

Development of Plant based Nutraceutical Gummies using *Portulaca oleracea*

Yamuna Somaajjan, Manneela Meghana, Aysha Mohsin

Department of Nutrition and Dietetics, School of Allied Health Sciences

REVA University, Kaattigenahalli, Bengaluru, India

Meghana.manneela@gmail.com, ayesshaaysf@gmail.com

Abstract: *The confectionery industry is increasingly moving toward functional and health-oriented products that combine taste with nutritional benefits. This study focuses on the development of plant-based gummy confections fortified with purslane (Portulaca oleracea), a nutrient-rich and underutilized plant known for its high omega-3 fatty acid content among terrestrial plants. Purslane also contains essential vitamins such as A, C, and E, along with important minerals like magnesium and potassium, making it a valuable ingredient for functional food development. The gummies were formulated by incorporating hot air oven-dried purslane powder into a pectin-based gel matrix, acidified with lemon juice to improve Flavors and texture. Three product variations were developed to enhance sensory appeal: Variation 1 (1.23% amchur), Variation 2 (2.40% amchur), and Variation 3 (1.23% amchur-coated). A sensory evaluation involving 15 panel members assessed attributes such as taste, texture, aroma, and overall acceptability.*

The results indicated that Variation 1 achieved the highest acceptability score (7.43/9) due to its balanced flavour, mild tanginess, and soft chewy texture. Variation 2 showed lower acceptability because increased amchur affected texture negatively, while Variation 3 was considered overly strong in taste. Overall, the study demonstrates that purslane gummies offer a nutritious, plant-based, and clean-label alternative to conventional confectionery products with promising commercial potential..

Keywords: Purslane, Plant-based gummies, Omega-3, Functional food, Sensory evaluation, Clean-label

I. INTRODUCTION

Increasingly prefer foods that combine taste with health benefits. Traditional sugar-rich candies are gradually being replaced by functional confectionery products containing natural and health-promoting ingredients. Among these products, gummies have become highly popular because of their soft texture, attractive appearance, easy consumption, and ability to incorporate functional ingredients. In this context, the present study focused on the development of a plant-based functional gummy prepared using dehydrated purslane (*Portulaca oleracea*) powder along with sugar, pectin, and natural lemon juice. Purslane is an underutilized medicinal plant recognized for its exceptional nutritional value. It is considered one of the richest plant sources of omega-3 fatty acids, especially alpha-linolenic acid, which supports cardiovascular health and reduces inflammation. In addition, purslane contains important vitamins such as A, C, and E, minerals including calcium and magnesium, and antioxidant compounds like flavonoids. Its mild earthy flavour and natural green colour make it suitable for incorporation into gummy formulations without the need for artificial additives. However, the high moisture content of fresh purslane makes it highly perishable and unsuitable for direct use in confectionery products. Therefore, hot air oven dehydration was employed to reduce moisture content, improve shelf stability, and concentrate nutrients and Flavors compounds. The dried material was then powdered and sieved to obtain a smooth texture suitable for gummies.



The gummy structure was developed using pectin as a plant-based gelling agent instead of gelatine, making the product suitable for vegetarian consumers. Lemon juice acted as a natural acidulant, promoting pectin gel formation while also improving Flavors and providing antioxidant protection. The developed gummies represent a nutritious and sustainable alternative to conventional candies, highlighting the potential of underutilized plants in functional food development.

Objectives

- 1.To develop and formulate plant-based gummies incorporating purslane powder promoting the utilisation of underutilised ingredient.
- 2.To achieve a well-balanced flavour profile and desirable soft chewy texture in the formulated purslane gummies
- 3.To evaluate the sensory characteristics of the developed purslane powder gummies including attributes.
- 4.To analyse and determine the nutritional composition of the developed purslane powder Gummies

Methodology



Procurement of raw material(49)

(purslane power5g, Sugar 30g, lemon juice3g, pectin power29 ,amchur power2g, water115-130ml



Preparation of purslane power

(using hot air oven 60-70 temp 6hr)



Formulation and Weighing of Ingredients(49)

(Purslane powder 5, sugar 30g, lemon juice 3g, pectin power 2g, Amchur powder 2g, water 115-130ml)



Preparation of Solutions[48]

Mixing the water with the powders and fol



Preparation of Solutions

Mixing the water with the powders and following the process of filtration



Boiling

(Boil purslane powder in 115-130ml of water until the smell of the powder is reduced. - gradually add the standard amchur solution, stir for 1-2mins, add pectin solution and stir on the same for 5mins) heat



Moulding and Setting(47)

(pour the liquid into silicon moulds Allow it to cool and set.)



Demoulding and storage

(Demould the set gummies and store in the air tight container or vacuum container)

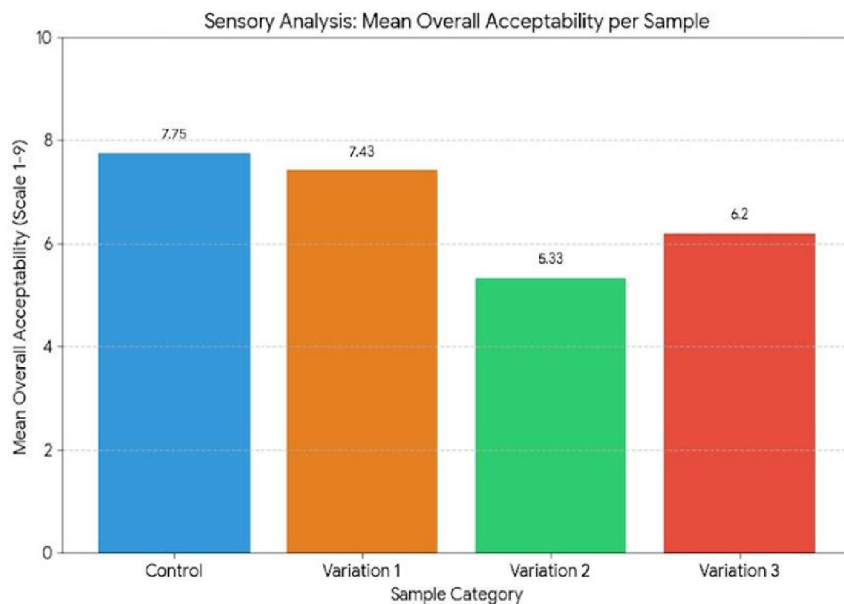


Standardization of Product

For the standardization of the purslane functional gummy product, various efforts have been made to produce an enriched product that would be accepted by customers. There were three variations of the formulation, based on the different quantities of purslane and amchur powder that were used. However, other ingredients were kept constant for all variations of the product, which included purslane powder, chia seeds, jaggery syrup, agar-agar, lemon juice, and water.

Sensory analysis of the products was done with the help of a semi-trained panel of fifteen individuals using a 9-point hedonic scale in which different parameters, acceptability was evaluated.

Ingredients	V1	V2	V3
Purslane power	5g	5g	5g
Sugar	30g	30g	30g
Lemon juice	3g	3g	3g
Pectin power	2g	2g	2g
Amchur power	2g(mixed)	4g(mixed)	2g(coated)

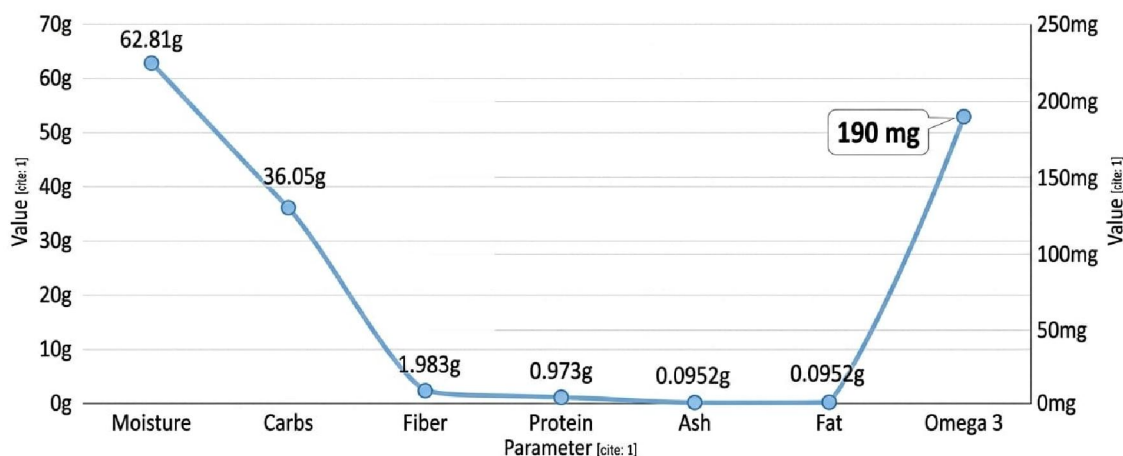


FINAL RESULTS

Parameter	V1
Moisture	62.809
Ash	0.0952
Fat	0.0952
Protein	0.973
Fiber	1.983
Carbs	36.05
Omega 3 fatty acids	0.19g



TOTAL COMPOSITION PROFILE OF PURSLANE GUMMY V1 (per 100g) [cite: 1]



Comprehensive nutrient profile and proximate composition of Purslane Gummy V1. All parameters except Omega 3 are shown in grams, with Omega 3 fatty acids specifically called out in converted milligrams for user request [cite: 1]. The single continuous line shows the logical progression of content [cite: 1]. All values are derived from <IMAGE 1> and <IMAGE 0> [cite: 1]. Percentage values for percentage values for proximates in <IMAGE 0> are converted to grams per 100g sample for consistency [cite: 1]. Watermark 'Analysis Data' and 'Data derived from 1000720367.jpg' are retained in small, discrete text at the bottom. No data is lost, all six values are present, including the 190mg value. The visual link between the axes is impeccable.

II. RESULT AND DISCUSSION

In the current study, it is possible to mention successful development of gummies based on plants with an additional component such as purslane powder. It has been established that the sensory properties of gummies have been determined by 15 semi-trained panel members. The results of sensory testing showed that Variation 1 demonstrated the highest sensory acceptability of samples due to the balance of flavours, tanginess, colour, and a soft chewy texture. Variation 2 scored relatively lower sensory marks since of the presence of excessive amchur. As for the taste of Variation 3, it was characterised by the coated taste. Proximate analysis of Variation 1 revealed 62.809% of moisture, 0.0952% of ash, 0.0109% of fats, 0.973% of proteins, and 1.983% of fibres. Consequently, it can be stated that it is possible to speak about the developed gummies being of low fat content, moderate fibres, and good sensory properties.

Summary

The study focused on the development and evaluation of plant-based functional gummies using purslane powder (*Portulaca oleracea*), an underutilized plant rich in omega-3 fatty acids, vitamins, minerals, and antioxidants. Three gummy variations were prepared using different levels and methods of incorporation of amchur powder while maintaining other ingredients constant. Sensory evaluation was conducted using a 9-point hedonic scale with 15 semi-trained panel members to assess appearance, taste, texture, flavour, and overall acceptability. Variation 1 was identified as the most acceptable formulation because of its balanced flavour and soft chewy texture. Proximate analysis of Variation 1 showed 62.809% moisture, 0.0952% ash, 0.0109% fat, 0.973% protein, and 1.983% fibre. The findings indicate that purslane gummies can be developed as a nutritious, low-fat, and consumer-acceptable functional confectionery product with potential health benefits and commercial value.

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