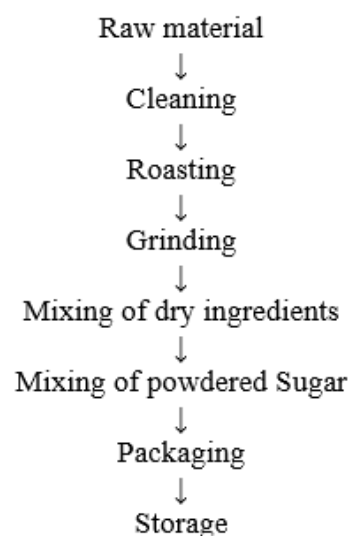


Fig 1: Process flowchart for preparation of porridge mix

Result and Discussion

Table 2: Mean sensory score values for the porridge mix.

Samples	Appearance	Colour	Flavour	After Taste	Mouthfeel	Overall Acceptability
T ₀	8.7	9	8.5	9	9	8.8
T ₁	7.5	7.6	7.9	8.0	8.0	7.8
T ₂	7.5	8.0	8.0	8.5	8.5	8.1
T ₃	8.5	8.7	8.5	9.0	8.5	8.6
SE +	0.069	0.096	0.054	0.070	0.084	0.052
CD @ 5%	0.209	0.290	0.076	0.212	0.253	0.158

Data indicated in above table 2. Showed that porridge mix with 60:30:10 (T₃) proportion received highest sensory score (i.e., 8.6) in case of all sensory attributes followed by porridge mix having 60:20:20 scored (i.e., 8.1) compared to rest of the samples. The effect of proportion on porridge mix was significantly affected by different recipe and treatment combinations the results found close to that of (Shinde *et al.*, 2017)^[27].

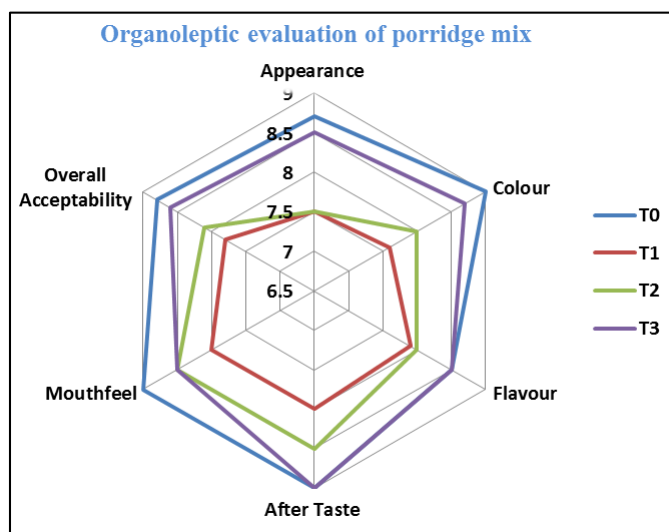


Fig 1.

Conclusion

In present investigation efforts were made to develop porridge mix with various proportions of different grains. The study discovered that the organoleptic characteristics of porridge mix *viz.*, colour, flavour, taste, and overall acceptability were significantly influenced by different recipe proportion. It can be finally concluded that porridge mix with 60:30:10 (T₃) oat, finger millet to pearl millet acknowledged highest sensory score (i.e., 8.6) in case of all sensory attributes.

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