Plant Archives Vol. 23, No. 2, 2023 pp.364-369 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org
DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2023.v23.no2.062

NUTRACEUTICAL CONTRIBUTION OF ALOE-VERA GEL FOR MAKING OF MILK CAKE DURING FESTIVE SEASONS IN INDIA

Monika Saini[1], Shriya Garg[1], Raj Kapoor[2], Rishabh Chitranshi[3] and Rajiv Dutta[3*]
[1]Shri Ram Group of colleges, circular road, Muzaffarnagar, U.P., 251001, India
[2]National Commodities Management Services Limited, Udyog Vihar, Sector-19, Gurugram-122016, India
[3]School of Biological Engineering and Sciences, Shobhit University, Gangoh, Saharanpur UP- 247341, India
*Corresponding author E-mail: director.sbt@gmail.com
(Date of Receiving : 29-07-2023; Date of Acceptance : 30-09-2023)

ABSTRACT

This research was carried out to develop a homemade, nutrient-rich milk cake for the Indian festive season. This milk cake has been prepared with condensed milk, aloe vera gel, and honey as a sweetener. Each component utilized has undergone a thorough analysis to determine its nutritional worth. Energy (72.96 kcal), total protein (1.12 g), total carbohydrate (17.24 g), total fat (0.11 g), total sugar (0.83 g), vitamin C (4.49), calcium (27 mg), potassium (46 mg), iron (2.15 mg), and salt (2.89 mg) All of these included in an analysis of aloe gel's nutritional content. While the total flavonoid concentration (3.90/100 g) and fibre content illustrate the antioxidant potential of aloe gel. The same kind of study was done on honey, taking into various factors like moisture percentage (17.2), reducing sugar (71.80), specific gravity at 27 °C (1.37), and total sugar (76.56) per 100 g. FTIR analysis of gel was also done during this work and it was observed throughout the duration of this assessment that the final product, which was made using just natural food ingredients and no chemicals, can prove to be a highly beneficial and popular appetite suppressant among individuals of all ages. This is owing to the fact it is energized and offers a variety of health advantages.
Keywords **:** Milk product, Aloe milk cake, Honey milk sweets, Nutraceutical Contribution.

Introduction

Aloe vera scientifically known as *Aloe barbadensis*, belongs to the family Lilaceae. The term “Aloe “originated from the Arabic word "aloeh," which means "bitter". (Sheikh *et al*. 2021) Because of its extraordinary abilities, the aloe vera plant is preferred for herbal and Ayurvedic medicines (Sánchez-Machado *et al*., 2017). Due to its vast medicinal and functional benefits, its adoption in producing contemporary culinary goods has increased (Campestriani *et al*., 2013; Pirsa and Hafezi, 2022). Water, as well as several other minerals, enzymes, vitamins, amino acids, and other high-quality nutrients, make up most aloe vera leaves (Ebrahim *et al*., 2020). Aloe vera has been utilized as emollient, anti-inflammatory, laxative, anti-microbial, aphrodisiac, antifungal, and antioxidant in homoeopathic, allopathic, and Ayurvedic medicine because of these qualities (Sahu *et al*., 2014). Additionally, it has many aesthetic benefits, and indigenous tribes also utilize it as their food (Benzidia *et al*. 2019). According to Nizam *et al*. (2021) the prolonged period of time between the extraction of Aloe vera juice and its concentration before being turned into powder alters the rheological qualities and may be caused by ongoing enzyme activity and oxidation. They discovered that HPP enhances the texture of the cubes by speeding up the moisture transfer rate in Aloe vera, a food ingredient (Bhatta *et al*., 2020). Because of its significant medicinal benefits, aloe vera is included in a variety of dairy products, including yoghurt and buttermilk. Aloe vera gel with yoghurt is a fantastic way to get bioactives in a tasty form. Aloe Vera enriched curd was attempted to be made by Govindammal *et al*. (2017) Aloe vera enriched yoghurt was shown to contain less fat and more fibre as well as phytonutrients such steroids, phlobatenin, saponins, and anthraquinones when compared to the control. Aloe vera's healing abilities and positive impacts are due to its high fibre content, low fat, and vitamin E, C, and content (Hęś *et al*., 2019). While in maize and soybeans, the tocopherols b and c predominate is found in abundant amount. Moreover, vegetable oils rich in tocopherols a and c, vitamin E (tocopherol) is extensively dispersed across the plant kingdom (Ubaldi *et al*. 2005) Because, it acts as an antioxidant and an inhibitor of cholesterol formation, vitamin E has a significant impact on nutrition (Tiwari and sonker, 2022). In the current study, dried and crashed gel with natural ingredients will be used to create an Aloe vera-based food product (Sweets). The new aloe-based cuisine will then be evaluated for several nutritional factors. It is possible to overlook the issues posed by antioxidant and other dietary deficiencies using this unique technique.

Material and Methods

Preparation of milk Cake with Aloe vera gel:

3-4 fresh, healthy and plump aloe vera leaves were taken at a time from the outer parts of the plant. Wash gently

and let them air dry properly. Separate the inner gel from the leaf and cut the aloe gel into slices or cubes. To make milk cakes, boil 1Letter of milk till the half of its quantity at low flame till light brown color is appeared. Add 150 ml of aloe vera gel along with100 g honey gently in the in milk at luck warm temperature. Stirrer the mixture continually. Moreover, any other ingredients, such as fruits, dry fruits, etc., were also added at this time. The prepared mixture was spread on a tray and allowed to dry for a good shape.

Aloe gel Nutritional analysis:

Preparation of Extract

The aqueous extraction is done with 05 g of aloe vera pulp and 200 ml of distilled water in a beaker. The mixture is cooked between 30 and 40 degrees Celsius on a hot plate for 20 minutes while being continually stirred. The mixture is filtered using Whitman filter paper, and the filtrate is used for further preliminary nutritional analysis.

Available Energy

The caloric value of aloe gel was determined by measuring the heat produced when a given amount is completely burnt in oxygen. 'Bomb calorimeter' method was used in which the oxygen is put in under considerable pressure. Since it requires a calorimeter of robust construction, it has been called a bomb calorimeter.

Total carbohydrate

Carbohydrates are dehydrated by conc. H_2SO_4 to form furfural. Active form of the reagent is anthranol, the enol tautomer of anthrone, which reacts by condensing with the carbohydrate furfural derivative to give a green color in dilute and a blue color in concentrated solutions, which is determined colorimetrically. The blue - green solution shows absorption maximum at 620 nm.

Total Sugars

A 1 mL aliquot of carbohydrate solution was rapidly mixed with 3 mL of concentrated sulfuric acid in a test tube and vortexed for 30 s. The temperature of the mixture was raised rapidly within 10–15 s after addition of sulfuric acid. The solution was cooled in ice for 2 min to bring it to room temperature. Finally, UV light absorption at 315 nm was measured using a UV spectrophotometer. Reference (reagent blank) solutions were prepared following the same procedure as above, except that the carbohydrate aliquot was replaced with distilled deionized water.

Total fat

Fat content is measured by the weight of fat loss of the sample. Soxhlet method is a semi continuous solvent extraction approach. In this procedure, the sample is soaked completely for 5–10 min in a solvent and then siphoned back into the boiling flask. The Mojonnier test is an example of the discontinuous solvent extraction method (FSSAI 2022).

Total available Dietary fiber

Total Dietary Fiber measures total dietary fiber using phosphate buffer systems. Duplicate portions of sample of dried (defatted if necessary) foods are gelatinized and partially digested with alpha-amylase and then enzymatically digested with protease and amyloglucosidase to remove the protein and starch present in the sample, simulating human digestion. One portion of the sample is analyzed for protein and the other is ashed. Total dietary fiber is calculated as the weight of the residue minus the weight of the protein and ash, reported as a percentage of the original sample weight (FSSAI, 2022)

Total protein analysis

For the determination of crude protein, 2 gm fine powder of aloe vera leaves was mixed with 10 mL of extraction buffer (100 mM monobasic potassium phosphate, 1% polyvinylpyrrolidone-40 (PVP-40) 2mM EDTA, pH 7.0) and vortex shake till the tissue was homogenized which may takes about 20-25 seconds, then centrifuged for12 min at 4ºC. The supernatant was collected in Eppendorf tubes and stored at -20ºC. Further, the quantification was carried out by the Bradford method (1976).

Vitamin analysis

L-ascorbic acid was determined by the 2,6 dichlorophenol–indophenol (Merck KGaA, Darmstadt, Germany) titrimetric method according to AOAC method No. 967.21 (AOAC, 2000). The vitamin C content in fresh and rehydrated A. vera gel samples was similarly evaluated. A total of 10 ± 0.1 g of triturated sample was weighed, filtered, and diluted to a volume of 50 mL. All measures were done in triplicate; the vitamin C content is expressed as mg AA/100 g d.m. (FSSAI, 2022).

Analysis of honey

Raw honey is used in whole process is for healthy sweetener. The quality parameters of honey were analyzed as per Indian standards (IS): 4941: 1994. RA: 2002.

Mineral analysis of aloe vera gel

The mineral content was measured in roots, stems, and leaves dried tissue. At the end of pot experiment the mature plants were carefully removed and surface-sterilized, to remove all kinds of impurities sticking their asparagus, and oven dried then analyzed for mineral updates. Mineral content of leaves were measured in mature leaves approximately 20–30 cm of length. The leaves were separated from the main plant. All the plants were placed in a pre-heated hot air oven to dry at 80°C in which the root, stem and leaves of the main plant were kept separately. Further, Na, Ca, Fe, and K content were determined by atomic absorption spectrophotometer. The AAS samples were prepared via acid digestion with H_2SO_4. (FSSAI, 2022).

Antioxidant capacity

For estimation of antioxidant activity, Aloe vera peel sample was dissolved in 6 ml of 0.008% methanol solution containing 1, 1diphenyl-2-picrylhydrazyl (DPPH) as radical scavenging agent After the reaction mixture, sample was analyzed through spectrophotometer at 517 nm for examination of antioxidant activity (López, 2013).

Flavonoid estimation

Aloe vera sample was crushed and dissolved in solvent (1mg/ml) and further 1 ml of 2% aluminium chloride ($AlCl_3$) solution (methanol) was added and mixed well. Afterwards, mixed sample was incubated at room temperature for 1 h. After incubation, sample was examined through spectrophotometer at 415 nm as per Hwang *et al*., 2015.

Phenolic Content

The reaction mixture was prepared by mixing 0.5 ml of plant extract solution, 2.5 ml of 10% Folin-Ciocalteu's reagent dissolved in water and 2.5 ml of 7.5% of Na_2CO_3 aqueous solution. The samples were thereafter incubated in a thermostat at 45°C for 45 min. The absorbance was determined using spectrophotometer at wave length 765nm. (Tiwari and Shankar, 2022).

Terpenoids

About 10 gm of Aloe vera powdered was taken and soaked in alcohol for 24 hours. It was filtered and filtrate extracted with petroleum ether; this ether extract was treated as total terpenoids (Doughari, and Saa-Aondo, 2021)

Fourier transform Infrared Spectrometer (FTIR)

The gel used in this preparation further undergo with Fourier Transform Infrared Spectrometer (FTIR) technique on αE-FTIR Spectrophotometer, Bruker, USA, over a spectrum range of 500–4000 cm^{-1} with powder dried aloe gel samples. Pellets of the driedsamples were prepared using KBr and scanned under thespectrum with a scanning frequency of 24 scans with a scanning resolution of 4 cm^{-1} (Chitranshi and Kapoor, 2022).

Result and Discussion

Aloe vera was used to test for the nutritional analysis and various phytochemicals. Fresh Aloe vera leaves were subjected to drying at 50°C and their energy, carbohydrate, fat, protein, fiber and mineral content were analyzed. These findings are in total agreement with those existing in the literature (Dharajiya *et al*., 2017).

Table 1 : Nutritional Analysis

S. No.	Parameter	Test Result as per 100 gm	Protocol
1.	Total Energy	72.96 Kcal	By Calculation
2.	Total Fat	0.11gm	AQAC
3.	Protein	1.12gm	IS: 7219
4.	Dietary Fiber	14.25gm	AQAC
5.	Total carbohydrate	17.24gm	By Calculation
6.	Sugar	0.83gm	AQAC
7.	Vitamin C	7.49gm	AQAC
8.	Calcium	27 mg	AAS
9.	Potassium	46 mg	AAS
10.	Vitamin A	0.0IU	AQAC
11.	Iron	2.15 mg	AAS
12.	Sodium	2.89 mg	Spectrophotometer

Total Phenolic Content (TPC)

TPC of methanolic extract of whole Aloe Vera leaves was found to be 2.35gm/ 100g of dry weight which is shown in Table-2. This finding is in agreement with the study done by Kumar *et al*. (2017) where the values ranged from 32.9 to 65.7 mg GAE per g of dry weight. And this finding is concomitant with sample from Kerala whose TPC of methanolic extract of whole Aloe Vera plant was 32.9 ± 0.19 mg GAE/ g of dry weight. Maximum values of TPC were obtained for Punjab, Jammu and Himachal accessions. Kerala, Telangana and West Bengal showed low TPC values as compared with other accessions in the study by (Chhetri and Khatri, 2017). Different agro-climatic conditions have effects on phytochemical diversity and antioxidant potential of Aloe Vera plant (Kumar *et al*., 2017).

Total Flavonoid Content (TFC)

This study showed Total Flavonoid Content (TFC) of methanolic extract of Aloe Vera to be 3.90gm QE/ 100 gm of dry weight. The findings of this study are more than the study done by Lefahal *et al*. (2018) where total flavonoid content of methanolic extract of crude gel was found to be 44.09 ± 2.13 mg QE/g of crude extract. The difference is probably due to the difference in the part of the plant used and also due to difference in the chemical used to prepare standard curve (Asuk *et al*., 2015). The flavonoid concentration of methanolic extract of *P. capillacea* was 91.58 ± 3.74QE/ mg which is near to the flavonoid content of Aloe Vera (Formagio *et al*., 2014). Aloe Vera is also concomitant to the study of leaves of *Zapoteca portoricensis* where TFC of methanolic extract was found to 63.67 ± 0.20 mg QE/g (Agbo *et al*., 2015).This study showed total flavonoids of ethanolic extract of Aloe Vera to be 54.95±2.46 mg QE/g dry weight of extract as shown in Table-2. This result is higher than the study done by Botes *et al*. (2008) which showed that total flavonoids (mg of CE/100g ± SD) of 95% Aqueous Ethanol Leaf Gel Extracts (ELGE) was 20.2 ± 0.50. Other study showed flavonoid content of ethanol extract of Aloe Barbadensis flower was 13.20 ± 0.09 mg CE/g of dry mass (Debnath *et al*., 2018). Some flavonoids are antioxidants and have been proved to exhibit a wide range of biological activities like antimicrobial, anti-inflammatory, antiangionic, analgesic, anti-allergic, cytostatic and antioxidant properties.

Total Antioxidant Capacity (TOAC)

In the study, TOAC of 99% methanolic extract of Aloe Vera was found to be in good percentage (Table-2). This finding is concomitant to the study done in Ethiopia in green tea where TOAC was 80.0 ± 0.63% (Bizuaychu *et al*., 2016). The antioxidative potential of plant extracts can be measured using various in vitro assays and each assay is based on at least one feature of antioxidant activity. However, total antioxidant properties of plants cannot be evaluated by any single method because of their complex nature of phytochemicals. Therefore, two or more methods should always be employed in order to evaluate the total antioxidative effects of plant extracts (Gunathilake and Ranaweera, 2016). Antioxidants prevent free radical induced tissue damage by preventing the formation of radicals, scavenging them, or by promoting their decomposition (Lobo *et al*., 2010).

Table 2 : Antioxidant Analysis

	Parameter	Result as per 100 gm
1.	Total Flavonoid Content	3.90
2.	Saponins	1.15
3.	Tarpenoids	2.60
4.	Total Phenolic Content	2.35

Properties of honey

During the study of Honey using IS 4941:1994 protocols the moisture was fond about 17.2% in 100grms. Reducing Sugars are 71.80; Specific gravity 27ºC is 1.37; Sucrose is 4.52, Total Sugars is 76.56, FG ratio is 0.99 and 72.06 HMF is found.

Table : 3 : Honey Analysis

S. No.	Parameter	% in 100 gms		Protocols
1.	Moisture	17.2		IS 4941:1994
2.	Reducing Sugars	71.80		IS 4941:1994
3.	Specific gravity 27ºC	1.37		IS 4941:1994
4.	Sucrose	4.52		IS 4941:1994
5.	Total Sugars	76.56		IS 4941:1994
6.	FG ratio	0.99		IS 4941:1994
7.	HMF	72.06		IS 4941:1994

FTIR analysis

Phytochemical screening of saponins was done by using Fourier Transform Infrared (FTIR) spectrometer (Fig 01). Absorption spectra obtained in the range of 4000-400 cm^{-1} show the presence of a hydrogen-bonded hydroxyl group (-OH).In gel extracts, sharp peaks were seen in the range of 400 - 4000 cm^{-1}, showing C-H stretching and the carboxylic group. In continuation peaks obtained in the range of 1700 to 1800 confirm the presence of esters(C=O). While, peaks observed at 1400-1600 cm^{-1} indicated the presence of (C=C) group in the extracted compounds. In gel extracts, peaks were observed in the range of 1000-1200 cm^{-1}confirms the presence of carbonyl (C-O) and ether (C-O-C) groups. Thus, the FTIR analysis confirms the existence of saponins in aloe vera by confirming the presence of carboxylic hydroxyl, esters, and ether functional groups after compare with standards.

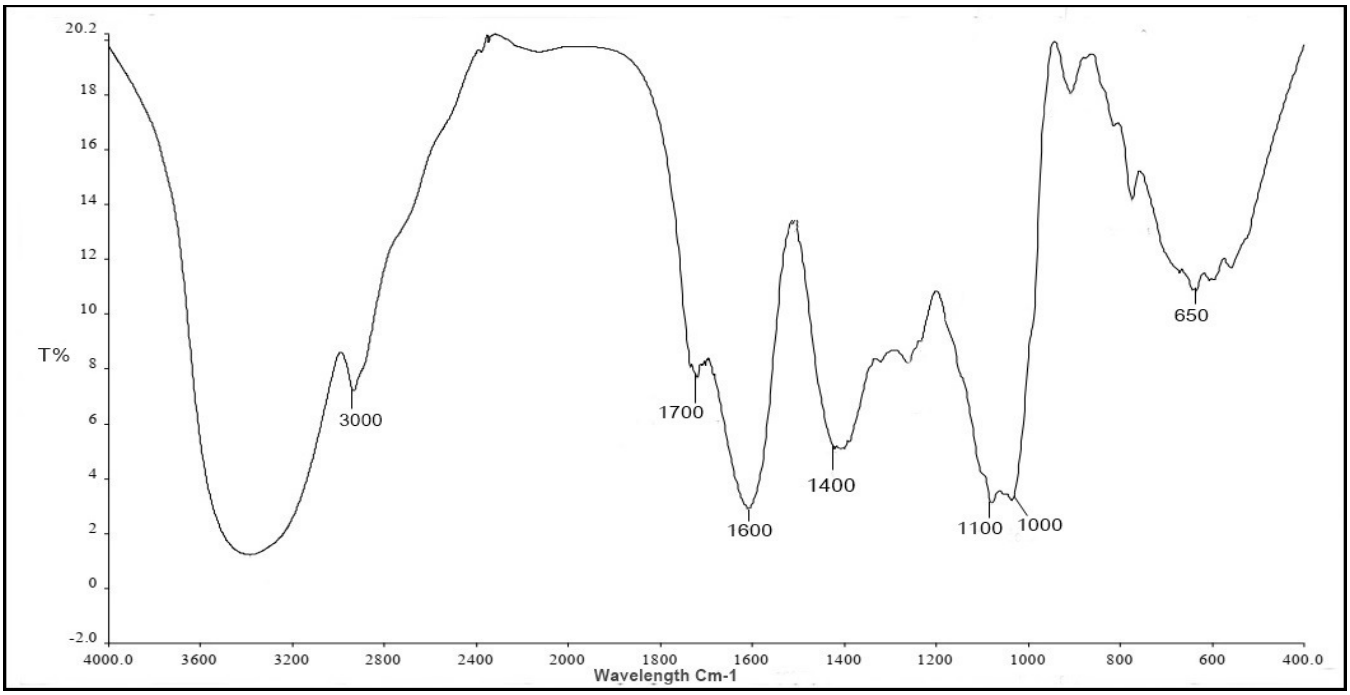

Fig. 1 : FTIR analysis of Aloe vera gel

Conclusion

In concluding remark the antioxidant activity of the methanolic and ethanolic extract was observed in Aloe vera gel. Whereas, in phytochemical analysis flavonoids, steroids, terpenoids, proteins, phenols, carbohydrates, reducing sugar, starch, tannins, glycosides were also detected in Aloe vera gel except saponin. Along with this the additional use of honey was prove as chary on cake during this food product development. Remarkable result was observed in making of testy milk cake which is full of health benefits during festivals.

Conflict of interest

Author(s) of this lookup work has no conflict with any ones interest comes under this work or any other.

Author's contribution

In this research author first and second execute all the laboratory experiments including collection of ingredients required in make of cake. Further, third author helps in quality analysis of end product. Author four helps in write-up, data analysis and compilation for this study. Finally, the corresponding author gives his remarkable suggestions in manuscript writing.

Acknowledgement

The authors of this paper are very thankful to the Honorable Chancellor Shobhit University, Gangoh, Saharanpur, Director & adminstration Sri Ram group of Colleges Muzaffarnagar for providing the financial supportand research facilities in the departmental & individual labs to complete this work properly. Also thankful to management & lab head NCML labs, Gurugram, Haryana.

Funding Information

Regular funding was provided by Shobhit university Gangoh, Saharanpur & Sri Ram Group of Institutions Musaffarnagar UP in there departmental labs. NCML Lab also helps in providing analysis results on priority basis.

References

Agbo, M.O., Uzor, P.F., Akazie-Nneji, U.N., Eze-Odurukwe, C.U., Ogbatue, U.B. and Mbaoji, E.C. (2015). Antioxidant, Total Phenolic and Flavonoid Content of

Selected Nigerian Medicinal Plants. *Dhaka University Journal of Pharmaceutical Sciences*, 14(1): 35-41.

AOAC (2000) Official Methods of Analysis. 17th Edition, TheAssociation of Official Analytical Chemists, Gaithersburg, MD, USA. Methods 925.10, 65.17, 974.24, 992.16.

Asuk, A.A., Agiang, M.A., Dasofunjo, K. and Willie, A.J. (2015). The biomedical significance of the phytochemical, proximate and mineral compositions of the leaf, stem bark and root of *Jatropha curcas*. *Asian Pacific Journal of Tropical Biomedicine,* 5(8): 650-657.

Benzidia, B., Barbouchi, M., Hammouch, H., Belahbib, N., Zouarhi, M., Erramli, H. *et al*. (2019). Chemical composition and antioxidant activity of tannins extract from green rind of *Aloe vera* (L.) Burm. F. *Journal of King Saud University-Science,* 31(4): 1175-1181.

Bhatta, S., Stevanovic Janezic, T. and Ratti, C. (2020). Freeze-drying of plant-based foods. *Foods*, 9(1): 87.

Bizuayehu, D., Atlabachew, M. and Ali, M.T. (2016). Determination of some selected secondary metabolites and their *in vitro* antioxidant activity in commercially available Ethiopian tea (*Camellia sinensis*). *Springer Plus*, 5(1): 1-9.

Botes, L., Van der Westhuizen, F.H. and Loots, D.T. (2008). Phytochemical contents and antioxidant capacities of two *Aloe greatheadii* var. davyana extracts. *Molecules,* 13(9): 2169-2180.

Bradford, M.M. (1976). A rapid and sensitive method for the quantitation of microgram quantities of protein utilizing the principle of protein-dye binding. *Analytical Biochemistry*, 72(1-2): 248-254.

Chhetri, S.B.B. and Khatri, D. (2017). Phytochemical screening, total phenolic and flavonoid content and antioxidant activity of selected Nepalese plants. *World Journal of Pharmacy and Pharmaceutical Sciences*, 6(12): 951-968.

Chitranshi, R. and Kapoor, R. (2021). Utilization of over-ripened fruit (waste fruit) for the eco-friendly production of ethanol. *Vegetos,* 34: 270-276.

Debnath, T., Ghosh, M., Lee, Y.M., Nath, N.C.D., Lee, K.G., Lim, B.O. (2018). Identification of phenolic constituents and antioxidant activity of *Aloe barbadensis* flower extracts. *Food and Agricultural Immunology*, 29(1): 27-38.

Dharajiya, D., Pagi, N., Jasani, H. and Patel, P. (2017). Antimicrobial activity and phytochemical screening of Aloe vera (*Aloe barbadensis* Miller). *International Journal of Current Microbiology and Applied Sciences*, 6(3): 2152-2162.

Doughari, J.H. and Saa-Aondo, M. (2021). Phytochemical analysis of crude methanol extracts and antimicrobial activity of n-hexane fractions of methanol seed and pod extracts of *Prosopis africana* on some selected microrganisms. *Archives*, 2: 121-137.

Ebrahim, A.A., Elnesr, S.S., Abdel-Mageed, M.A.A. and Aly, M.M.M. (2020). Nutritional significance of aloe vera (Aloe barbadensis Miller) and its beneficial impact on poultry. *World's Poultry Science Journal,* 76(4): 803-814.

Formagio, A.S.N., Volobuff, C.R.F., Santiago, M., Cardoso, C.A.L., Vieira, M.D.C. and Pereira, Z.V. (2014). Evaluation of antioxidant activity, total flavonoids, tannins and phenolic compounds in *Psychotria* leaf extracts. *Antioxidants,* 3(4): 745-757.

Govindammal, D., Seethalakshmi, M. and Thangaraj, S. (2017). An evaluation of physio-chemical properties on aloevera gel fortified yoghurt. *Asian Journal of Dairy and Food Research,* 36(4): 288-291.

Gunathilake, K.P.P. and Ranaweera, K.K.D.S. (2016). Antioxidative properties of 34 green leafy vegetables. *Journal of Functional Foods*, 26: 176-186.

Hęś, M., Dziedzic, K., Górecka, D., Jędrusek-Golińska, A. and Gujska, E. (2019). *Aloe vera* (L.)Webb.: natural sources of antioxidants–a review. *Plant Foods for Human Nutrition,* 74: 255-265.

Hwang, J.W., Kim, E.K., Kim, Y.S., Lee, J.W., Lee, J.J., Pyo, H.J. *et al*. (2015). Growth period effects on the protective properties of Aloe vera against t-BHP-induced oxidative stress in change cells. *Journal of Microbiology and Biotechnology,* 25(12): 2072-2081.

Indian Standard EXTRACTED HONEY-SPECIFICATION (Second Revision)(IS): 4941: 1994. RA: 2002.

Khan, F.A., Ullah, Z. and Haider, S. (2011). Phytochemicals screening and antimicrobial activities of selected medicinal plants of Khyber pakhtunkhwa Pakistan. *Afr. J. Pharm. Pharmacol*. 5: 746–750.

Kumar, S., Yadav, A., Yadav, M. and Yadav, J.P. (2017). Effect of climate change on phytochemical diversity, total phenolic content and in vitro antioxidant activity of *Aloe vera* (L.) Burm.f. *BMC research notes*, 10(1): 60.

Lefahal, M., Zaabat, N., Ayad, R., Makhloufi, E.H., Djarri, L., Benahmed, M., Laouer, H., Nieto, G. and Akkal, S. (2018). *In Vitro* Assessment of Total Phenolic and Flavonoid Contents, Antioxidant and Photoprotective Activities of Crude Methanolic Extract of Aerial Parts of *Capnophyllum peregrinum (L.)* Lange (Apiaceae) Growing in Algeria. *Medicines (Basel, Switzerland):* 5(2): 26.

Lobo, V., Patil, A., Phatak, A. and Chandra, N. (2010). Free radicals, antioxidants and functional foods: Impact on human health. *Pharmacognosy reviews,* 4(8): 118.

López, A., De Tangil, M.S., Vega-Orellana, O., Ramírez, A.S., Rico, M. (2013). Phenolic constituents, antioxidant and preliminary antimycoplasmic activities of leaf skin and flowers of Aloe vera (L.)Burm. f. (syn. *A. barbadensis* Mill.) from the Canary Islands (Spain). *Molecules,* 18(5): 4942-4954.

Manual of methods of foods, dairy and dairy products, Food Safety Slandered Authority of India-2022

Narsih, K.S. and Wignyanto, W.S. (2012). Identification of aloin and saponin and chemical composition of volatile constituents from Aloe vera (L.) Peel. *J Agric Food Tech*, 2: 79-84.

Nizam, N.H.M., Rawi, N.F.M., Ramle, S.F.M., Abd Aziz, A., Abdullah, C.K., Rashedi, A. and Kassim, M.H.M. (2021). Physical, thermal, mechanical, antimicrobial and physicochemical properties of starch based film containing aloe vera: A review. *Journal of Materials Research and Technology*, 15: 1572-1589.

Pirsa, S. and Hafezi, K. (2022). Hydrocolloids: Structure, preparation method, and application in food industry. *Food Chemistry*, 133967.

Sahu, P.K., Giri, D.D., Singh, R., Pandey, P., Gupta, S., Shrivastava, A.K., ... and Pandey, K.D. (2013). Therapeutic and medicinal uses of Aloe vera: a review. *Pharmacology & Pharmacy,* 4(08): 599.

Sánchez-Machado, D.I., López-Cervantes, J., Sendón, R. and Sanches-Silva, A. (2017). Aloe vera: Ancient knowledge with new frontiers. *Trends in Food Science & Technology*, 61: 94-102.

Sheikh, A., Pathak, A., Bante, C., Gedam, A., Sonwane, A., Gharjee, A. and Bhange, P. (2021). Formulation and Characterization Of Poly Herbal Gel. *World Journal of Pharmaceutical Research,* 10(13): 1755-1768

Shi, J., Xue, S.J., Ma, Y., Li, D., Kakuda, Y. and Lan, Y. (2009). Kinetic study of saponins B stability in navy beans under different processing conditions. *Journal of Food Engineering*, 93(1): 59-65.

Tiwari, R. and Shankar, P. (2022). Prospects of aloe vera juice in supplementing nutrition and antioxidantal properties", Int. *Journal of Emerging Technologies and Innovative Research*, 9(8): 738-750.

Tzanova, M., Atanasov, V., Yaneva, Z., Ivanova, D. and Dinev, T. (2020). Selectivity of current extraction techniques for flavonoids from plant materials. *Processes*, 8(10): 1222.