

Development Of Flat Bread by Utilizing Moringa Leaves Powder and Water Chestnut Powder to Combat Malnutrition

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ABSTRACT

Malnutrition is extremely prevalent in third world nations. Undernourishment is the medical term for a lack of nutrition. Most countries follow a cereal-based diet, which causes major problems with protein malnutrition among all age groups. One strategy for assistance in this condition is the production of high nutrient-density products, which cover all micronutrient and macronutrient requirements of the body as well as provide energy for metabolism. Functional foods are one of the most important food classes that have the ability to reduce the risk of disease and reduce the risk of micronutrient deficiency. Moringa oleifera contains numerous medicinal activities such as antioxidant activity, anti-inflammatory activity, anti-tumor activity, and anti-arthritis activity. Moringa leaves have beta-carotene, Vitamin D, essential amino acids, magnesium, calcium, and potassium. Magnesium, calcium, and potassium are also present in water chestnut. Moringa oleifera and water chestnut (trapanatans) contain about 99.1 mg/100gm, 1.4mg/100gm of calcium, respectively. Moringa oleifera leaves, seeds, bark, roots, sap, and flowers are widely used in traditional medicine, and the leaves and immature seed pods are used as functional foods in human nutrition. Due to Moringa oleifera and water chestnut powder (WCP), the metabolic activity of the body improves, such as it enhances the absorption of calcium in bones at postmenopausal stage, reduces the risk of osteopenia, antioxidant activity and also reduces inflammation. Basically, the study's objective was to characterize and develop flat bread utilizing various combinations of wheat flour (WF) and water chestnut (WCP) and moringa leaves powder (MLP) and also improve the nutrient profile of the flat bread.

Keywords: Moringa, Water chestnuts, super Food, Bioactive agents, Inflammation, malnutrition

INTRODUCTION

Nutraceutical and functional foods currently represent a worldwide market valued more than \$28 billion. In 2016 Pakistan's share of this market is very small due to inadequate research facilities and lack of sophisticated technologies and methodology. But in 2017 government of Pakistan work on nutraceutical products or functional products with new technologies and developed low cost product which is easily purchase by middle class customers which help to increase the market share of Pakistan in upcoming years. Functional foods & nutraceutical products embodied market value more than \$28 billion. In 2016 Pakistan has small share of this market due to insufficient research services and lack of refined technologies and tactics. But in 2017 government of Pakistan work on nutraceutical products or functional products with new technologies and developed low cost product which is easily purchase by middle class customers which help to increase the market share of Pakistan in upcoming years. *Anwar et al 2011*. The term "Nutraceutical" was coined by merge the terms "Nutrition" and "Pharmaceutical" in 1989 by Dr. Stephen De Felice, Chairman of the Foundation for Innovation in Medicine. Nutraceutical (from nutrition + pharmaceutical) is a commercial term used for foods or food products that might help to prevent and treat diseases. The nutraceutical component may be considered a food or part of a food and provides medical or health benefits, encompassing, prevention and treatment of

diseases. Such products may range from isolated nutrients, dietary supplements and diets to genetically engineered "designer" foods, herbal products and processed foods such as cereals, soups and beverages. Nutraceutical (from nutrition + pharmaceutical) is a commercial term used for foods or food products that might help to prevent and treat diseases *Dolkar et al 2017*.

Nutraceutical are generally natural substances and, unlike drugs, are not substances synthesized for a certain purpose. Nutraceutical are also called functional foods, which are defined as "food products to be taken as part of the usual diet in order to have beneficial effects that go beyond basic nutritional function". Nowadays, Nutraceutical products are commonly trending in markets because they are formulated with natural resources, which does not embrace any chemical compounds or preservative which directly ramification human health. These products accorded positive impact and can be used as medicines or supplements which have attribute to avert diseases. *Patil et al 2016*. The main impetus of this project is to originate the idea of that product, worthy for the consumer health and easily accessible to them. In present, consumers have much awareness related to their health or diet and also are they have grip on different type of diseases and they were preferred those foods which ceased all that type of diseases without gifting any worse effects. Functional foods are elucidated as modified food as they claim to improve health and deliver serviceable effects. Functional foods are not counterpart of medicines as they can be maneuver in normal diet by consummated their daily nutrient requirement (*Hussain et al 2020*).

Functional foods are those foods which have an ability to reduce the risk of diseases and cure disease. it is more similar to conventional food/diet. Within a 1-decade functional food captures great market place. This terminology firstly used in japan in 1980. Functional foods cure many diseases such as it reduces the risk of cancer, lowering of body cholesterol, cardio vascular diseases and hypertension. Many other functional foods are design to cure different metabolic diseases. *Butnaria et al 2019*.

Water chestnut (*trapanatans*) is an aquatic dicotyledons plant commonly known as singhara. water chestnut (*trapanatans*) is free floating root plant belongs to family trapacea. commercially it is cultivated in Pakistan, India, Japan and Srilanka. It is used as a diet in many countries in boiled, roast form because it contains unique taste and nutty aroma. Water chestnut (*trapanatans*) possesses sufficient amount of carbohydrates, proteins vitamin especially vitamin A, C, D, B1 and minerals which make it more acceptable in nutritional point of view. it is used as inflammation treatment, sore throat treatment, urinary discharge fracture treatment, bronchitis treatment and Diabetic treatment. *Chaudhary et al 2012*. According to studies water chestnut (*trapanatans*) has numeric health benefits related to body health. From ancient time this is used as medicinal herb. According to modern pharmacological researches water chestnut (*trapanatans*) has immunomodulatory activity it shows great effects on cell mediate response. Due to anti-inflammatory activity, it suppresses activity of cytokinins. *Kim B et al 2015*. Beside all these properties physicochemical characteristics of water chestnut flour (WCF) is also good due to this reason it is used in many bakery products 'cookies, bread and crackers. water chestnut flour has high pasting properties. Resistant starch content and swelling capacity. *Mir et al 2014*. Moringa (*Moringaoleifera*) belongs to family moringacea. From flower to roots this plant has numerous health benefits. it is worldwide used by pharmacologist to cure many diseases such as diabetes, cancer, inflammation, hepatitis, fever, wound healing, osteoporosis and other metabolic disorders. *AbdullRazis et al 2014*. Moringa Leaves contains vitamins B12, D and C. It also contains phytoestrogens which is important for osteoporosis. According to study Epigallocatechin-3-gallate like flavonoids persuade bone nodule formation and bone mineralization. Moringa (*Moringaoleifera*) flower and fruit are abundant in various flavonoids and phytoestrogens. *Habib et al 2018*. *Sanganna C. et al. 2010*. Calcium is an important element which plays an important role for sustaining metabolic function of skeletal system. In human, absorption of calcium affected by availability of vitamin Organic calcium such as calcium gluconate and calcium lactate are very effective in calcium absorption in body. *Sunyecz et al 2008*. dairy source of calcium

is milk and its derivatives such as yogurt, cheese and kefir. While in non dairy source green leafy vegetables, seeds and fruits are common. *Omidvar, Nasrin et al. 2015.*

On the basis of literature research and studies, selection of water chestnut (*trapanatans*) and moringa leaves blend on the numerous health benefits and disease curing ability. Incorporation of moringa leaves powder (MLP) in water chestnut flour (WCF) products were enhance the amount of calcium as well as absorption of calcium in bones were also improve upon consumption. Due to high pasting property swelling capacity and gluten free characteristic, water chestnut (*trapanatans*) is used as flour for bakery and extruded dough making and incorporation of moringa leaves powder can improve dough functional properties and medicinal properties.

AIMS AND OBJECTIVES

1. To study the Medicinal properties of nutraceutical product based on water chestnut and moringa leaves blend.
2. To investigate the mechanism behind Health promoting activity of water chestnut (*trapanatans*) and moringa leaves based Product.
3. To study the sensory acceptability, nutritional composition and dimensional analysis of end product.

MATERIALS & METHOD:

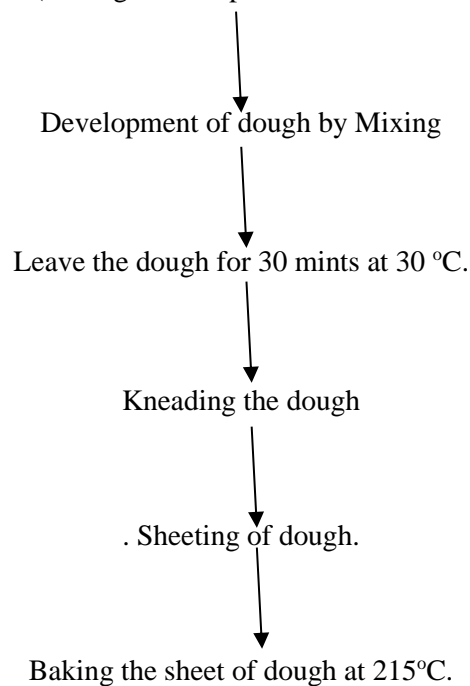
Plant material collection:

The moringa leaves powder water chest powder and wheat flour were procured from a local super market.

Product Development

The Flat bread were develop by using following steps

Weighing of raw material (moringa leaves powder + water Chestnut flour+ wheat flour)



Proximate analysis of product

✓Moisture analysis

Moisture content were determined by *Moisture Analyzer*.

✓Ash Content

Ash content were determined by *Twinomuhwezi et al 2020*.

✓Fat content

Fat content were estimated by *Twinomuhwezi et al 2020*.

✓Protein Content

Protein content were estimated by *Twinomuhwezi et al 2020*.

✓Carbohydrate analysis

Carbohydrate’s content was estimated by *Twinomuhwezi et al 2020*.

✓ Determination of calcium content

Calcium content were determined by *Twinomuhwezi et al 2020*

Table 1. Proximate analysis of product.

	Protein %	Fat%	Carbohydrate %	crude fibers %	Ash Content %	Moisture %
Control	9.58	0.94	74.20	0.36	0.94	12.67
Composite A	10.107	1.275	74.4855	0.9945	1.533	13.15
Composite B	10.401	1.665	73.248	1.528	1.731	13.181
Composite C	10.771	2.055	71.991	1.7225	2.0625	13.215
Composite D	11.103	2.445	70.734	2.085	2.394	13.249

Table 2. Determination of calcium content

	Calcium %	Phosphorus%	Magnesium %
Control	0.018	0.107	0.022
Composite A	0.2192	0.11375	0.0393
Composite B	0.441	0.1298	0.0566
Composite C	0.6518	0.12445	0.0739
Composite D	0.8626	0.1298	0.0912

Table 3. Sensory analysis of product

Samples	Color	Aroma	Appearance	Mouth feel	Over all acceptability
Control	9	8	9	9	9
Composite A	8	8	8	8	8
Composite B	8	8	8	9	8
Composite C	7	8	8	7	7.5

RESULT & CONCLUSION

The proximate analysis of product shows that protein content, ash content and fiber content were increased due to increase in concentration of moringa and waterchest addition in wheat flour. In this study, wheat flour was replaced with 5%, 10%, 15% and 20% of moringa leaves powder and 15 %, 20%, 25% and 30% of water chestnut powder to investigate of its effects on nutrient content and sensory attributes. Addition of moringa leaves powder and water chestnut powder improved bread nutrient profile. Breads baked with up to 20% moringa leaves powder and 30% water chestnut powder, were considered to be suitable as indicated by sensory evaluation. Samples substituted with 20% moringa leaves powder and 30% water chestnut powder had the high fiber content, ash content and protein content. The trend of nutraceuticals is increasing due to their health promoting effects. While the bioactive are known for their health promoting effect which are present in our products. The present study was also focus the physical chemical and functional interaction of phytochemicals and food additive with other micro & macro nutrients of the food chain system during processing, storage and consumption. Secondly the mechanism of the bioactive components is different which can provide different effect by individually or in combination, its impact on stability on end quality of products and its effect on human health. The research data strongly indicates its positive response against osteoporosis, inflammation, arthritis, and cell proliferation. Furthermore, the developments of such product were great market place due to its potential health benefits which is supportive for different researches in the field nutraceuticals, food supplements& pharmaceuticals.

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