In the present study, a variation of dried lentil dumplings has been made through the utilization of cauliflower. Several trials coded from T1 to T7 were performed. Sensory parameters such as colour, odour, taste, texture and overall acceptability were evaluated for samples using a 5-points hedonic scale. Sensory evaluation revealed the most acceptable sample as T2 with 85g and 15g of moong dal and cauliflower respectively. It was observed that sensory scores varied significantly in terms of odour while slight changes were noted for other attributes.

**Keywords:** Lentil dumplings, Badi, Moong dal, Cauliflower, Drying, Sensory
**Introduction**

Dried lentil dumpling is a popular food product aboriginal to the Indian culinary. India being a multilingual country; this traditional food in India is known with many regional names such as badi, wadi/vadi, bari, rakhiya badi, mangodi. The authentic food is a blend of pulse, vegetable, spice. The versatile use of badi in the preparation of a variety of meals is noteworthy.

Pulses are chief constituents of the human diet and are regarded as "poor man’s meat". Pulses play a vital role in cereal-based diets. They are inexpensive and valuable sources of micronutrients/vegetable protein (1) Moong dal a well-known staple pulse of the Indian diet is extensively rich in protein, dietary fibre and provides considerable amounts of carbohydrates and fats. They offer appreciable amounts of vitamins and minerals. Moong dal (100g) contains 324 calories, 24g of protein, and 53g of carbohydrates, 1g of fat and 9g of dietary fibre (2). The various processing methods tend to reduce the anti-nutritional factors in moong dal thus, enhance the digestibility, bioavailability and are said to improve the overall acceptability (3). Soaking reduces anti-nutritional substances and flatulence causing compounds (4). Soaking facilitates cooking time (5) and increases slowly digestible starch (6). Drying reduced the moisture content and thereby increased the nutritional quality.

Cauliflower is one of the majorly consumed vegetables. Cauliflower (Brassica Oleracea) is a rich source of fibre, carotenoids and other health-promoting compounds (7). It contains substantial amounts of phytochemicals such as indole-3-carbinol, L-ascorbic acid and glucosinolates (2). Glucosinolates upon metabolization exhibit anti-carcinogenic properties. Cauliflowers also possess ample amounts of minerals such as phosphorous, calcium and potassium (8). Studies on the application of processing methods reported insignificant changes in the nutritional value of cauliflower (7). Drying of cauliflower significantly improved the storage life by an immense reduction in moisture (8)

Spices and condiments are a vital part of Indian cuisine. They provide decent amounts of micronutrients. Spices and condiments are generally added to foods to enhance flavour/taste,

To improve palatability and nevertheless are consumed for its therapeutic and pharmacological value. In addition to this, spices possess anti-bacterial and anti-microbial properties (1)

**Objectives**

- To develop ameliorated dried lentil dumplings
- To evaluate the sensory properties of the product

**Materials and Method**

The raw materials required for the preparation of dried lentil dumplings were procured from the local stores of Hyderabad. Raw materials were thoroughly washed and rinsed with water to remove impurities. The process for the preparation of dried lentil dumplings is presented below in the flow diagram. The prepared dumplings were later packed and stored in a sealed plastic bag for further evaluation.

Figure 1: a) thick paste of badi b) badi kept for drying c) dried badi
Dried Lentil Dumplings

**Sample design**

The product is formulated with cauliflower in counter to moong dal at different levels (as given in table 1). The coded samples (T1 to T7) were then evaluated for different sensory characteristics to attain the desirable product.

```
DRIED LENTIL DUMPLINGS
Soak moong dal and cumin seeds (4hrs)  
Grind soaked moong dal  
Addition of cauliflower, spices  
Mix thoroughly  
Spread uniformly on a cloth  
Sundry (3-4 days)  
Pack and store in a sealed bag
```

Sensory evaluation of dried lentil dumplings was conducted by panel members with good health from the department of food and nutrition with dietetics, sun international institute of tourism and management. The samples coded from T1 to T7 were served to the panellists with written instructions for evaluation based on colour, odour, taste, texture and over acceptability. Sensory evaluation was carried out to select the most acceptable sample with a 5-point hedonic scale with 5 indicating 'like extremely' and 1 indicating 'dislike extremely'.

**Result and discussion**

The results acquired from the sensory profile revealed significant changes among the samples. Table 2 provides the varying sensory scores obtained by all the samples. The scores of the most acceptable sample (T2) in terms of colour, odour, taste, texture, overall acceptability are 4.0, 3.7, 4.6, 4.5, and 4.2 respectively. All the samples have obtained good scores for colour, taste and texture; while odour acquired relatively low scores which influenced the overall acceptability of the product.

The results of the sensory analysis are further discussed in detail.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Colour</th>
<th>Odour</th>
<th>Taste</th>
<th>Texture</th>
<th>Overall acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>3.6</td>
<td>3.7</td>
<td>3.9</td>
<td>4.3</td>
<td>3.8</td>
</tr>
<tr>
<td>T2</td>
<td>4.0</td>
<td>3.7</td>
<td>4.6</td>
<td>4.5</td>
<td>4.2</td>
</tr>
<tr>
<td>T3</td>
<td>4.3</td>
<td>3.2</td>
<td>4.2</td>
<td>4.3</td>
<td>4.0</td>
</tr>
<tr>
<td>T4</td>
<td>4.5</td>
<td>2.6</td>
<td>4.5</td>
<td>3.9</td>
<td>3.8</td>
</tr>
<tr>
<td>T5</td>
<td>4.2</td>
<td>2.3</td>
<td>4.3</td>
<td>3.6</td>
<td>3.5</td>
</tr>
<tr>
<td>T6</td>
<td>4.1</td>
<td>1.4</td>
<td>3.8</td>
<td>3.6</td>
<td>3.2</td>
</tr>
<tr>
<td>T7</td>
<td>3.8</td>
<td>1.1</td>
<td>3.7</td>
<td>3.4</td>
<td>2.9</td>
</tr>
</tbody>
</table>

Table 2: sensory profile of dried lentil dumplings

**Colour**

The colour of the samples was bright yellow and it was found to be visually appealing. It was observed that the samples T3, T4, and T5 have obtained relatively high score than T1, T2, T6 and T7. The variation in the colour was influenced by different proportions of cauliflower. (9) have shared similar thoughts in their study.

**Odour**

Sensory scores were significantly affected based on the odour of the samples. It is noted that there is a gradual drop in the scores of the prepared samples. The characteristic odour is believed to be

---

**Table 1: product formulation**

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Moong dal (g)</th>
<th>Cauliflower (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>90</td>
<td>10</td>
</tr>
<tr>
<td>T2</td>
<td>85</td>
<td>15</td>
</tr>
<tr>
<td>T3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>T4</td>
<td>75</td>
<td>25</td>
</tr>
<tr>
<td>T5</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>T6</td>
<td>65</td>
<td>35</td>
</tr>
<tr>
<td>T7</td>
<td>60</td>
<td>40</td>
</tr>
</tbody>
</table>
Associated with the addition of cauliflower. Glucosinolates: are the naturally occurring compounds responsible for its odour (10) Therefore, it could be stated that with the increase in the amounts of cauliflower, samples have obtained minimum scores.

**Taste**

The taste of all the samples was preferably good but slightly changed the sensory scores. Samples T2 and T4 have obtained relatively high scores in comparison with T1, T3, T5, T6 and T7.

**Texture**

The textural properties of the samples were severely affected by drying. It can be noted that the samples T1, T2 and T3 obtained maximum scores compared to T4, T5, T6 and T7. The samples were satisfactorily brittle. The minute changes in texture could be due to the varying ratios of the ingredients.

**Overall acceptability**

Colour, odour, taste and texture have significantly influenced the overall acceptability of the samples. It can be observed that T2 obtained the maximum score while T7 has obtained the least score. However, the sensory profile of the samples reveals the most acceptable sample to be T2 with 4.2 as its hedonic rating. In a study conducted by (11) which used defatted soy flour and drumstick leaf powder sensory scores have been obtained in close proximity for the desired product based on a 9-point hedonic scale.

![Figure 2: statistical data on sensory attributes of dried lentil dumplings](image)

**Conclusion**

The present study assessed the effect of utilizing Cauliflower in dried lentil dumplings. Several trials have been performed by varying the proportions of the ingredients. It was observed that increasing the amounts of cauliflower has developed an unpleasant odour and adversely affected the sensory profile.

The sensory evaluation has revealed T2 as the most acceptable sample with 4.2 as the overall acceptability. It was observed that high scores were obtained by T4 in terms of colour and T1 and T2 in terms of odour. However, T2 obtained the maximum scores for taste, texture and overall acceptability.

From the results, it may be concluded that cauliflower can be utilized up to an extent of 15g. Considering the therapeutic value of cauliflower, it can be stated that the utilization of cauliflower can be effective in improving the health of the consumers. Due to the product’s nutrient density, dried lentil dumplings can be useful in combating several lifestyle diseases including diabetes, obesity and heart diseases. As a rich source of dietary fibre, dried lentil dumplings can improve the gut health of individuals.

**Reference**

01. Gopalan C, 1918-, Rama Sastri B v. , Balasubramanian SC. Nutritive value of Indian foods [Internet]. National Institute of Nutrition, Indian Council of Medical Research; 1971 [cited 2021 Mar 18]. Available from: [Article] [Crossref] [PubMed] [Google Scholar]

02. Volden J, Bengtsson GB, Wicklund T. Glucosinolates, L-ascorbic acid, total phenols, anthocyanins, antioxidant capacities and colour in cauliflower (Brassica oleracea L. ssp. botrytis); effects of long-term freezer storage. [Crossref] [PubMed] [Google Scholar]


04. Widjajaseputra *, Widyastuti AI, Trisnawati TEW. Potency of mung bean with different soaking times as protein source for breastfeeding women in Indonesia. Journal
Dried Lentil Dumplings

01. homepage. 2019;3(5):501–5. [Crossref] [PubMed] [Google Scholar]

02. Deraz SF, Khalil AA. Strategies to Improve Protein Quality and Reduce Antinutritional Factors in Mung Bean. [Crossref] [PubMed] [Google Scholar]

03. Kaur H, Gill BS, Karwasra BL. In vitro digestibility, pasting, and structural properties of starches from different cereals. International Journal of Food Properties [Internet]. 2018 Jan 1 [cited 2021 Mar 18];21(1):70–85. Available from: [Article] [Crossref] [PubMed] [Google Scholar]


08. Pareek N, Chaudhary R, Bisla G. Nutritional and sensory evaluation of papad and badi enriched with defatted soy flour and drumstick leaves powder. 2011;6(1):69–72. [Crossref] [PubMed] [Google Scholar]