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Short Communication

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Aloe vera cookies preparation, nutritional aspects, DPPH assay and physicochemical assay

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Abstract

Aloe vera has been widely used for various therapeutic purposes over the millennia. It is becoming increasingly popular due to its antiviral and antibacterial qualities. For many years, aloe vera has been employed in biomedical research. It's a fantastic way to boost the nutritional value of any food product. This research aims to expand on the nutritional value of cookies by including Aloe vera gel. It would focus on the substance's biological and pharmacological characteristics. The nutritional quality of aloe vera cookies was evaluated after being manufactured with all-natural, chemical-free ingredients. The primary objective was to investigate its functional properties, sensory characteristics, and quality characterization. Quality control was performed on aloe vera cookies, and the results were discussed. The process is quick and straightforward, and it comes at a reasonable cost that boosts nutrient content, but it can also be utilized as a part of a well-balanced diet. Because of its beneficial characteristics, aloe vera-based cookies could be particularly beneficial for most vulnerable groups in underdeveloped countries. The cookies are safe to eat daily as a snack food.

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Introduction

Food provides essential nutrients for normal body function, but an unbalanced diet over a long time increases the risk of developing nutritional diseases and involves expensive medical treatments (Minwuyelet *et al.,* 2017). Aloe Vera is a traditional medicinal plant that belongs to the family Liliaceae. Its juice may help some people with ulcerative colitis, an inflammatory bowel disease. Aloe has been marketed to remedy coughs, wounds, ulcers, gastritis, diabetes, cancer, headaches, arthritis, immune-system deficiencies, and many other conditions when taken internally. However, the general internal use is as a laxative. The lower leaf of the plant is used for medicinal purposes. If the lower leaf is sliced open, the gel obtained can be applied to the affected area of the skin (Radha *et al.,* 2015).

Pharmacologically it boosts immunity and detoxifies the harmful chemicals from the system. In adjuvant therapy NSAIDs (Nonsteroidal Anti-Inflammatory Drugs), it is suggested as antibiotics and chemotherapeutic effects. Even it is being used to exclude drug persuaded gastritis and other harmful effects. It is also helpful in different diseases such as type II diabetes, cures arthritis, improves eye-related diseases, cures various kinds of tumors and liver health, and controls bloating, jaundice, and ulcers. It maintains our blood sugar level. Relieves constipation, maintains an excellent gastric pH and helps in inflammatory bowel diseases, non-ulcer dyspepsia, gastric and duodenal ulcers (Rajeswari *et al.,* 2012; Ramachandraiahgari *et al.,* 2012). Aloe vera has also been used visibly to treat different skin conditions like cuts, burns, and Eczema. It is also not only helps reduce pain but also helps to reduce inflammation. So, the anti-inflammatory properties enhance the healing process and cure wound rapidly.

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Introduction

In our daily life, poor diet, poor eating habits, and a polluted environment trigger acute conditions in our bodies. The antioxidant properties of the Aloe vera remove toxins from the body, in resulting preventing our body from cancerous cells. Aloe vera gel improves our digestive system and enhances the immune response against foreign anti-cancerous agents (Sanzana *et al.,* 2011). Aloe vera also has antibacterial properties. The protein 14 kDa present in Aloe vera gel is extracted that works against the bacteria like Candida *krusei* and Candida *albicans.* Aloe vera gel also has anthraquinones, an active compound against bacteria that blocks ribosomal activity and inhibits the synthesis of bacterial protein, resulting in no growth of pathogenic bacteria. Aloe vera gel is also proposed to be the most effective natural agent against *H. pylori* to prevent gastric ulcers and gastric infection (Sonawane *et al.,* 2021).

Aloe vera is being used as a functional food or as an ingredient in various other food products. The vital nutrients and vitamins in Aloe vera enhance the nutrient value of food and make it more energetic. World Health Organization (WHO, 1982) has suggested various traditional medicinal plants that are less toxic and can be used as oral therapy against different diseases, specifically diabetes, and Aloe vera is one (Vogler and Ernst, 1999).

The basic concept of functional food is to understand the real nutrient value for the consumer in the final product. Cookies are one of the most common and popular food products used as bakery food items that's why the use of Aloe vera in cookies form is very effective. It is high in sugar, fat, and carbohydrates. The shelf life of cookies is straightforward to handle. There are various methods of its production to enhance nutrient value and its fortification. The critical ingredient is refined wheat flour and pure Aloe Vera extract. The actual nutritional improvement of these cookies is our primary concern in the study. Therefore, the consumption of enriched food sources is one of the primary efforts to decline various digestive diseases (Masood *et al.,* 2021).

As Aloe vera is enriched with various nutrients, some significant benefits are summarized in Table I (Mikołajczak and Sport, 2018), which is given below:

Table I. Benefits of Aloe vera

TERMS	BENEFITS
Detoxification	Detoxify harmful toxins from the body
Vitamins & Minerals	Contains vitamins like Vit A, C, E & B12
	Minerals like Ca, Zn, Na, Fe and K
Adaptogen	Adaptive & Defence mechanisms of the body
Digestion	Improves digestive tract
Immune System	Build Immunity
Antibacterial and antiviral	Fight against Bacteria and Viruses
Weight loss	Helps to lose weight
Inflammation	Reduce inflammation

Material and methods

The primary material and methods that are used in making Aloe vera cookies are described below in detail:

Extraction of aloe vera

After harvesting, the aloe vera leaves were washed with water and then separated from the outer matrix to obtain the fresh pulp.

Cutting and blending

Aloe vera pulp 50 grams was taken, cut into slices, and then blended to make paste/juice. All the ingredients taken were weighed.

Mixing with the essential ingredients

After blending, all the essential ingredients, including ground sugar, butter, beaten eggs, ground orange peel, Aloe vera, salt, wheat flour, and all-purpose flour, were mixed well in milk to make the cookie dough. The cookies were given the best round shape and sprinkled with ground coconut.

Baking

After giving proper shape, shift cookies on baking dishes. The baking dish was oiled with olive oil, and the cookies were baked in the oven. The baking temperature was 180°C, and it was kept for 15 min in a baking oven. After completing the baking procedure, the prepared aloe vera cookies were packed in airtight polyethylene zipper bags. The prepared cookies were analyzed.

Analysis of cookies

Aloe vera cookies were tested for nutritional value, aflatoxin levels, and heavy metal content.

The dish is quick and straightforward to prepare. The cookies were made from unusual ingredients, and on a shoestring budget Table, II lists the principal elements and the total cost.

Results and discussion

Taste and quality

When a product is made in the food industry, the first task is evaluated by its taste, texture, and flavor. Taste panel studies were conducted at Food and Biotechnology Research Centre, involving 15 panelists. The primary criteria for the evaluation are the selection of those panelists who are consuming

Table II. Main ingredients of Aloe vera cookies

	Ingredient	Added quantity	Costs (Rs.) approx.
1	Ground sugar	200g	18
2	Butter	100g	75
3	Beaten Egg	50.0g	25
4	Ground orange peel	2.50g	5.0
5	Aloe vera	50.0g	30.0
6	Salt	0.50g	0.5
7	All-purpose flour	150g	15
8	Wheat flour	150g	12

Table III. Results of physico-chemical tests and metal content of Aloe vera cookies

Sr. No.	Metals	Concentration (ppb)	WHO 1982, Permissible limits (ppb)
1.	As (Arsenic)	0.01±0.05	10.0
2.	Cd (Cadmium)	Not Detected	0.08
3.	Co (Cobalt)	Not Detected	0.0
4.	Cr (Chromium)	Not Detected	1.90
5.	Cu (Copper)	0.02±0.01	7.30
6.	Fe (Iron)	0.03±0.02	90.50
7.	Hg (Mercury)	Not Detected	0.10
8.	Mn (Manganese)	Not Detected	0.03
9.	Ni (Nickel)	Not Detected	13.0
10.	Pb (Lead)	Not Detected	0.0
11.	Zn (Zinc)	0.05±0.01	113.80
	pH	7.45±0.02	

Table IV. Nutritional analysis of Aloe vera cookies

Sr. No.	Parameter	Nutritional value/ 100g of cookies
1.	Moisture	10.08
2.	Ash	0.85
3.	Fat	12.26
4.	Fiber	1.40
5.	Protein	4.09
6.	Carbohydrate	71.32
7.	Energy (Kcal/100g)	318.0

Table V. % Inhibition (DPPH) of Aloe vera Cookies

Concentration (mg/ml)	% Inhibition (DPPH)
2	4.67
4	6.54
6	14.53
8	19.89
10	28.75

cookies regularly and who are not allergic. Instructions were given to panelists to assess the cookies' appearance, taste, and texture. They passed the taste as well as its quality.

Determination of heavy metals

The toxicity of any food product can be checked out by the concentration of metals present in that specific food product. These are elements that have higher atomic mass and higher density. Heavy metals, including silver, iron, cobalt, copper, etc., can affect individuals and their environment directly or indirectly. The main issue regarding heavy metals is that they cannot biodegrade even in low amounts (Zaynab *et al.,* 2022).

If present in formulations, heavy metals would have a deleterious effect on different organs of the body, particularly kidneys, and lead to renal toxicity. Hence, the evaluation of heavy metals plays an important role. Heavy metals, including arsenic, copper, lead, silver, cadmium, nickel, antimony, cobalt, manganese, tin, and mercury, were determined in prepared cookies. The results are given in Table III.

After the physicochemical tests of Aloe vera cookies, it has been evaluated that the metals including Cd (cadmium), Co (cobalt), Cr (chromium), Hg (Mercury), Mn (manganese), Ni (nickel), Pb (lead), Sb (antimony), Sn (tin) are not detected. While the metals including Ag (silver), As (arsenic), Cu (copper), Fe (iron), and Zn (zinc) are detected at the concentration of 0.05, 0.001, 0.02, 0.3, and 0.05 ppm, respectively. The results showed that heavy metals that are toxic to our health are not detected in the cookies (Dobbins *et al.,* 2021).

Nutritional evaluation

The nutritional evaluation of Aloe vera cookies was carried out by preferred formulation. The cookies were then exposed to check physical and chemical analyses. The chemical and nutritional analyses include ash, moisture, fat, fiber, protein, carbohydrate, and the energy

content in the cookies. The nutrient value of Aloe vera cookies is being checked, and took out the exact evaluation is described in the given table.

The nutritional analysis results showed that the Aloe vera cookies could be reflected as a potential food product by having high-calorie content, and these can be used as dietary supplements to compete with deficiencies as well.

DPPH assay is an essential test to analyze the presence of antioxidants and is based on a hydrogen atom transfer reaction (Saeed *et al.,* 2022). DPPH assay depicted that Aloe vera cookies showed excellent antioxidant properties at a concentration of 10mg/L i.e., 28.75% inhibition.

Conclusion

Aloe vera is a medical plant with a wide range of therapeutic purposes. It is also used to make a variety of food products. Its antioxidant properties aid in the elimination of pollutants from the body. Its biological activities and chemical composition have also contributed to the medical field. In the food industry, the Aloe vera plant presents a vital role in producing various kinds of food products with immense health benefits. Production of Aloe vera cookies is one of them. The results based on mixture represent that wheat flour is the most active ingredient in improving the color and texture of the cookies. The nutritional value of the cookies depicts that it has excellent nutrient value and are a good source of energy. Physiochemical tests show that there are no harmful metals present in the cookies. From the study findings, it is concluded that Aloe vera cookies could be a nutrition rich cookies, cheap and readily available thus could be helpful to boost nutrient content, where necessary. It has been expected that more benefits would be discovered from this versatile plant by conducting research and by understanding its effects and composition.

References

Dobbins DC, Marcelo-Silva J and Siebert SJ (2021), Screening the phytoextractability of trace metals by Aloe cryptopoda Baker and Aloe vera (L.) Burm. f. cultivated on mine tailings, *South African Journal of Botany* **140:** 110-113.

Masood S, un Nisa A, Arif F, Ashraf M, Ashraf S, ur Rehman H, Hina S and Ahmad I (20210, Aloe vera based cookies as a functional food. *Bangladesh Journal of Scientific and Industrial Research* **56**(4): 293-298. DOI: https://doi.org/ 10.3329/ bjsir.v56i4.57201

Mikołajczak NJJoE (2018), Potential health benefits of Aloe vera, *Health and Sport* **8**(9): 1420-1435.

Minwuyelet T, Sewalem M and Gashe MJGJP (2017), Review on therapeutic uses of Aloe vera **11**(2): 14-20. DOI: 10.5829/idosi.gjp.2017.14.20

Radha MH and Laxmipriya NP (2015), Evaluation of biological properties and clinical effectiveness of Aloe vera: A systematic review, *Journal of traditional and complementary medicine* **5**(1): 21-26. DOI: org/10.1016/j.jtcme.2014.10.006

Rajeswari R, Umadevi M, Rahale CS, Pushpa R, Selvavenkadesh S, Kumar KS and Bhowmik D (2012), Aloe vera: the miracle plant its medicinal and traditional uses in India, *Journal of Pharmacognosy and Phytochemistry* **1**(4): 118-124.

Ramachandraiahgari RMY, Somesula SR, Adi PJ, Mannur IS, Enamala M and Matcha B (2012), Protective role of ethanolic extract of aloe vera antioxidant properties on liver and kidney of streptozotocin-induced diabetic RATS. *Digest Journal of Nanomaterials and Biostructures* (DJNB) **7**(1): 175-184.

Saeed MK, Zahra N, Shahzad K, Firdous S, Ahmad I, Ashraf M, Hussain SIA and Syed QA (2022), DPPH Assay and Reducing Power Activity ofWater Extract of (Mentha longifolia) Mint, *Lahore Garrison University Journal of Life Sciences* **6**(1): 38-47.

Sanzana S, Gras ML and Vidal-Brotóns DJPFS (2011), Functional foods enriched in Aloe vera. Effects of vacuum impregnation and temperature on the respiration rate and the respiratory quotient of some vegetables, **1**: 1528-1533. DOI: org/10.1016/ j.profoo. 2011.09.226

Sonawane SK, Gokhale JS, Mulla MZ, Kandu VR and Patil S (2021), A comprehensive overview of

functional and rheological properties of aloe vera and its application in foods, *Journal of Food Science and Technology* **58**(4): 1217-1226.

Vogler BK and Ernst E (1999), Aloe vera: a systematic review of its clinical effectiveness. *British journal of general practice* **49**(447): 823-828.

WHO (1982), Safety evaluation of certain food additives and contaminants: Zinc, World Health Organization Geneva, Food additives Series 17.

Zaynab M, Al-Yahyai R, Ameen A, Sharif Y, Ali L, Fatima M, Khan KA and Li S (2022), Health and environmental effects of heavy metals, *Journal of King Saud University-Science* **34**(1): 101-653. DOI: org/10.1016/j.jksus.2021.101653