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Review Study of Quality Characteristics and Health benefits of Fiber Rich Bread

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Abstract-research and development section of food industries are always in need of new variation in staple products. Addition of DF in staple food such as bread is a boon for industry. Many researchers have been conducted on incorporation of various fiber sources from plant and the effects studied on the rheological, organolaptic and health benefits. The new products resembling the basis recipe are widely accepted and popularly in demand.

I. ABBREVIATION

DF- Dietary Fiber
SDF- Soluble Dietary Fiber
IDF- Insoluble Dietary Fifer
RS - Stabilized Rice
RB- Rice Bran
DFF- Defatted Flaxseed Flours
FFF- Full fat Flaxseed Flour
JRF- Jackfruit Rind Flour
LDL- Low Density Lipoprotein
CPHP- Cocoa Pod Husk

II. SIGNIFICANCE OF DIETARY FIBER IN BIOLOGYCAL SYSTEM

Dietary fiber (DF) is a non nutritional component. It is edible part of plant or analogous carbohydrate that are resistant to digestion and absorption in the human small intestine with complete and partial fermentation in the large intestine. Dietary fiber includes polysaccharides, oligosaccharides, lignin and associated plant substances. It promotes beneficial physiological effects including laxation, and/or blood cholesterol attenuation, and/or blood glucose attenuation (AACC 2001).Fiber was identified as first ingredient associated with health by food idustry in 1980s.

DF can be broadly classified into two type namely soluble dietary fiber (SDF) and insoluble dietary fiber (IDF). IDF Controls and balances the pH in the intestine, It helps to move bulk through intestine, Promote regular bowl movement and also remove toxic waste through colon in less time. Whereas, SDF binds fatty acid, delay stomach emptying time therefore, sugar is released and absorbed slowly, Reduces cholesterol, especially level of LDL (bad cholesterol) and regulates absorption of simple sugar. This is especially useful for people with diabetes and metabolic syndrome. The SDF: IDF ratio is important for both, dietary and functional properties. It is generally accepted in some researches that those fiber sources suitable for use as food ingredient should have an SDF/IDF ratio as to 1:3. The role of dietary fiber in controlling chronic disorder like cardiovascular disease, diabetes, diverticulitis, bowl cancer constipation etc. is well known (painter and Burkitt, 1975; Naraya and Rupa, 2005).

A. Df And Bakery Products-

Developments of new products with substantial DF contents are a strategic area for the Bakery industry. Dietary fibers are a common and important ingredient of a new generation of healthy food products (Schleibinger, M. *et al.* 2013). The dietary fiber content of bakery products may be increased by adding various substances from plant kingdom rich in dietary fiber (kamaljit, K. *et al.* 2011).Dietary fiber has received attention from researcher due to their functional properties such as water holding capacity, oil holding capacity, swelling capacity, viscosity, synergism with sweetener and fat replacement properties etc. derived from different sources ; cereal, fruits and vegetables, have created a renewed interest in fiber particularly in bakery industry. Many of the fiber supplements which have been researched are obtained from by- products resulting from the processing of fruits, vegetables, legumes

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and other food products. Recently, many researchers have been performing studies in order to improve the technological knowledge regarding functional food as well as the development of enriched food, especially cereal based products. An "ideal dietary fiber" must have important properties such as a pleasant flavor, color, aroma, balanced composition, proper amount of bioactive compound, a long shelf life and compatibility with food processing with favorable physiological effects on human body and reasonable price (Larrauri, 1999).Bread is most popular and common staple food. Its origin dates back to Neolithic era is still one the most consumed and acceptable staple in all part of world (Manny and Shadasharaswny, 2005). It is prepared by baking dough which consists of flour, leaving agent and water. Nowadays, many variation of the basic recepie of bread are available as innovation. (Oluwajoba *et al*.,2012). But the new products should have same qualities as the original recepie. Fiber rich bread is one of those types. Bread and baked product are the most important source of dietary fiber in the total food consumption.

A number of researches have been carried out on substitution of white wheat flour with different fiber sources and quality characteristics of bread. This reviews article presents some studies regarding the effect of some fiber ingredient on quality parameters of bread in terms of bread characteristics, dough rheological properties and shelf life of high fiber bread.

III. EFFECT OF FIBER INCORPORATION ON BREAD QUALITY SENSORY PARAMETERS-

One of the most efficient ways to increase the fiber content of bakery products is to supplement part of the flour with cereal bran. However, addition of high amount of fiber ingredients is a technological challenge, in both in term of flavor and texture of the final product. For example, Irakli *et al*., (2015), used stabilized rice bran in bread. The RB substituted bread contained higher level of total dietary fiber content as well as in color and firmness of the bread increased with the level of substitution. Moreover, the experimental bread was rich in vitamin E, Phallic content and anti oxidant activity in comparison to the control. Sensory evaluation revealed bread with 30% RB were overall acceptable ,However substitution level higher than 10 % negatively affected the sensory properties in term of color crumb and texture. Similarly, bread containing 10% rice bran has got best sensory scores by (Bagheri and Seyedein, 2011). Oganean et al. (2006) produced low calorie and high fiber bread by substituting wheat bran for 10-20 % of standard flours in various form as raw, fermented and washed in water after fermentation. The sample with 20% bran had increase 6% fiber content and 18.6% reduced calorie value. But sample had low sensory features.

Kamaljit et al. (2011) carried out work on substitution of wheat flour with oat fiber and psyllium husk. Oat fiber at5% level and psyllium husk at 3% level of incorporation was optimized on the basis organoleptic quality and bread characteristics including: baking absorption*, loaf volume, loaf height and specific volume. Results showed that increase in level of substitution of both ingredients (oat and psyllium) increased baking absorption. Non significant variations were observed in loaf weight at different levels of incorporation of oat fiber and psyllium husk, whereas, loaf volume and loaf height decreased. Another study had been carried out by Beueri et al. (2011), analyzed the effect of different amount of oat bran on bread making. The correlation between the addition of oat bran and specific volume were found negative. Citrus waste of juice center is valuable functional ingredient. Ocen and Xu (2013), studied the effect of citrus fiber on bread produced from frozen dough, due to increase demand for fresh bread. There was no significant difference in specific volume between control and 1% formulation but all formulations showed significant increase in firmness from control bread. Whereas, the addition of fiber from wheat, apple, potato and bamboo caused decrease of loaf volume and also change of crumb colour and slightly increase of bread firmness.The best sensory properties were detected with an addition of wheat and potato fiber (kucerova et al., 2013).The unleavened flat bread were prepared from whole wheat fortified with 16% defatted flaxseed flours (DFF) and 12 % full fat flaxseed flours (FFF). Their result indicated that bread prepared from both DFF and FFF had higher content soluble & non soluble and total dietary fibers (Hussain et al., 2012). Feili et al. utilized jackfruit rind flour (JRF) as a fiber source in bread formulation. Increasing the level of JRF in to wheat flour caused an increase in hardness and darkness of bread and decreased their volume compared to the control. It was concluded that bread sample substituted with 5% JRF had the highest mean scores of overall acceptance. Amir et al. (2013), developed high fiber bread by using cocoa by-product. The cocoapod husk can be classified as one of the sources of fiber. The incorporation of cocoa pod husk powder gives significant effects toward bread qualities where the bread became denser and harder in texture. The colour of bread crumb and crust was also changed in to darker as compare to control. The 5% formulation obtained highest mean score among the composite bread.

*Absorption is an indication of flour's ability to hold water while maintaining its consistency. (Lallemand, baking update American yeast sales volume 1 issue no. 17)

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IV. EFFECT OF DIETARY FIBER INCORPORATION ON RHEOLOGICAL PROPERTIES -

The incorporation of dietary fiber to wheat flour affects the rheological properties in various ways. Lemon pomace accounts for 50-85g/100gm of whole fruit mass. There is a great interest in utilizing the remaining Biomass. Tai-fu etal.(2015) analyzed the effect of lemon pomace on dough properties. Result showed that the substitution of wheat flour by lemon fiber resulted in stiffer and less extensible dough. Ocen and Xu (2013) added citrus fiber in frozen dough. They reported that dough stability*, development time and breakdown time were decreased with increase in fiber amount. Babiker et al. (2013) found that the crude protein, crude oil, crude fiber and carbohydrates content of orange peels were 1.14%, 2.1%, 3.33%, and 6.78%respectvely. They find out the effect of supplementation of wheat bread with orange peels on rheological properties. The result showed that maximum resistance to extension was found from 430mm in wheat flour to 531mm in wheat flour containing 5%orange peels powder. The result also indicated, addition of orange peels to wheat flour caused an increase in arrival time** and decrease in dough stability. Flipovic et al. (2004) sugar beet pomace as an additive in bread making. It was evidenced that sugar beet dietary fiber in yeast dough influenced water retention of dough, which is a desirable characteristics but it had an adverse effect on gluten structure, bread crumb quality and colour. Hassan et al. (2008), observed the effect of fermentation and particle size of wheat bran on anti nutritional factors and bread quality. It was sieved and classify as coarse, medium and fine bran size. The result indicates that fermentation of wheat bran increased the percentage of crude fiber. The tannin and catechin content decreased, whereas, specific volume of three cultivars with 10, 15 and 20 %wheat bran decreased with increased the amount of wheat bran. Bread with 10% fermented coarse wheat bran gave the best result for all characteristics tested in organoleptic evaluation. Due to the emulsifier properties, rice bran had a good effect on the texture of bread. Baking and rheological observation showed that an increase in the amount of rice bran leads to raise in the extension and coefficient as well as water absorption, but it decreased flour resistance to extension (Bagheri and Seyedein, 2011). A study done by Khajdova et al. (2012), reported that increase water absorption, dough development time and dough stability, decreased mixingtolerance index*** of dough containing carrot pomace powder. Similarly maximum resistance to extension was found in wheat flour dough containing 5% orange peels powder. The result also showed that increase arrival time and decrease dough stability reported by Baker et al. (2013).Wheat, apple, potato, and bamboo fiber applied at 1 and 3 % content to wheat flour bread. The addition of fiber affected the farinograph parameters, significantly decreased the specific volume especially at 3 % fiber (kucerova et al., 2013).

*Stability is the interval between the arrival time and departure time. It is also known as tolerance of the flour to over and under mixing.

** Arrival time is the time required for the curve to reach the 500 brarender unit (BU) line. It gives the rate of hydration of the flour. Peak time is the time required for the flour to reach full development. It gives an indication of optimum mixing time in bakery Departure time is the time at which the curve leaves the 500 BU line

***Mixing tolerance index is the difference in Brabender Units from the top of the curve at peak time to the top of the curve five minutes after the peak is reach.. (Lallemand, baking update American yeast sales volume 1 issue no. 17)

A. Influence Of Dietary Fiber On Bread Shelf Life-

Bread is usually considered as perishable products with a limited shelf life by physicochemical changes known as staling. Bread staling is a process that occur during storage of the product, that results in crumb hardening ,crust softening and loss of the fresh flavor of product (Gray and Bemiller, 2003). Some studies carried out on sensory profile of wheat flour and whole wheat pan bread to characterization sensory changes during a three week storage period. Result showed that storage time had a significant effect on aroma and flavor of both bread. Dietary fibers have important functional properties such as water and oil holding capacity, anti sticking rising thickening capacity, these help to extent shelf life of bread (Kurek and Wyrwisz, 2015). Curti *et al*. (2015), reported that fiber extract from potato peels had high water holding capacity. It was studied for its ability to reduce bread staling even if employed at low level (0.4 g /100 g flour).Schlibinger et al. (2013) studied the influence of different fibers (sugarbeet fibers, cellulose and inulin) on firmness and water loss of the crumb of brown bread. Their study revealed that the highest water retention as well as the lowest firmness was measured at cellulose rich bread. From this study it is claimed that all of the applied fiber affected the staling of brown bread with cellulose showing the strongest reducing effect on water loss and firming. Flipovic *et al*. (2004), used sugar beet pomace as an additive in bread making. They stated that fiber from sugar beet reduce bread staling. Kamaljit et al. (2011) studied that oat fiber at 5% and Psyllium hunk at 3% level selected for bread on the basis of organoleptic characteristics. Shelf life of their bread was found to be 5 day at room temperature. On other side oat bread and psyllium bread were store under refrigeration (18.7°). In Refrigerated condition, no spoilage was seen up to seven days of storage.

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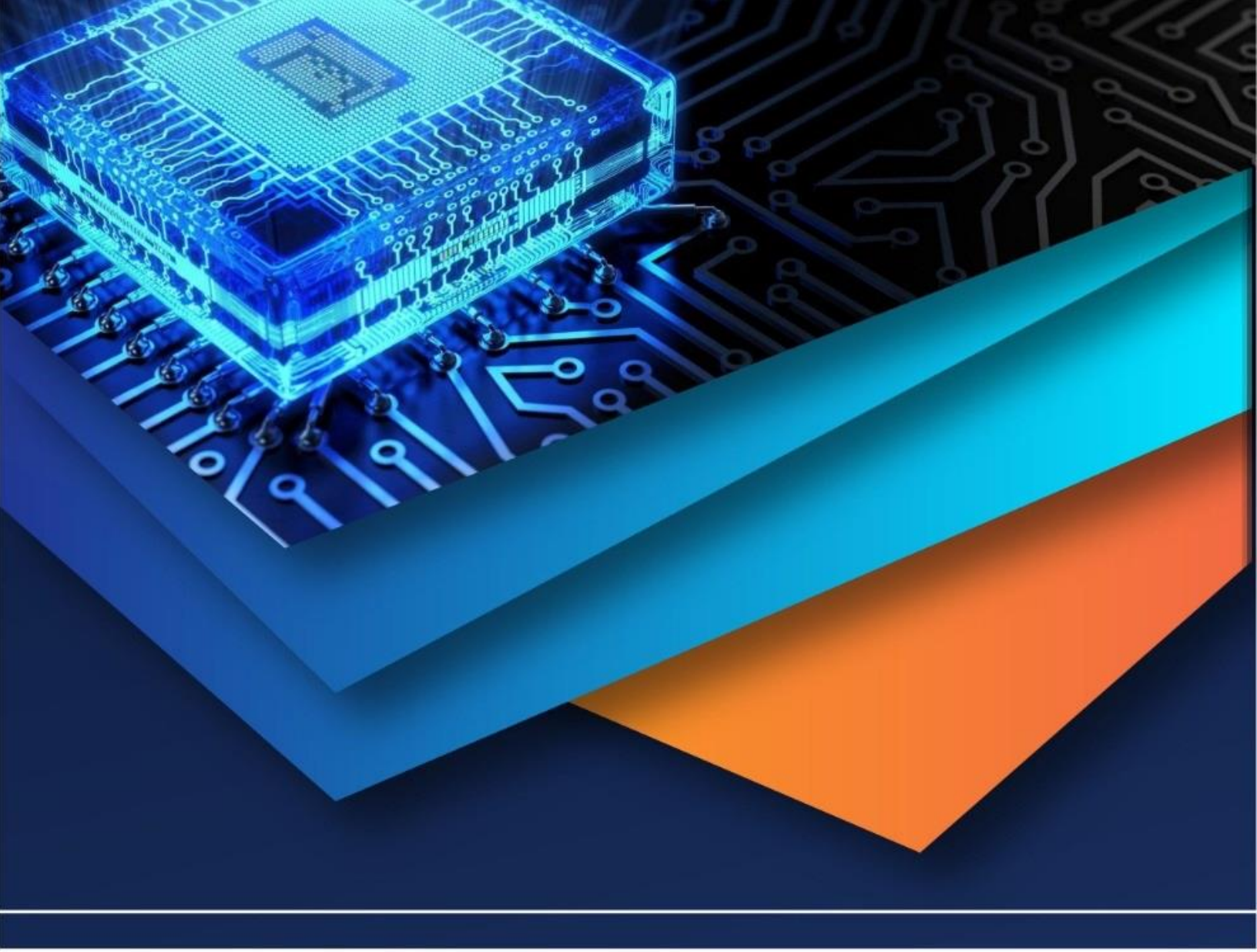
V. CONCLUSION

DF not only contributes to increase the health benefits but affects the rheological and organolaptic characteristics of bread. The consumption of bread is expected to increase day by day hence variations in the form of addition of dietary fiber with potential health effects will be a blessing for producers and consumer as well.

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