

Development, Nutritional Quality and Sensory Evaluation of Iron Rich Garden Cress Cookies

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ABSTRACT

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Lepidium sativum, commonly known as garden cress is a fast-growing annual herb that is native to Egypt and West Asia, although it is now cultivated in the entire world. This study explored nutrient microbial and organoleptic quality of cereal-based cookies prepared using garden cress seeds. Seeds are considered to be galactagogue, also known as lactation inducer, food that promotes flow of mother's milk emmenagogue, a substance that stimulates menstrual flow, and recommended in inflammation, bronchitis, muscular pain and rheumatism. Amongst the various snack foods available, cookies seem to be the most widely eaten snack food around the world. Garden cress seeds rich in proteins, dietary fibre, omega-3 fatty acids, iron, other essential nutrients and phytochemicals. Cookies were prepared using ragi flour, rice flour, soybean flour, jaggery, nuts and garden cress seeds. Variations in the cookies were brought about by incorporating three different quantities (5g, 10g, and 15g) of garden cress seeds.

Keywords: *Lepidium sativum*, cookies, nutritional, organoleptic quality, phytochemicals

I. INTRODUCTION

Throughout human history, plants have played a key role in treating human diseases. In thousands of years

of trials many plants have been identified, which are good for treating ailments and curing serious health problems like cancer, diabetes and atherosclerosis etc. (Rana et al.,2011). Garden cress is commonly known as “Chandrashoor” in various Ayurvedic text of medieval India. The most reputed formulations which are commercially available are “Chaturbuja” which claims to possess a number of therapeutic properties including anti-inflammatory activities (Shail et al., 2016). Garden cress (*Lepidium sativum* Linn.) is an annual herb, belonging to Brassicaceae (Cruciferae) family. *Lepidium sativum* is a perennial food plant that grows quickly and is related to mustard and watercress. Ethiopia is the origin of this seed. About 150 species are found in the temperate and sub temperate area. It can grow in any climate and soil condition. The climatic condition of India is much favourable for the cultivation (Wadhawa et al., 2012). In India, it is mainly cultivated in UP, Rajasthan, Gujarat, Maharashtra and Madhya Pradesh (Agarwal and Sharma, 2013).

Garden cress seeds are rich source of protein, fat, iron, calcium and phosphorous as well as vitamins A, E, and C specially niacin, B6 and folic acid. Garden cress seed (*Lepidium sativum* Linn) is categorized under nuts and oil seeds by ICMR. The seeds contain 25.3 per cent protein, 24.5 per cent fat and provide 454 Kcal/100g. It is a good source of calcium (377 mg/100g), iron (100mg/100g), magnesium (430mg/100g) and other nutrients (thiamine,0.59mg/100g; riboflavin,0.61mg/100g; niacin, 14.3mg/100g) (Gopalan et al., 2009). Nutritive

value of the seeds show protein 25.5g, fat 24.5g, carbohydrate 33.0g, calcium 377 mg, phosphorous 723 mg, iron 100 mg, fibre 7.6g, carotene 27 mg, thiamine 0.59 mg, riboflavin 0.61mg, niacin 14.3 mg (Gopalan et al., 2010). It is the richest source of iron containing 100 mg of iron for 100 g of seeds (Gopalan et al., 2009; and Elizabeth and Poojara, 2014). The seeds of the indigenous plant have essential medicinal, physiological and nutritional role. The seeds are also used in the treatment of diarrhoea, respiratory disturbances, cough, bleeding piles and to anaemia (Chopra et al., 1956). Globally, anaemia affects 1.62 billion people, which corresponds to 24.8% of the population (WHO, 2009). According to the UNICEF (2012) iron deficiency anaemia affects over 60% of the adolescent girls in India. According to DLHS-3 survey in Himachal Pradesh, 43% women and 55% children are anaemic. Iron is necessary for synthesis of haemoglobin. Iron deficiency is thought to be the most common cause of anaemia globally (NHRM, 2014). Regular consumption of garden cress seed is very beneficial for postmenopausal women suffering from signs of cardiovascular disease, like high blood pressure and high cholesterol level.

Amongst the various snack foods available, cookies seem to be the most widely eaten snack food around the world. This study explored the nutrient microbial and organoleptic quality of cereal-based cookies prepared using garden cress seeds which is a rich source of iron. Cookies were prepared using ragi flour, rice flour, soybean flour, jaggery, nuts and garden cress seeds. Variations in the cookies were brought

about by incorporating three different quantities (5g, 10g, and 15g) of garden cress seeds.

II. OBJECTIVES

- To study nutritional, sensory and shelf-life characteristics of cookies enriched with garden cress seeds using qualitative and quantitative analysis techniques.
- To evaluate and sensory properties of cookie fortified using garden cress (*Lepidium sativum*) seeds to know the best addition from garden cress to prepare cookies high nutritional value.
- To modify biscuit using rice flour, soy flour, ragi flour with garden cress seeds and To standardize the ingredients for the development of food product.
- To estimate the cost of the product.

III. RESEARCH METHODOLOGY

The research project was carried out to analyse Nutritional and Sensory Attributes of Cookies Enriched with Garden cress seeds. The research was executed on 13-09-2023 in the research laboratory of SOMAS, Department of Nutrition and Health, GD GOENKA UNIVERSITY, Gurugram, Haryana.

Materials procurement

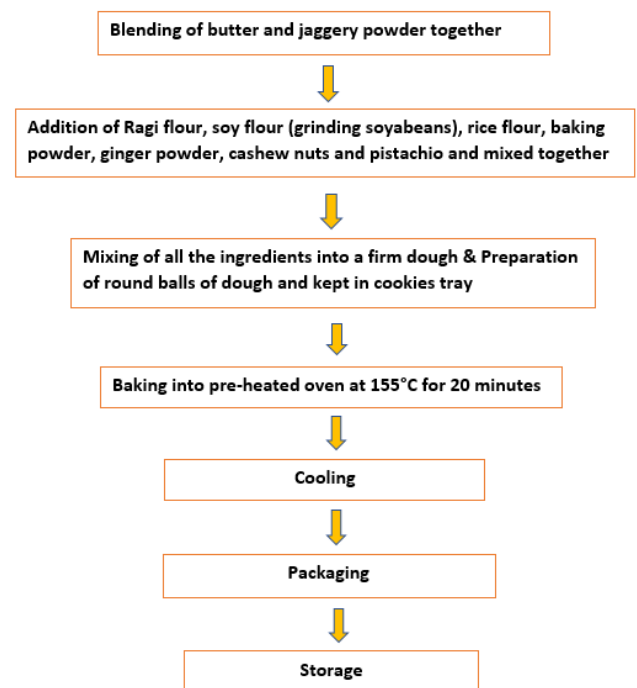
Garden cress seeds for the project was procured online. The ingredients for the cookie, such as soyabean, rice flour, ragi flour, as well as nuts, jaggery,

baking powder, milk, were procured from the local market of Gurugram, Haryana.

Development of cookies enriched with garden cress

Standardized formula of cookies, T0 contained 40 % Ragi flour, 30% soy flour, 35% jaggery powder, 30% butter and 30% rice flour. Cookies were developed using garden cress seeds. For the preparation of cookies, GCS were used at different levels. Enrichment of garden cress seeds in different samples of cookies were made at 5%, 10% and 15% level T1, T2, and T3 respectively.

Flow diagram for preparation of cookies



Formulation of cookies

Baked product cookies was formulated with incorporation of Garden Cress seeds at 5%, 10% and 15% levels on.

Standardization of recipes through incorporation

Cookies incorporated with 5%, 10%, and 15% percent levels of Garden cress seeds.

S.NO	INGREDIENTS	QUANTITY USED(in gms)
1.	Ragi flour	40 gm
2.	Soy flour	30 gm
3.	Rice flour	30 gm
4.	Jaggery powder	30 gm
5.	Baking powder	5 gm
6.	Butter	30 gm
7.	Milk	15 ml
8.	Ginger powder	5 gm
9.	Water	45 ml

Ingredients for the Preparation of 5%, 10%, 15% Level of Garden Cress Seeds Incorporated Cookies.

S.NO	INGREDIENTS	QUANTITY USED		
		5%	10%	15%
1.	Garden cress seeds	5 gm	10 gm	15 gm
2.	Ragi flour	40 gm	35 gm	30 gm
3.	Soy flour	30 gm	25 gm	20 gm
4.	Rice flour	30 gm	25 gm	20 gm
5.	Jaggery powder	30 gm	30 gm	30 gm
6.	Baking powder	5 gm	5 gm	5 gm
7.	Butter	30 gm	30 gm	30 gm
8.	Milk	15 ml	15 ml	15 ml
9.	Ginger powder	5 gm	5 gm	5 gm
10.	Water	45 ml	45 ml	45 ml

Organoleptic Evaluation of cookies

To evaluate the look, colour, taste, texture, and flavour of cookies including garden cress seeds, a total of 10 members’ semi-trained preference test panel

from the staff of SOMAS, Faculty of Nutrition and Health, GD Goenka University. Each panelist received a scorecard with a hedonic rating of nine points.

PANELIST RATING	HEDONIC	LIKING SCORE
Like Extremely		9
Like Very Much		8
Like Moderately		7
Like Slightly		6
Neither Like nor Dislike		5
Dislike Slightly		4
Dislike Moderately		3
Dislike Very Much		2
Dislike Extremely		1

Determination of nutritional content of garden cress seed enriched cookies

The parameters analysed were carbohydrates, protein and energy, dietary fiber, total fat, calcium, iron by AOAC procedures (1990). The total carbohydrate content was determined by difference method. Energy value of the product was calculated by multiplying the figure for percentage of protein, fat and carbohydrate.

$$\text{Energy value (Kcal/100 g)} = (4 \times \text{Protein \%}) + (9 \times \text{Fat \%}) + (4 \times \text{Carbohydrate \%})$$

Nutrient composition per 100 g serving

Category	Ragi flour	Soy flour	Rice flour	Jaggery	Garden cress seed	Pista chio	Cashew nut

					s		
Energy (kcal)	32	37	35	354	445.	539.9	583.
	1	7.7	6.6		6		2
Protein (g)	7.1	37.	7.9	1.85	23.3	23.35	18.7
	6	80	4		6		8
Fat (g)	1.9	19.	-	-	23.7	42.49	45.2
	2	42			4		0
Carbohydrates (g)	66.	10.	78.	84.8	33.6	15.82	25.4
	82	16	24	7	6		6
Calcium (mg)	36	19	7.4	107	318	135	34
	4	5	9				
Iron (mg)	4.6	8.2	0.6	4.63	17.2	4.50	5.95
	2	2	5		0		
Dietary fiber (g)	11.	2.8	22.	-	8.27	10.64	3.86
	18	1	63				

Cost evaluation of garden cress seed enriched cookies

Cost of all the samples of the garden cress seed enriched cookie was evaluated based on the current market price of raw ingredients used in the development of cookies.

Ingredients	Cost per 500 g	Amount used	Cost per amount used
Soy flour	115 Rs	30 g	7 Rs
Ragi flour	40 Rs	40 g	3 Rs
Rice flour	50 Rs	30 g	3 Rs
Jaggery	100 Rs	30 g	6 Rs
Cashew nut	429 Rs	10 g	8 Rs
Pistachio	649 Rs	10 g	2 Rs
Garden cress seeds	225 Rs	5 g	2 Rs

Butter	265 Rs	30 g	15 Rs
Ginger powder	350 Rs	5 g	3 Rs
Baking powder	254 Rs	5 g	2 Rs
TOTAL		195 g	51 Rs

IV.CONCLUSION

From the present study, it can be concluded that cookies developed from the enrichment of GCS had acceptable sensory attributes and also had improved nutritional profile in terms of macronutrients and micronutrients such as energy, proteins, fats, carbohydrates, iron and calcium. Thus, garden cress seeds enriched cookie which is high in energy and nutrients especially protein, iron and calcium can be preferred as a potential health snack to enhance the nutritious quality of the diet of children, adolescent and malnourished population without compromising much on the sensory attributes.

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