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DEVELOPMENT AND EVALUATION OF PUMPKIN ORANGE BASED JELLY

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ABSTRACT

The objective of this study was to develop pumpkin-based jelly and evaluate its sensory and nutritional properties. The jelly was prepared by combining pumpkin and orange in different ratios: T1 (75:15), T2 (70:20), and T3 (65:25). Sensory evaluation for suitability of consumption was conducted using a nine-point hedonic scale. Proximate analyses, including moisture, ash, and protein content, were performed following AOAC 2010 nutritional guidelines. Vitamin C and carotenoid content for all treatments were also analyzed using a modified AOAC method.The results indicated that all formulations were acceptable based on sensory scores. Among them, T3 (65g pumpkin + 25g orange + 8g sugar + 2g pectin) exhibited superior nutritional composition compared to T1 and T2. The nutritional profile of T3 included moisture (26.21%), ash (3.69g), protein (1.4g), fat (0.14g), carotenoids (36.2 mcg), crude fiber (0.49g), and vitamin C (22.4%).

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INTRODUCTION

Pumpkin (*Cucurbita sp.*) is a significant vegetable belonging to the family *Cucurbitaceae*. It is a versatile and nutrient-rich crop cultivated for centuries across diverse cultures worldwide. Pumpkins are an excellent source of carbohydrates, dietary fiber, and essential minerals, including calcium, phosphorus, and zinc. They also provide vitamins such as tocopherol (vitamin E), β-carotene (a precursor to vitamin A), and B vitamins. In addition to its nutritional profile, pumpkin offers numerous health benefits, contributing to its therapeutic potential (Caili *et al*., 2006). It contains bioactive compounds like flavonoids, phenolic acids, and lignans, which exhibit anti-inflammatory, antimicrobial, anticancer, and immunomodulatory properties, playing a crucial role in disease prevention. Rich in antioxidants like β-carotene, vitamin C, and vitamin E, pumpkin helps protect cells from oxidative stress caused by free radicals, thereby lowering the risk of chronic diseases such as cardiovascular conditions, certain cancers, and age-related macular degeneration. The vibrant yellow to orange hue of pumpkin flesh is due to its high β-carotene content, essential for maintaining healthy vision, supporting immune function, and promoting skin health (Boileau *et al*., 1999). In recent years, pumpkin has gained significant attention in the food processing industry for its health-promoting and nutritional attributes. Various studies highlight the incorporation of pumpkin flour in bakery products, soups, sauces, instant noodles, pasta, and flour mixes as a partial replacement for cereals. Despite its immense potential, pumpkin remains underutilized in commercial food product development. Orange (*Citrus sinensis*), a widely cultivated fruit of the *Rutaceae* family, is believed to have originated in Southeast Asia and is now grown in tropical and subtropical regions worldwide. The evergreen orange tree can reach up to 10 meters in height, featuring glossy green leaves and fragrant white flowers. Its fruit, a type of berry known as a hesperidium, has a leathery rind and a juicy, segmented interior. Oranges are renowned for their high vitamin C content, which supports immune health, enhances skin vitality, and acts as a powerful antioxidant. They also provide dietary fibre, folate, and potassium, making them a valuable addition to a balanced diet. The fruit's vibrant colour and sweet-tart flavour make it popular for fresh consumption, as well as juicing, baking, and cooking. Depending on the variety and growing conditions, oranges mature over 7 to 12 months. Globally, oranges are a significant commercial crop, with major producers including Brazil, the United States, China, and India. In addition to fresh consumption, oranges are widely processed into juice, marmalade, and flavouring's, reflecting their versatility and global appeal. The rich nutritional profile and diverse uses of oranges have cemented their status as one of the world's most popular and economically valuable fruits. This version corrects grammatical errors, improves clarity, enhances flow, and provides a more precise description of the nutritional and economic importance of pumpkins and oranges.

MATERIALS AND METHODS

***Experimental site*:** The present investigation was carried out in the Nutrition Research Laboratory of Department of Food Nutrition and

Public Health Ethelind College of Community Sciences, Sam Higginbottom University of Agriculture Technology and Science, Prayagraj.

Procurement of Raw Material: The raw materials for preparation of jelly, pumpkin, orange and sugar and other ingredients required for study were purchased from the local market and chemical required for study were parches from lab of local market.

Take pumpkin and orange
↓
Washing
↓
Cutting into thin slice/cubes
↓
Boiling with water(20-30min)
↓
Addition of sugar
↓
Boiling (addition of gelatine)
↓
Removal of foam
↓
Cool/shape/Packaging
↓
Storage of ambient temperature

Product Name	Ingredients	Experimental Treatments			Replication
		T_1	T_2	T_3	
Pumpkin orange jelly	Pumpkin	75	70	65	5
	orange	15	20	25	
	Sugar	8	8	8	
	galetin	2	2	2	

Procedure: Making pumpkin jelly involves several steps to achieve a delightful and flavourful product. First, fresh pumpkin is cleaned, peeled, and diced. The diced pumpkin is then boiled until tender. Once cooked, the pumpkin is mashed or pureed to obtain a smooth consistency. Sugar and pectin are added to the pumpkin puree, along with any desired spices such as cinnamon or nutmeg, to enhance flavour. The mixture is brought to a boil, stirring continuously to dissolve the sugar and activate the pectin. Lemon juice may also be added for acidity and to help with the gelling process. After achieving a rolling boil, the pumpkin jelly mixture is simmered briefly until it reaches the desired gel consistency. It is then carefully poured into sterilized jars, ensuring proper sealing. The jars are processed in a water bath canner to preserve the jelly for long-term storage. Once cooled, the pumpkin jelly sets into a smooth and spreadable consistency.

Sensory evaluation of the developed food products: Sensory evaluation of the food products for their acceptability was done by a panel of 5 judges. The scorecard based on the 9-point Hedonic Scale was used for sensory evaluation (B. Srilakshmi, 2018) Determination of Nutritive Value of developed products: The nutrient content of the food products was calculated with the help of the food composition table given.

Statistical Analysis: The data was statistically analyzed by using appropriate statistical analysis of variance (ANOVA) and critical difference techniques. A significant difference between the treatments was determined by using a CD (Critical Difference) test. "t" test was performed to compare the difference in nutritional content between the control and the best treatment of the nutritionally enriched food products (Gacula and Singh 2008).

Cost Calculation*:* The cost of the prepared products was calculated by taking into account the cost of individual raw ingredients used in the preparation of food products as the prevailing market.

RESULTS AND DISCUSSION

Table 1. Average sensory score of different parameters in treatment of Pumpkin jelly

Products	Colour and appearance	Body and Texture	Taste and Flavour	Overall Acceptability
T_1	7.16	7.14	8.84	6.9
T_2	7.1	7.3	6.9	7.8
T_3	8.48	7.74	7.2	7.3

The mean of sensory scores obtained for pumpkin jelly in relation to color and appearance, express that T_3 has the highest score (8.48), followed by T_1 (7.74), and T_2 (7.2). It indicates that the treatment T_3 was liked very much by the responders, Whereas T_1 and T_2 was liked moderately regarding the color and appearance of pumpkin jelly by the respondents. The analysis jelly. Treatment (T_2) is best treatment due to used amount of sugar (12%) which gives light yellowish color to the jelly; although further increase in the sugar content darkens the sugar and lowers the scores for color and appearance.

Table 2. Nutritional composition of pumpkin jelly

Nutrients	T_1	T_2	T_3
Moisture (%)	18.23	21.28	26.21
Ash(g)	2.21	3.21	3.69
Protein(g)	0.9	1.4	1.05
Fat(g)	0.5	0.12	0.14
Carotenoid (µ)	31.11	34.21	36.2
Crude Fibre(g)	0.42	0.42	0.49
Vitamin C	1.81	10.2	22.4

Moisture: The pumpkin jam Moisture content of were varied from 26.21% to 21.28%. The analysis of present data found that the moisture content was highest inT_3 (26.21) followed by T_2 (21.22) and T_1(18.23). It was observed that with increasing pumpkin content in treatments the moisture content increases. Similar results have also been reported by Sabeera *et al.* (2016) which are consistent with our findings. The show the lower shelf life there for low moisture content of jelly is preferable.

Ash: The ash content values were varied from 3.21 to 3.69. The analysis of present data found that the Ash content was highest in T_3 (3.69) followed by T_2 (3.21) and T_1 (2.21). The high ash content of Treatment (T_3) was attributed to the presence of high content of orange and pumpkin pulp. The present findings is further supported by Fleshner *et al*., (2004) ash analysist.

Protein: Protein content jellywere varied from 1.05g to 1.4g. The analysis of present data found that the protein content were highest in T_3 (1.05g) followed by T_2 (1.4g) and T_1 (0.9g). It was observed that with increasing orange and pumpkin pulp in treatments the protein content increases. Sangeeta *et al*. (2009) analysed the increase in crude protein content in pineapple-based pumpkin jam the high protein content T_2 attributed to the presences of high protein in pumpkin, Similar findings have been reported by Jakia *et al*. (2014).

Fat: Fat content of jellywas varied from the nutrient analysis of present jelly data found that the fat contentwas highest in T_3 (0.14g) followed by T_2 (0.12g) and T_1 (0.5g). It was observed that with increasing and pumpkin pulp content in treatments the fat content increases. Sangeeta *et al*. (2009) analysed the increase in fat content in pumpkin-basedorange jelly.

Crude fibre: The nutritional values of the pumpkin Jelly in which Fiber content the analysis of present data found that the fibre content was highest in T_3 (0.49g) followed by T_2 (0.42g) and T_1 (0.42g). It was observed that with increasing the orange (40%) and pumpkin pulp content in treatments the fibre content increases. Sangeeta *et al.* (2009) analysed the increase in crude fibre content in pumpkin-

basedorange jelly can be attributed to concentrated aqueous solution of invert sugar, complex mixture of enzymes, amino groups.

Carotene: The nutritional values of the pumpkin jelly in which Carotene beta content were varied from 36.2mcg to 34.21mcg. The analysis of present data found the beta carotene content were highest in T_3 (36.2mcg) followed by T_2 (34.21mcg) and T_1(31.11mcg). It was observed that with increasing the orange and pumpkin pulp content in treatments the beta carotene content increases. Lee and Kader, (2000) studied the increase in beta carotene content in pumpkin-basedorange jelly can be attributed to minimum leaching in syrup, minimum oxidation as well as thermal degradation as compared to the glucose. The results are in conformity with the findings of Rodriguez *et al*. (2004).

Vitamin C: The nutritional values of the pumpkin orange jelly in which Vitamin C content varied from 22.4% to 10.2%. The analysis of present data found that the vitamin C content was highest in T_3 (22.4%) followed by T_2 (10.2%) and T_1(1.81%). The Vitamin C content of Treatment (T_3) was increased due to 40% orange and Pumpkin pulp content in treatment with its high content of ascorbic acid.

Cost: The total cost of pumpkin orange jelly per 100g for treatment T_1 is Rs. 7.75 Treatment T_2 is Rs. 8.04, Treatment T_3 is Rs. 8.09 and. It can be concluded that T_3 is costly among all treatments due to added pumpkin and orange different proportion in treatment.On the otherhand, pumpkin vegetables, which are membersof the Cucurbitaceae family, are usually eaten fresh, cooked as vegetables or used as ingredients inpies, soups, sweets, marmalades, beverages or in children's foods.Pumpkin and its squash are also considered excellent sources of carotenoids (vitamin A), flavonoids, polyphenols, antioxidants and minerals, such as Ca, K, P, Zn and Fe (Rachel and Kabelka, 2009; Yadav *et al*., 2010). Ahmed *et al*. (2022) investigated a comparative study of jam processing from pumpkin with sugarcane and pumpkin with date juice. The authorstated that the chemical composition of the pumpkin andits antioxidant content makes it an important food product for human consumption. The carotenoids content in pumpkin vegetables give them their distinctive yellow-orange hue. In general, fruits and vegetables are very important healthy foods, as they provide the body with essential needs, such as vitamins, polyphenols, antioxidants, sterols, minerals and other substances thatthe other hand, pumpkin vegetables, which are members of the Cucurbitaceae family, are usually eaten fresh, cooked as vegetables or used as ingredients in pies, soups, sweets, marmalades, beverages or in children's foods. Pumpkin and its squash are also considered excellent sources of carotenoids (vitamin A), flavonoids, polyphenols, antioxidants and minerals, such as Ca, K, P, Zn and Fe (Rachel and Kabelka, 2009; Yadav *et al*., 2010). Ahmed *et al*. (2022) investigated a comparative study of jam processing from pumpkin with sugarcane and pumpkin with date juice.

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CONCLUSION

The study concludes that Pumpkin jelly can be successfully made using pumpkin and orange. Among the tested variations, the jelly labelled T_3, consisting of Pumpkin and orange, received the best sensory evaluation. T_3 Jelly costs Rs. 8.09 per 100 g and has a nutritional profile of moisture 26.21g Ash, 3.69g protein, 1.05g fat, o.14g carotenoid, 36.2µ crude fibre,0.49g and 22.4 mg Vitamin C. The formulations were replicated five times. The T_3jelly (Pumpkin 65 g+ pineapple 25g+Sugar 8g+gelatin2g) ranked highest in colour, appearance, texture, taste, flavour, and overall acceptability. T3 jelly had the highest cost among all variations per 100 g.

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