The Pharma Innovation Journal 2020; 9(7): 117-122

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2020; 9(7): 117-122

www.thepharmajournal.com
Received: 12-05-2020
Accepted: 14-06-2020

**Shekhara Naik R**
Department of Food Science and Nutrition, Yuvaraja's College [An Autonomous Constituent College under University of Mysore], Mysuru, Karnataka, India

**Sharada R**
Department of Food Science and Nutrition, Yuvaraja's College [An Autonomous Constituent College under University of Mysore], Mysuru, Karnataka, India

**Prakruthi M**
Department of Food Science and Nutrition, Yuvaraja's College [An Autonomous Constituent College under University of Mysore], Mysuru, Karnataka, India

**Devaki CS**
Department of Food Science and Nutrition, Yuvaraja's College [An Autonomous Constituent College under University of Mysore], Mysuru, Karnataka, India

**Mahesh MS**
Department of Food Science and Nutrition, Yuvaraja's College [An Autonomous Constituent College under University of Mysore], Mysuru, Karnataka, India

**Corresponding Author:**
**Mahesh MS**
Department of Food Science and Nutrition, Yuvaraja's College [An Autonomous Constituent College under University of Mysore], Mysuru, Karnataka, India

# Effect of different processing methods on the acceptability and keeping quality of burfi's prepared from Garden cress seeds [*Lepidium sativum* Linn]

**Shekhara Naik R, Sharada R, Prakruthi M, Devaki CS and Mahesh MS**

**Abstract**
Garden cress seeds is one of the potential oil seeds packed with good amount of nutrition especially iron [1 mg/g]. It is the richest source of non-heme iron can be used as potential natural iron fortificant to combat iron deficiency anemia. However, the bitterness of this seed decreases the acceptability of the final product due to the presence of phenolic compounds. Further, presence of polyphenols can reduce iron bioavailability. Soaking, germination, roasting and other cooking and processing methods are known to reduce total polyphenols and can thus enhance its acceptability and iron bio-availability. To study the effect of different processing methods on the acceptability and keeping quality of burfi's prepared from Garden cress seed flour [GCSF]. Garden cress seeds were subjected to three processing methods namely germination, roasting and soaking. Processed seeds were dried and powdered were used for product development. The developed products were tested for their sensorial attributes nutrition composition and storage stability. Further these developed burfi's were analysed for total phenolic, antioxidant activity and total flavonoids as well. Burfi's prepared from germinated GCSF had better acceptability compared to other processing methods when measured in a 9 point hedonic scale. Total polyphenols and flavonoids were reduced in burfi's prepared from germinated GCSF thus reducing their bitterness and increasing its acceptability. The keeping quality was also good in germinated garden cress seeds burfi. Germination process can reduce the bitterness, polyphenol content and other anti-nutritional factors which can enhance the acceptability of the products prepared from GCSF.

**Keywords:** Anaemia, burfi, Garden cress seeds, *Lepidium sativum*, polyphenols, germination

## 1. Introduction
Iron deficiency Anemia (IDA), a morbid condition, is a global concern that affects people of all age groups and is significant challenge in both developed and developing countries [1]. It increases risk of premature delivery and low birth weight, retards growth, impairs cognitive performance and reduces physical activity [2]. Iron deficiency can be caused not only by diets deficient in iron but by poor absorption of available dietary iron [3]. Dietary intervention approach is an effective method to combat iron deficiency anemia [4]. Food vehicles must be designed considering its synergistic effects with iron complexes for effective absorption and bioavailability [1]. Fortification or enrichment of iron into complex food matrix rich in fibres and polyphenols will reduce iron bioavailability. Enriching food or diet with simple food matrix with richest source of non-heme iron could be one of the effective strategy to effectively combat IDA.

Garden cress *(Lepidium sativum L.)* belonging to brassicacease family is a fast growing annual herb botanically related to watercress and mustard sharing their peppery, tangy flavour and aroma [5]. Also known by Chandrasur, and it is considered as an important medicinal crop in India and used in many traditional medicine [6]. Garden cress seed (GCS) possesses several of pharmacological properties like anti-anemic, antioxidant, galactogogues, etc. and has tremendous potential for the development of functional food by fortification with it [7, 8]. Garden cress seeds show many medicinal properties such as antidiabetic, hypocholesterolemic, antihypertensive, antidiarrheal, antispasmodic and laxative activities. It also has fracture healing, hepatoprotective, diuretic, and nephrocurative, and nephroprotective, antinflammatory, antipyretic and analgesic potential. Garden cress seed can be used as a promising multipurpose medicinal source [9].

The seeds of the garden cress comprise good amount of protein (23 - 25%) and almost equal amount of fat. It is an important source of iron, folic acid, calcium, vitamins C, E and A. It is a rich source of iron 'containing 100 mg iron/100g. Minerals like calcium (317 mg),

phosphorus. Vitamins like carotene, thiamine, riboflavin, niacin are abundantly present in cress seeds [10-13]. Since the seeds are rich in macro and micro nutrients, they have been supplemented in food products. Many supplementation studies have been conducted on garden cress seeds and its products which really produced good results. For instance, laddu [11, 14], chikki [11], cookies and muffins [15], dhokla mix [16], burfi [11], biscuits [11] and many more foods were prepared using different proportion of seeds. The products were analyzed for its nutritional value which was found to be improved with addition of seeds. But, the seeds also contain good amount of fibers (7 - 8 mg/100 g) and anti-nutritional factors like oxalates (33 mg/100 g) and phytates (1037 mg//100 g) which may interfere in the absorption of macro and micro nutrients. However, the processing reduces the anti-nutritional factors in the seeds.

Despite of being rich in nutrients, the seeds are not popular. Bitterness of the seeds due to high polyphenol content is one of the factors which significantly decrease its acceptability [17, 18] and bioavailability of minerals.

Burfi is one of the highly nutritious khoa based indigenous milk products with simple food matrix without anti-nutritional factors which can reduce mineral bioavailability [19, 20]. Thus, in this study the garden cress seeds were subjected to different processing techniques to examine the acceptability of the products prepared using these processed garden cress seed flour.

## 2. Methods and materials

### 2.1 Materials procurement

The raw materials such as garden cress seed, dates, desiccated coconut, jaggery and other ingredients which were required to prepare burfi was been procured from the local market of Mysuru, Karnataka.

### 2.2. Processing of garden cress seeds

The Garden cress seed was subjected to three methods of processing viz., Soaking, Germination and roasting.

**a. Soaked**: The seeds were cleaned and soaked for overnight, and then dried at ambient temperature (18-25 °C) for 4-5 days. Later, seeds were milled to produce fine texture powder.

**b. Germination:** The garden cress seeds were sorted and cleaned to remove impurities. The seeds were washed and drained. The seeds were spread on the muslin cloth and were kept at room temperature (18-25 °C) for 48 hours, and then dried at ambient temperature (18-25 °C) for 4-5 days. Later, seeds were milled to produce fine texture powder.

**c. Roasting:** The seeds were cleaned and roasted on a low flame for about 10 mins. Later, seeds were milled to produce fine texture powder.

### 2.3. Standardization and development of burfi [Table 1]

A. Standard burfi
B. Soaked Garden Cress Seed burfi
C. Germinated Garden Cress Seed burfi
D. Roasted Garden Cress Seed burfi

**Table 1:** Quantity of the ingredients used for burfis

| Ingredients | Quantity [g] | | | |
|---|---|---|---|---|
| | A | B | C | D |
| GCSF | 0 | 5 | 5 | 5 |
| Milk | 40 | 40 | 40 | 40 |
| Ghee | 15 | 15 | 15 | 15 |
| Jaggery | 10 | 10 | 10 | 10 |
| Desiccated coconut | 15 | 10 | 10 | 10 |
| Dates | 20 | 20 | 20 | 20 |

### 2.4. Preparation of burfi

Roast the garden cress seed powder with little amount of ghee and keep it aside

⇓

Boil the milk and reduce it into half the quantity

⇓

Add jaggery and allow it to melt

⇓

Incorporate Desiccated coconut, garden cress seed powder and chopped dry dates

⇓

Add remaining ghee with continuous stirring till the desired consistency is attained.

⇓

Pour it on a greased plate and cut into pieces.

### 2.5. Sensory analysis

The burfi's were served to semi trained panellists for organoleptic evaluation on a nine point hedonic scale, with score 9 as excellent and score 1 as disliking. Sensory evaluation was carried by 25 semi trained panel members. The sensory properties such as appearance, colour, consistency, flavour, taste and overall acceptability of finished product were evaluated on the basis of 9 point hedonic scale [21].

### 2.6. Estimation of nutritional parameters

The chemical parameters analyzed includes proximate composition, major minerals.

#### 2.6.1. Estimation of moisture [AOAC, 1980]

Moisture was determined by taking about 10 g of powdered sample in petri dish and dried in an oven at 60° C till the weight of the Petri dish was constant. Each time before weighing, the petri dish was cooled in desiccators. Moisture content of the sample was expressed in g/100 g of sample.

$$\text{Moisture content } \mathbf{[g/100\ g]} = \frac{\text{Initial weight [g]} - \text{final weight [g]}}{\text{Weight of sample [g]}} \text{ X } 100$$

**2.6.2. Estimation of total protein [AOAC, 1980]**
The protein content of the dried samples was estimated as per cent total nitrogen by micro kjeldhal method. Protein per cent was calculated by multiplying the per cent nitrogen by the factor 6.25. [Annexure 1]

$$\text{Protein [g/100 g]} = \frac{\text{Titre value x normality of HCl x 0.014 x 6.25}}{\text{Weight of sample (g)}} \text{X } 100$$

**2.6.3. Estimation of fat [AOAC, 1980]**
Fat content of the sample was estimated as crude ether extract using moisture free samples. The solvent was removed by evaporation and the residue of fat was weighed. [Annexure 2]

$$\text{Fat content} = \frac{\text{Weight of ether extract}}{\text{Weight of sample}} \text{X } 100$$

**2.6.4. Computation of carbohydrate [AOAC, 1980]**
Carbohydrate content was calculated by difference method.
**Carbohydrate [g/100 g]** = 100 – [protein [g] + fat [g] + fiber [g] + ash [g] + moisture [g]]

**2.6.5. Computation of energy [AOAC, 1980]**
Energy was computed as follows for all the samples.
**Energy [kcal]** = [protein [g] x 4] + [carbohydrate [g] x 4] + [fat [g] x 9]

**2.6.6. Estimation of total ash [AOAC, 1980]**
The ash content of the sample was obtained by dry ashing the samples completely over a flame followed by ashing in a muffle furnace for 4 hour at 600º C. this was expressed as g/100 g of the sample.

**2.6.7. Preparation of mineral solution**
The mineral solution was prepared by dissolving the ash obtained after ashing the samples in a muffle furnace in dilute hydrochloric acid.

**2.6.8. Estimation of iron**
The iron content of the sample was estimated by using atomic absorption spectrophotometer and the results were expressed in mg/100 g of the sample.

**2.7. Estimation of functional compound**

**a. Total polyphenols**
The content of total polyphenol in extracts was determined according to a modified Folin-Ciocalteu method [22]

**b. Antioxidant assay**
The samples were analysed for its antioxidant activity by DPPH assay [23]

**c. Total flavonoid**
Total flavonoid content was measured with the aluminium chloride colorimetric assay [24, 25]. Stability studies

**2.8. Storage stability of the burfis**
**a. Free fatty acids**
Acid value is the number of milligrams of KOH required to neutralize the free fatty acids present in one gram of the oil or fat [AOAC].

$$\text{Acid value as Oleic acid} = \frac{\text{ml of alkali} \times \text{N of alkali} \times \text{mol.wt of NaOH}}{\text{Weight of sample}}$$

**b. Acidity**
Take 1g of grated sample into conical flask and add 10ml of distilled water into it and stir it with glass rod. Add 2-3 drops of phenolphthalein indicator and titrate it against 0.1N NaOH till pale pink colour appears. Note down the burette reading.

$$= \frac{9 \times \text{Titre value} \times \text{Normality of NaoH}}{\text{Weight of the sample}}$$

**2.9. Statistical analysis**
All the data were presented in the form of mean ±SD. To test the significant difference between the organoleptic scores of the product Holm Sidak method was applied.

**3. Results and discussion**
Results of sensory evaluation are presented in Table 2. The burfi without garden cress seeds was best accepted with overall acceptability of 8.8 out of 9. The sensory attributes of burfi's with germinated GCSF was on par with the standard in almost all the attributes. Roasting didn't improve the acceptability. Burfi's prepared from GCS which were soaked had better sensory profile compared to roasting.

**Table 2:** Sensorial attributes of the developed burfi

| Sensory parameters | A | B | C | D |
|---|---|---|---|---|
| Appearance | 8.9±0.09 | 8.0±0.81* | 8.5 ± 0.07 | 7.6±0.66* |
| Color | 8.6±0.08 | 8.0±0.90* | 8.5± 0.10 | 7.9±0.69* |
| Texture | 8.7±0.03 | 8.2±0.65* | 8.7± 0.04 | 8.1±0.55* |
| Flavour | 8.8±0.05 | 8.0±0.09* | 8.6± 0.04 | 8.0±0.55* |
| Taste | 8.8±0.03 | 8.0±0.09* | 8.6± 0.05 | 7.9±0.63* |
| Overall acceptability | 8.8±0.03 | 8.1±0.07* | 8.6 ± 0.04 | 7.9±0.61* |

A. Standard burfi
B. Burfi from Soaked Garden Cress Seed flour
C. Burfi from Germinated Garden Cress Seed flour
D. Burfi from Roasted Garden Cress Seed flour
Values are mean ± SD [n=25]
Data analyzed by Holm Sidak method, * p≤0.05

**Table 3:** Nutritional evaluation of Burfi's prepared from Garden cress seed flour from different processing methods

| Proximate [g/100 g] | A | B | C | D |
|---|---|---|---|---|
| Moisture | 19±0.09 | 18.05±0.8 | 18.8± 0.07 | 16.35±0.66* |
| Fat | 31±0.08 | 34±0.90 | 32± 0.10 | 38.8±0.69* |

| | | | | |
|---|---|---|---|---|
| Protein | 2.48±0.03 | 2.73±0.15 | 2.81± 0.14 | 3.1±0.55 |
| Carbohydrate | 46.82±5.05 | 44.47±7.09 | 45.64±6.04 | 40.2±4.55* |
| Ash | 0.7±0.03 | 0.83±0.09* | 0.75± 0.05 | 0.83±0.03* |
| Energy | 476.28±9.03 | 494.88±8.07 | 481.8±10.04 | 530.4±12.61* |

A. Standard burfi
B. Burfi from Soaked Garden Cress Seed flour
C. Burfi from Germinated Garden Cress Seed flour
D. Burfi from Roasted Garden Cress Seed flour
Values are mean ± SD [n=3]
Data analyzed by Holm Sidak method, * p≤0.05

Nutritional composition of the burfi's prepared from GCSF from different processing methods is presented in the table 3. There's not much difference between the burfi prepared from GCSF of different processing methods except slightly less in roasted GCSF. Even in terms of protein, fat and energy, similar trend was evident. On contrary CHO content was reduced in the sample D.

**Table 4:** Calcium and Iron content of Burfi's prepared from Garden cress seed flour from different processing methods

| Proximate [mg/100 g] | A | B | C | D |
|---|---|---|---|---|
| Calcium | 200.30±10.9 | 212.52±8.1 | 251.10±9.07* | 210.52.±10.66* |
| Iron | 10.5±0.88 | 15.2±0.90* | 16.5± 1.10* | 15.5±1.69* |

A. Standard burfi
B. Burfi from Soaked Garden Cress Seed flour
C. Burfi from Germinated Garden Cress Seed flour
D. Burfi from Roasted Garden Cress Seed flour
Values are mean ± SD [n=3]
Data analyzed by Holm Sidak method, * p≤0.05

Calcium and Iron content of Burfi's prepared from Garden cress seed flour from different processing methods is presented in the table 4. There's not much difference in levels of calcium except in burfi from germinated GCSF which was increased by 20%. In terms of iron, addition of GCSF increased iron content of all the burfi.

**Table 5:** Total polyphenols, Total Flavonoids and Antioxidant activity in the burfis prepared from Garden cress seed flour from different processing methods

| Ingredients | Quantity [g] | | | |
|---|---|---|---|---|
| | A | B | C | D |
| Total Polyphenol [mg catechol / 100 ml] | 156.5±15.2 | 132±17.9 | 99±13.2* | 132±19.3 |
| Antioxidant activity | 72±17.5 | 77.5±19.1 | 96.2±8.2* | 43±6.5* |
| Total Flavonoids | 671±55.8 | 519±64.4 | 447.5±38.4* | 650±56.5 |

A. Standard burfi
B. Burfi from Soaked Garden Cress Seed flour
C. Burfi from Germinated Garden Cress Seed flour
D. Burfi from Roasted Garden Cress Seed flour
Values are mean ± SD [n=3]
Data analyzed by Holm Sidak method, * p≤0.05

The total polyphenol content in burfi prepared from GCSF is depicted in the table 5. It is evident that the processing methods reduced the polyphenols and total flavonoid content. However antioxidant activity was increased in germinated GCSF.

**Table 6:** Storage stability [free fatty acid] studies of burfi prepared from Garden cress seed flour from different processing methods

| S. No. | Days of storage | Free fatty acid mEq/l | | | |
|---|---|---|---|---|---|
| | | A | B | C | D |
| 1. | 0$^{th}$ day | 3.25±0.05 | 3.05±0.05 | 3.38±0.005 | 3.27±0.01 |
| 2. | 5$^{th}$ day | 3.43±0.01 | 3.15±0.05 | 4.05±0.05 [a] | 3.27±0.01 |
| 3. | 10$^{th}$ day | 3.51±0.01 | 3.43±0.005 | 4.47±0.01 [a] | 3.66±0.015 |
| 4. | 15$^{th}$ day | 3.9±0.005 | 3.48±0.01 | 4.4±0.1[a] | 3.87±0.01 |

A. Standard burfi
B. Burfi from Soaked Garden Cress Seed flour
C. Burfi from Germinated Garden Cress Seed flour
D. Burfi from Roasted Garden Cress Seed flour
Values are mean ± SD [n=3]
Data analyzed by Holm Sidak method, * p≤0.05

**Table 7:** Storage stability [Alcoholic acidity] studies of burfi prepared from Garden cress seed flour from different processing methods

| S. No. | Days of storage | Acidity mEq/l | | | |
|---|---|---|---|---|---|
| | | A | B | C | D |
| 1. | 0th day | 0.45±0.005 | 0.45±0.005 | 0.45±0.005 | 0.45±0.005 |
| 2. | 5th day | 0.46±0.005[d] | 0.47±0.01 | 0.47±0.01 | 0.47±0.01 |
| 3. | 10th day | 0.48±0.005 | 0.5±0.01 | 0.47±0.005 | 0.48±0.005 |
| 4. | 15th day | 0.51±0.005 | 0.54±0.01 | 0.5±0.01 | 0.49±0.01[d] |

A. Standard burfi
B. Burfi from Soaked Garden Cress Seed flour
C. Burfi from Germinated Garden Cress Seed flour
D. Burfi from Roasted Garden Cress Seed flour
Values are mean ± SD [n=3]
Data analyzed by Holm Sidak method, * p≤0.05

**Table 8:** Microbiological analysis of burfi on studies of burfi prepared from Garden cress seed flour from different processing methods on 15th day

| Microorganisms | A | B | C | D |
|---|---|---|---|---|
| Yeast / mold | Nil | Nil | Nil | Nil |
| Coliform | Nil | Nil | Nil | Nil |
| TPC | 1900 | 2500 | 2100 | 500 |

A. Standard burfi
B. Burfi from Soaked Garden Cress Seed flour
C. Burfi from Germinated Garden Cress Seed flour
D. Burfi from Roasted Garden Cress Seed flour

The prepared GCS burfis were subjected to storage study and the results of the same is depicted in the tables 6, 7 and 8. The experiment were conducted for every 5th day for a period of 15 days. There was a gradual increase in the acidity and the free fatty acid content at the end of storage period. There's not much difference in any of the storage parameters with different processing methods except slight increase in free fatty acid on 10th day in germinated GCSF.

**Discussion**

Anaemia is the most common form of malnutrition, affecting approximately 1.6 billion people world-wide. As the most prevalent micronutrient condition in the world it is critical that there is a strong understanding of how to improve iron intake. Iron supplementation, mostly with a therapeutic orientation, has been a key strategy for the short-term control of iron deficiency and ferropenic anemia. It has been used almost exclusively in antenatal clinics, but in spite of its confirmed efficacy in supervised trials, it has proven ineffective in practice in most developing countries. Poor effectiveness has been attributed to various factors including insufficient dose and time of supplementation and poor adherence [26]. Fortification or enrichment of foods with complex food matrix or ingredient which is used in preparation of dishes wherein there's loss during preparation may not be very prudent strategy. It is advisable to enrich the food stuff like snack item which will ensure the compliance and adherence to combat anemia. Burfi is one such snack item with simple food matrix without any fibre or polyphenols or other anti-nutritional factors which can reduce iron bioavailability.

Garden cress seed is an important food stuff loaded with nutrients as well as health enhancing properties and is the richest source of nonheme iron [28]. Its high nutritive value and cheaper availability makes it possible for people of all sections of the society to include them in their diets and enhance the nutritive quality of their meals [15]. Development of recipes for adolescents is an emerging area of interest, especially the modification and enrichment of snacks. Incorporation of Garden cress seed in foods have shown marked increased in the iron and protein content [27]. Since IDA is highly prevalent problem among the reproductive women in India (NIN, 2010) particularly adolescent girls it is appropriate to enrich energy rich snack item with Garden cress flours.

Although GCS is high in iron, it also contains lot of iron chelating polyphenols which also makes the GCSF bitter to taste [29, 30]. Several processing methods have shown to reduce the bitterness and polyphenols which can thus make them taste better. In this study it was found the processing methods does have effect on the acceptability of the product prepared. Both soaking and germination reduced the total polyphenol content there by enhancing their palatability. Further, reduction in these polyphenols may increase iron bioavailability. Processing methods did not had any significant effect on the storage stability of prepared product. Thus it can be concluded that the using different processing methods, the bitterness of the GCSF can be reduced and increase the acceptability of the product developed with them. Flour from germinated GCS can be used partially in any preparation to enhance the iron content of any product without affecting any sensorial attributes and may thus serve as an effective tool to combat IDA.

**5. References**


1. Shubhum KT, Anukiruthika SD, Kashyap Jeyan AV, Moses A and Anandha Ramakrihnan C [2020] Iron deficiency anemia: A comprehensive review on iron absorption, bioavailability and emerging food fortification approaches Trends in Food Science & Technology. 2020; 99:58-75.
2. Nuzhat Huma, Salim-Ur-Rehman, Faqir Muhammad Anjum, M Anjum Murtaza, Munir A Sheikh Food Fortification Strategy--Preventing Iron Deficiency Anemia: A Review Crit Rev Food Sci Nutr. 2007; 47(3):259-65.
3. M Layrisse 1, M N García-Casal Strategies for the Prevention of Iron Deficiency through Foods in the Household Nutr Rev. 1997; 55(6):233-9. doi: 10.1111/j.1753-4887.1997.tb01610.x.
4. Preeti Chaudhary, Radhna Gupta Formulation and sensory evaluation of iron rich recipes using garden cress seeds [*Lepidium sativum*] International journal of food and Nutrition sciences 2017; 6(2):25-33.
5. Malleshi N, Guo M. Chemical composition of garden cress seeds and its fractions and use of bran as a functional ingredient, Indian Journal of Traditional knowledge. 2004; 12(4):105-111.
6. Chandra Shekhar Singh, Vinod Kumar Paswan. The Potential of Garden Cress [*Lepidium sativum* L.] Seeds

for Development of Functional Foods Advances in Seed Biology [http://dx.doi.org/10.5772/intechopen.70355] 279-294
7. Williams DJ, Critchley C, Pun S, Chaliha M, Timothy JO. Differing mechanisms of simple nitrile formation on glucosinolate degradation in Lepidium sativum and Nasturtium officinale seeds. Phytochemistry. 2009; 70:1401-1409.
8. Mali RG, Mahajan SG, Mehta AA. Lepidium sativum [garden cress] a review of contemporary literature and medicinal properties. Oriental Pharmacy and Experimental Medicine. 2007; 7(4):331-335.
9. Eddouks M, Nutrititional, elemental analysis and antioxidant activity of Garden cress seeds, International Journal of Pharmaceutical science. 2005; 4:390-395.
10. Balasubramanian, Nutritive value of Indian food, National Institute of nutrition ICMR, Hyderabad, 2009.
11. Jain T *et al*. Development and Sensory Evaluation of Ready to Eat Supplementary Food Using Garden Cress [*Lepidium sativum*] Seeds. Journal of Applied and Natural Science. 2016; 8(3):1501-1506.
12. Jain T *et al*. Effect of Processing on Nutrients and Fatty Acid Composition of Garden Cress [*Lepidium sativum*] Seeds. Food Chemistry. 2016; 213:806-812.
13. Longvah T *et al*. Indian Food Composition Tables National Institute of Nutrition, Indian Council of Medical Research, Ministry of Health and Family Welfare, Government of India, Hyderabad, India, 2017.
14. Angel M, Devi KPV. Therapeutic impact of garden cress seeds incorporated ladoo among the selected anaemic adolescent girls [12-15 years]. Journal of Drug Delivery and Therapeutics. 2015; 3(25):18-22.
15. Elizabeth KGG, Poojara RH. Organoleptic attributes of garden cress seed incorporated snacks suitable for adolescents. International Journal of Food and Nutritional Sciences. 2014; 3(6):126-129.
16. Lohekar AS, Arya AB. Development of value-added instant 'dhokla' mix. International Journal of Food and Nutritional Sciences. 2014; 3(4):78-83.
17. Tanu Jain. Garden Cress Seeds: Its Pros and Cons. Acta Scientific Nutritional Health. 2018; 2(1):01-02.
18. Tanu Jain, Kiran Grover, Navjot Kaur Gill. Effect of Supplementation of Garden Cress Seeds on The Amino Acid and Fatty Acid Composition of Ready to Eat Traditional Foods, International Journal of Applied Home Science. 2017; 3(11-12):412-421.
19. Charis Kharkongor Ripnar, Umadevi S, Hiremath Anitha S. Formulated Nutri-Dense Burfi and Its Physico-Chemical Components. Journal of Food and Nutrition Sciences, 2015, 15.
20. Chetana R, Ravi R, Yella Reddy S. Effect of processing variables on quality of milk burfi prepared with and without sugar Journal of Food Science and Technology. 2010; 47(1):114-118.
21. Devaki CS, Premavalli KS. Development of bitter gourd fermented beverage using response surface methodology. J. Phar. Nutri. Sci. 2012; 2(1):94-103.
22. Singleton VL, Rossi JA. Colorimetry of total phenolics with phosphomolybdic-phosphotungstic acid reagent. American Journal of Enology and Viticulture. 1956; 16:144-158.
23. Shekhar, Anju. Antioxidant Activity by DPPH Radical Scavenging Method of *Ageratum conyzoides* Linn. Leaves. American Journal of Ethnomedicine. 2014; 1(4):244-249.
24. Patel A, Patel A, Patel A, Dr. Patel NM. Estimation of flavonoid, polyphenolic content and in vitro antioxidant capacity of leaves of *Tephrosia purpurea* Linn. [Leguminosae]. Int J Pharma Sci and Res. 2010; 1(1):66-77.
25. Pallab K, Tapan B, Tapas P, Ramen K. Estimation of total flavonoids content [TPC] and antioxidant activities of methanolic whole plant extract of Biophytum sensitivum Linn. Journal of Drug Delivery and Therapeutics, 2013; 3(4):33-37.
26. Viteri FE, Iron supplementation for the control of Iron deficiency in population at risk. Nutr Rev. 1997; 55(6):195-209.
27. Nathiya M, Nora Vigasini. Formulation of Cereal Based Nutricookies Prepared Incorporating Garden Cress Seeds [*Lepidium sativum*] A Protein and Iron Rich Snack IJSR International Journal of Scientific Research. 2014; 3(2).
28. Shail, Dwivedi Manjari, Kumar Neeraj Gupta LN. Nutritional importance of *Lepidium sativum* L. [Garden cress/ Chandrashoor]: A Review. International Journal of Pharmacy and Analytical Research. 2016; 5(1):152-160.
29. Snehal Doke, Manisha Guha. Identification of Extraction Conditions for Determination of Phenolic Contents of Garden Cress Seed [*Lepidium sativum* L.] and Its Milled Fractions. Food analytical methods, 2014.
30. Susana Soares, Susann Kohl, Sophie Thalmann, Nuno Mateus, Wolfgang Meyerhof, and Victor De Freitas Different Phenolic Compounds Activate Distinct Human Bitter Taste Receptors. Journal of Agricultural and Food Chemistry. 2013; 61:1525-1533.