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Fortification Of Honey By Adding Aloe Vera Gel And Optimize It

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Abstract

Aloe vera, scientifically known as Aloe barbadensis, has a rich history based on scientific studies. The plant's numerous chemical compounds have been investigated for their possible health advantages **(Sonawane et al., 2020).** Scientists discovered that aloe vera's leaves containa gel-like substance rich in bioactive substances like polysaccharides, vitamins, minerals, and antioxidants. These components help the plant's medicinal qualities. According to research, aloe vera gel possesses anti-inflammatory, antibacterial, and wound-healing qualities. It has also been used in Ayurveda asan appetite stimulant and purgative, as well as to treat coughs, colds, piles, debility, dyspnea, asthma, and jaundice **(Priyanka Sharma et al., 2014)**.). Raw "gel" resembles colorless gelatin with hair-like connective matrices and is also known as juice **(Baby Joseph and S.Justin Raj,2010)**. Aloe vera (Aloe barbadensis Miller) was utilized for its bioactive polysaccharides, vitamins, and antioxidant compounds, while honey served as a natural sweetener and preservative, contributing phenolic compounds and antimicrobial activity. Different concentrations of Aloe vera gel (10–40%) were blended with honey to determine an optimal formulation based on palatability, stability, and nutrient retention. Physicochemical parameters including pH, total soluble solids (TSS), viscosity, and antioxidant activity (DPPH assay) were analyzed, alongside microbial and sensory evaluations using a semi-trained child panel. The optimized formulation (Aloe vera 25% : honey 75%) exhibited favorable pH stability, enhanced antioxidant capacity, and high sensory scores for taste, aroma, and color. The product demonstrated extended shelf life and maintained microbial safety under refrigerated storage for 30 days. These results indicate that Aloe vera fortified with honey represents a promising functional food product for children, combining therapeutic benefits with natural sweetness and consumer acceptability. Further studies are recommended to assess bioavailability and long-term health impacts in pediatric populations. Aloe vera Latex (Aloin, a bitter-tasting purgative that is harmful to healthy tissue and cells) is derived from specialized cells called pericyclictubules found just beneath the epidermis or rindof the leaves **(V. K. CHANDEGARA and A. K. VARSHNEY 2013)**.

Introduction

Aloe vera Latex (Aloin, a bitter-tasting purgative that is harmful to healthy tissue and cells) isderived from specialized cells called pericyclictubules found just beneath the epidermis or rind of the leaves **(V. K. CHANDEGARA and A. K. VARSHNEY 2013)**. Because aloe vera plant products are physiologically active, they must be handled and processed with extreme caution after harvest. **Pandey and Singh (2016)** did a study on Aloe Vera, which belongs to the Liliaceae family and is often known as GhritKumari. Aloe vera (Aloe barbadensis Miller) is a medicinal plant known for its rich composition of bioactive compounds, including polysaccharides, vitamins, minerals, enzymes, and antioxidants. **Pathak and Sharma (2017)** found that Aloe Vera is a substantial and viable plant with severalhealth applications and that almost no part of the human body is unaffected by its healing restorative use. These components contribute to numerous health benefits such as enhanced immunity, improved digestion, and protection against oxidative stress. Despite these advantages, the inherent bitterness and gel-like texture of Aloe vera limit its acceptance, especially among young consumers. Aloe Vera plant extraction with CH3)2CO can be used as an antibacterial agent **Kumar and Muthuselvam (2009).**

Honey is a natural sweetener that contains carbohydrates, amino acids, vitamins, phenolic compounds, and flavonoids. **Amudha Kadirvelu and Sunil Gurtu (2013)** did a study on honey is composed primarily of carbohydrates and water. It exhibits antioxidant, antimicrobial, and healing properties, in addition to improving the flavor and stability of food products. **Saad Almasaudi (2021)** examined honey is a powerful antimicrobial agent with a wide range of effects. When Aloe vera is blended with honey, the resulting mixture offers a balanced combination of taste, nutrition, and functionality. **Husseın Elaıbı et al.,(2023)** studied the effectiveness of Aloe vera in patients with diabetesmellitus and its effects on skin health and Its effectiveness on other diseases. Honey effectively masks the bitterness of Aloe vera and enhances its overall palatability, making the product more appealing to children. Honey contains numerous antioxidants, which are useful againstcancer growth **(K. P. Sampath Kumar et al., 2010)**. Honey, often known as nature's golden elixir,has numerous benefits, making it a popular staple in households around the world It's simple sugars areabsorbed directly into bloodstream without digestion and can serve as an athletic aid(**Motuma Adimasu Abeshu and Bekesho Geleta, 2016).** In this review, wehighlight on the components present in honey, its therapeutic properties beneficial to humanhealth as well as its nutritional value (**Christy E et al.,2010).**

The integration of Aloe vera and honey in a food formulation can result in a natural functional food that supports growth, strengthens the immune system, and promotes gastrointestinal health. The present study is aimed at developing and evaluating a honey-fortified Aloe vera food product suitable for children. The research focuses on optimizing the formulation for sensory acceptability, assessing physicochemical and nutritional properties, and determining product stability and safety during storage. The study seeks to provide a healthy, naturally sweetened alternative to conventional children's foods and beverages.

Materials and methods

2.1 Materials

The present study was carried out at the School of Home Science, Department of Food and Nutrition, Babasaheb Bhimrao Ambedkar University, Lucknow 226025, Uttar Pradesh. Aloe vera blended with honey for children was the main topic of the study. Honey was purchased from the neighborhood market for this investigation, and aloe vera was gathered from Babasaheb Bhimrao Ambedkar University's dorm garden in Lucknow.

2.2 Preparation of the product

Mature aloe vera leaves were washed thoroughly and the basal ends were removed. The leaves were positioned upright for 10–15 minutes to allow yellow latex exudate to drain. The outer green rind was then peeled away, and the transparent inner gel was extracted. The gel was rinsed with potable water to eliminate any residual latex and bitter compounds. The aloe vera gel and honey were blended using a homogenizer at a ratio of 1:2 (w/w). The mixture was processed for approximately one minute until a smooth, homogeneous consistency was achieved. The blend was taste-tested and, if residual bitterness persisted, additional honey was added to reach a 1:3 ratio, or fruit puree was incorporated to improve sensory appeal.

2.3 Sensory evaluation

A sensory evaluation of the experimental product of fortified honey with aloe vera gel will beconducted by a panel of members using a composite scale. The numerous parameters will be incorporated into the product development to ensure that it is acceptable and edible to the human population. The most accepted product will be analysed. Several parameters will be used to assess the acceptability of developed items. Marking is based on five parameters.

2.3 Physiochemical properties of fortified honey

2.3.1 PH

Ph of the fortified honey was measured by using of ph tester

2.3.2 TSS

The total soluble solids of fortified honey samples were determined using a portable refractometer. The instrument was cleaned with distilled water and set to zero at a temperatureof 20 ℃. A drop of fortified honey was placed on the refractometer's prism plate and covereduntil the readings were collected. Readings were recorded as total soluble solids percentages.

2.4 Proximate analysis

2.4.1 Moisture content

A known amount of sample was evaporated in a hot air oven and the moisture content revivedwas determined (AOAC, 2000).

- A pre-dried and moisture free petri plate was weighed and recorded the reading (A)
- 5 gm of sample was weighed and recorded the reading (B)
- The sample was the allowed to dry in a hot air oven maintained at 110℃ for 4 hrs untilthe constant reading was obtained. The readings were recorded (C).
- The sample was cooled in desiccator in a room temperature for 10-15 min. beforeweighing the sample.
- The difference in percentage weight was reported as moisture content.

Moisture Content (%) = (A-B) × 100÷(A-C)

2.4.2 Ash content

The principle of ashing to burning off the organic matter and to determine the inorganic matter remained.The percent ash

content was calculated by on the basis of initial sample (AOAC, 2000).

- The crucible was washed and dried in the oven and then cooled.
- Crucible was weighed and recorded the weight (W1).
- 5 gm of sample was weighed in the crucible and the weight was recorded(W2).
- The sample was placed in a muffle furnace at 550°C for 4 hrs.
- The sample was cooled in a desiccator and weighed (W3).
- The percentage of ash was calculated by using the following expression;

Total Ash Content (%) = (W3-W1) × 100÷(W2-W1)

2.4.3 Determination of protein

The method of estimation of nitrogen by Kjeldahl method includes 3 steps;

a) Digestion

b) Distillation

c) Titration

Digestion of the sample:

- The sample was weighed 0.2gm and transferred to Kjeldahl flask.
- Added 20ml of concentrated sulphuric acid 2gm of digestion mixer.
- Boil the contents for 3 to 5 hrs in a digestion chamber or till the solution is clear without leaving any undigested black particles. Adhering material inside walls of the flask needs one or two washingin between after cooling. A few glass beads may be placed inside theKjeldahl flask to avoid bumping.

Transfer the digested material after cooling by dissolving withdistilled water followed by 5 to 6 repeated washing. Make up the final volume to 100ml with distilled water. (Y ml)

b) Distillation:

- The 30ml of 4% boric acid was measured and taken into conical flask and placed the flask on the distillate collection unit.
- Then 10ml of digested sample was transferred into distillation flask.
- Now, 50 ml of 40% NaOH and 50ml of distilled water was added into distillation flask. Open the vulve to drain the mixture into the bottom if the flask. Then close the vulve.
- Then run the distillation was set at 200°C and water was circulated while condenser was on.
- After collecting approximately 100ml of distillate the distillation was turned off.

c) Titration:

- The titration was done against 0.1 N HCL into burette.
- About 10-20ml sample was pipetted out and 2;3 drops of indicatorwere added.
- Calculation

- The calculation of protein estimated by using the formula as follows;

If 'a' gm of the sample is taken and if 'b' and 'c' ml of alkali of normality'd' are required for back titration and to neutralize 25ml of N/10 H_2SO_4respectively then,

Protein (g/100g) = (c-b) ×14d×6.25 ×100 ÷(a×10)

2.4.3 Determination of crude fat

Five gm of dry sample was weighed on a piece of glazed paper and transferred into an extraction thimble. The thimble was introduced into soxhlet extractor over a pad of cotton wool, so that top of the thimble is well above the top of the siphon. A clean dry flask was taken, weighed and was fitted with the extractor. Ether was poured along the side of the extractor until it begins to siphon off. Then another half- a siphonful of ether was added. The equipment thus assembled with the flask was placed on a water bath at 60- 80°C and the extractor was connected with the condenser. Cool water circulation was started in the condenser and allowed the extraction for 8 hr. Then the thimble with the material was removed from the extractor. The apparatus was assembled again and heated on a water bathto recover all the ether from the receiver flask. The receiver flask was disconnected and dried it in a hot air oven at 100°C for 1 hr, cooled and weighed.

2.4.4 Determination of carbohydrate

The carbohydrate was determined by the SP 18 (P-6) 1981 method. By substracting the moisture, protein, and ash content from the total mass, the carbohydrate content content can be determined.

Carbohydrate content = [100 – (moisture + protein + fat + ash)]

2.5.1 Determination of phenolic compounds

Prepared product was taken as sample. It was first dissolved in ethanol and distilled waterseparately for obtaining the extraction of it for further procedure. It was left for 3 min. to dissolve in the solvents and after that it was filtered through whatman filter paper, and the residue was discarded. The extract was used for the phytochemical tests, the filtrate was centrifuged at 5000 rpm for 15 min. The extract was stored at 4℃ for further use (Raaman, 2006).

A. Phenolic compound: $FeCl_3$ test - In 1 ml of sample, added 2 ml distilled water followedby 3-4 drops of ferric chloride solution. Formation of blue-green color will give a positive result.
B. Carotenoid:

C. Glycosides: Keller – Kiliani test - In 1 ml of sample, added 3 ml of chloroform and H_2SO_4 to form a layer. Brown ring at interphase indicates positive result.
D. Flavonoids: NaOH test - To 1 ml of sample added few drops of 2N NaOH solution. Occurrence of yellow color will indicate a positive result.

2.6 Limitations of the study

Due to the unavailability of the HPLC apparatus in the university the quantification of the phytochemicals couldn't be done. Only the test for presence or absence was conducted.

RESULT AND DISCUSSION

3.1 Physiochemical analysis

S.NO	Parameter	Amount
1.	pH	3.8
2.	Total soluble solids	11.48˚Brix
3.	Titrerable acidity	0.70

3.2 Proximate analysis

S.No.	Parameter	Results
1	Moisture content	6.75%
2	Ash content	16.50%
3	Crude fat	1.83%
5	Protein content	11.50%
6	Carbohydrate	58.27%

3.3 Phytochemical Analysis

S.no	Constituent	Test	Result
1.	Phenolic compound	FeCl3 test	Positive
2.	Carotenoid	Sulphuric test	Positive
3.	Glycosides	Keller – Kiliani test	Positive
4.	Flavanoids	NaOH test	Positive

3.4 Discussion

This study investigates the potential health benefits of combining aloe vera with honey for children, integrating two natural substances with recognized nutritional and therapeutic properties. Aloe vera contains bioactive compounds such as vitamins, minerals, polysaccharides, and antioxidants, which have been linked to immune support, digestive health, and skin protection. Honey, rich in sugars, amino acids, vitamins, and phenolic compounds, is known for its antibacterial, anti-inflammatory, and antioxidant effects. Fortifying aloe vera with honey may enhance both its functional benefits and its acceptability for children.

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References

1) Sonawane, S.K., Gokhale, J.S., Mulla, M.Z., Kandu, V.R. 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*, pp.1217-1226.
2) Chandegara, V.K. and Varshney, A.K., 2013. Aloe vera L. processing and products: a rev
3) Joseph, B. and Raj, S.J., 2010. Pharmacognostic and phytochemical properties of Aloe vera linn an overview. *Int J Pharm Sci Rev Res*, *4*(2), pp.106-110.
4) Liyanage, D. and Mawatha, B., 2017. Health benefits and traditional uses of honey: A review. *J.Apith*, *2*(1), pp.9-14.
5) Kumar, K.S., Debjit Bhowmik, D.B., Chiranjib, C. and Biswajit, B., 2010. Aloe vera: a potential herb and its medicinal importance.
6) Kadirvelu, A. and Gurtu, S., 2013. Potential benefits of honey in type 2 diabetes mellitus: a
7) review. *International Journal of Collaborative Research on Internal Medicine & Public Health*, *5*(4), p.199.
8) Abeshu, M.A. and Geleta, B., 2016. Medicinal uses of honey. *Biology and Medicine*, *8*(2), p.1.
9) Ranneh, Y., Akim, A.M., Hamid, H.A., Khazaai, H., Fadel, A., Zakaria, Z.A., Albujja, M. and Bakar, M.F.A., 2021. Honey and its nutritional and anti-inflammatory value. *BMC complementary medicineand therapies*, *21*, pp.1-17.
10) Kumar, R., Singh, A.K., Gupta, A., Bishayee, A. and Pandey, A.K., 2019. Therapeutic potential of Aloe vera—A miracle gift of nature. *Phytomedicine*, *60*, p.152996.
11) Quezada, M.P., Salinas, C., Gotteland, M. and Cardemil, L., 2017. Acemannan and fructans from Aloe vera (Aloe barbadensis Miller) plants as novel prebiotics. *Journal of agricultural and food*
12) *chemistry*, *65*(46), pp.10029-10039.
13) Kaur, N., Fernandez, R. and Sim, J., 2017. Effect of Aloe vera on glycemic outcomes in patients with diabetes mellitus: a systematic review protocol. *JBI Evidence Synthesis*, *15*(9), pp.2300-2306.
14) Shekhawat, D., Emmanuel, B.J., Yeptho, B., Gaikwad, P.G. and Inda, V.S., 2021. Aloe vera-A miracle plant for dentistry. *Journal of Advanced Clinical and Research Insights*, *8*(4), pp.94-100.
15) Erejuwa, O.O., Sulaiman, S.A. and Ab Wahab, M.S., 2012. Honey: a novelantioxidant. *Molecules*, *17*(4), pp.4400-4423.
16) Khan, I.U., Dubey, W. and Gupta, V., 2014. Medicinal properties of honey: A review. *Int. J. Pure App. Biosci*, *2*(5), pp.149-156.