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Literature Review: Analysis of Moringa Leaf Extract Utilization

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Keywords

Physical, chemical, ice cream, moringa leaves.

ABSTRACT

Moringa leaves (Moringa oleifera) is one of the natural ingredients that has the potential to be used as an additive in food products, including ice cream. The purpose of this study is to determine the use of Moringa leaf extract from various aspects. This study used the literature review method. Data in this study was collected from various literature sources, such as scientific journals, articles, books, and related research reports. The data that has been collected is then analyzed in three stages, namely data reduction, data presentation and conclusions. The results showed that Moringa leaves can be used in various aspects including reducing cholesterol levels, increasing breast milk production, increasing the weight of toddlers and pregnant women, as lactogum and supplements, as antioxidants, preventing malnutrition or stunting, increasing body immunity, alternative food products, affecting the physical stability of pH-related creams, adhesion, dispersion, and viscosity.

INTRODUCTION

Moringa plants (Moringa oleifera) are plants that contain phenolic compounds, namely flavonoids that have activity as antioxidants (Rikadyanti et al., 2021). Moringa leaves contain vitamin C, calcium, vitamin B, iron, vitamin A, potassium and protein in large quantities that are easily digested and absorbed by the body. One of the most prominent ingredients of moringa is antioxidants, especially the leaves contain high antioxidants (Haq, 2022). Here is the nutritional content of fresh and dried Moringa leaves.

The use of Moringa leaves in Indonesia is currently still limited, generally only as an ingredient in the vegetable menu. This is due to the lack of public knowledge in using Moringa leaves as a food source. The variety of nutritional content in Moringa leaves can support food diversification efforts (Shiriki et al., 2015). One of the uses of Moringa leaves to be processed into ice cream, is expected to increase the intake of nutritional value and added value of Moringa leaves. Moringa leaf ice cream plays a role in increasing nutritional value, namely as a source of antioxidants, so it is expected to have a positive effect on health (Naufal Ramadhani, 2020; Parera et al., 2021; Prihati, 2015).

Ice cream is a semi-solid meal made from a combination of milk, vegetable or animal fats, sugar without or with other additives permitted by freezing procedures. Generally, ice cream is made using dairy raw materials, such as cow's milk, goat's milk, and soy milk. As the main raw material, milk has an important role that affects the sensory and physico-chemical properties of ice cream (Kurniawan et al., 2021). However, many ice creams in circulation contain preservatives because a factory mass-produces them, so they harm the human body. Therefore, innovation is made so that ice cream becomes a healthy food that is favored by all circles. Using Moringa leaves, trying to create healthy and nutritious ice cream (Herlina &

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Yulia, 2021; Melo et al., 2013), and cosmetics and drugs to supplement drinks. Supplement drinks are energy-boosting drinks that are included in the category of food supplements, are complementary products for food nutritional needs, and contain one or more ingredients in the form of vitamins, minerals, amino acids, or other ingredients that have nutritional value and/or physiological effects in concentrated amounts (Tukiran., 2020). Only a few culinary, medicine, and cosmetic business people carry their products using traditional basic ingredients from their own country, such as Moringa leaves.

The research of Rosida et al. (2020) stated that Moringa leaves have a high nutritional content and are easily obtained in the surrounding environment but are still less diverse in their use. People generally only use Moringa leaves as food processed into clear vegetables. Thus, this study aims to analyze the utilization of Moringa leaves that are beneficial to health,

METHODS

This research is a study using the literature review method. Research data was collected from various literature sources, including scientific journals, articles, books, and research reports related to the topic being studied, namely the analysis of ice cream's physical and chemical properties with Moringa leaf extract. The data collection process begins with finding and accessing relevant literature sources. Data is searched based on several keywords, including Moringa leaf extract, Moringa leaf extract, and Moringa leaf benefit. After the data was collected, data reduction was carried out, where researchers identified the most relevant and important information related to the use of Moringa leaf extract. At this stage, the data is sorted based on the following exclusion and inclusion criteria:

Table 1. Research Criteria

No	Criterion	Inclusion	Exclusion
1	Language	Indonesian and English	In addition to Indonesian and English
2	Publication Period	2013-2023	Before 2013

Furthermore, the reduced data will be presented as summaries, tables, or graphs. The presentation of this data will facilitate the understanding of the findings in the literature sources that have been reviewed. Data is presented clearly and systematically for easy understanding and comparison. After the data is well presented, the final stage is concluding. At this stage, researchers will conclude the results of the analysis from the literature review data that has been carried out.

RESULTS

Based on the search results, results were obtained including the use of Moringa leaf extract as many as 4,260 articles, Moringa leaf extract as many as 8,620 articles, and Moringa leaves as many as 7,120 articles. After the data reduction process, 15 articles were obtained which will be discussed in this study.

Table 2. Research Results

No	Author and Year	Journal	Research Results
1	Wahyuningsih, R., &; Darni, J. (2021).	Sasambo Journal of Community Service, 2(2), 161-165.	To prevent stunting in children, mothers need to consume proper nutritional intake, and have good nutritional knowledge. Efforts to improve stunting can be done by increasing knowledge so

			that it can improve feeding behavior in children with processed Moringa leaves as a snack to prevent stunting problems.
2	Suhaemi, Z., Yerizal, E., &; Yessirita, N. (2021).	Journal of Animal Product Production Science and Technology, 9(1), 49-54.	The higher the dose of adding Moringa leaf flour (TDK), can increase the crude protein content, and reduce crude fat and total cholesterol from nuggets.
3	Muthoharoh, L., &; Rianti, D. R. (2020).	Akfarindo Journal of Pharmacy, 27-35.	Organoleptic and homogeneity tests showed no change and homogeneous preparations. The pH test results of Moringa leaf extract cream preparations in weeks 0, 2 and 4 were 6.38, 6.32 and 6.42 respectively, adhesion tests were 1.66 seconds, 2.08 seconds and 1.42 seconds, and dispersion power was 6.01 cm, 6.15 cm and 4.99 cm. Viscosity testing of Moringa leaf extract cream preparations decreased from 667.11 cps to 574.38 cps. The addition of Moringa leaf extract affects the physical stability of the cream in terms of pH, adhesion, dispersion and viscosity. There is a significant difference in the stability ratio between the two formulas in the pH parameter.
4	Rani, R., Jayani, N., &; Darmasetiawan, N. (2021).	Journal of Community Service. 5(3), 312-318.	Moringa leaf nuggets and ice cream products are alternative food products that can be produced at affordable prices to meet the nutritional needs of toddlers in Bogo Village.
5	Lubis, S., Alfaruqi., M., Fasha., N., et al. (2021)	Journal of AgribiScience. 7(2), 21-28.	The implementation of socialization of the use of Moringa leaves as a way to increase body immunity in order to prevent viruses and the practice of making food mixtures from Moringa leaves with the Village Head, students and lecturers in Air Joman Village. The processed foods from Moringa leaves are Moringa leaf noodles, Moringa leaf sticks, Moringa leaf meatballs, Moringa leaf clear vegetables, Moringa leaf pastries, Moringa leaf steamed eggs, and Moringa leaf sponge.

6	Asmawati, A., Marianah, M., Ihromi, S., Sari, D. A., &; Nurhayati, N. (2022).	JMM (Journal of Independent Society), 6(2), 1402-1410.	Moringa is one type of vegetable that is very rich in nutrients, especially protein, vitamin A, vitamin C and calcium. Moringa also contains bioactive compounds such as polyphenols that can function as natural antioxidants, so it is very good to be given to children as an addition to their food menu to optimize their growth and development. So that Moringa leaves are considered capable of preventing malnutrition and stunting.
7	Hadju, V., &; Bahar, B. (2014).	Journal of Public Health Sciences, 5(3).	Giving Moringa leaf extract can increase the weight of pregnant women but cannot provide an increase in the intake of pregnant women informal sector workers.
8	Israwati, I., Werna Nontji, W. N., &; Veni Hadju, V. H. (2021).	Journal of Midwifery, 10(2), 171-180.	In the intervention group and control group there was an effect of iron (Fe) and Moringa leaf tea (Moringa Oleifera Tea) on Birth Weight and Body Length and there was a difference between birth weight, body length and placental weight in the intervention group the average value was greater than the control group, but both had mean values in the normal category.
9	Widowati, L., Isnawati, A., Alegantina, S., &; Retiaty, F. (2019).	R&D Media, 29(2), 143-152.	Klabet seed extract and Moringa leaves have superior potential as lactagogum and at the same time supplements with high nutrition.
10	Damayanti, A., &; Widiawati, I. (2021).	Journal of Silawangi, 2(2), 861-869.	Giving Moringa leaf extract can affect milk production and baby's weight gain.
11	Editia, Y. V., &; Sigahitong, N. (2023).	IMJ (Indonesian Midwifery Journal), 6(2), 50-54.	There is an effect of giving Moringa leaf ice cream on increasing toddler weight in Gemeh sub-district, Talaud Islands Regency. It can be concluded that Moringa leaf ice cream affects the weight increase of toddlers who suffer from stunting and malnutrition. Moringa leaf ice cream can be used as an additional food at the Gemeh Health Center for toddlers and can be innovated as attractive as possible so that it can increase the appetite of toddlers at posyandu.

12	Johan, H., Anggraini, R. D., &; Noorbaya, S. (2019).	Sebatik, 23(1), 192-194.	Moringa leaves have the potential to increase breast milk production in postpartum mothers.
13	Tjong, A., Assa, Y. A., &; Purwanto, D. S. (2021).	EBiomedic, 9(2).	There is a significant reduction in blood cholesterol levels when given Moringa leaves in lowering blood cholesterol levels, as well as the dose given. In conclusion, antioxidants in Moringa leaves can reduce cholesterol levels in the blood.
14	Sugihartini, N., &; Nuryanti, E. (2017).	Periodical of Dermatology and Venerology, 29(1).	The test showed that an increase in the concentration of Moringa leaf extract led to a decrease in evenness ($p<0.05$) which was effective at a concentration of 3%. The concentration of Moringa leaf extract that can be used as antiaging that reduces evenness is 3%.
15	Fauziandari, E. N. (2019).	Journal of Health by Husada, 7(2), 185-190.	The results showed a significant difference between hb levels before and after Moringa leaf extract. With the result of p value 0.009 < 0.005. Based on this p value, it can be concluded that Moringa leaf extract is effective for increasing hemoglobin levels in adolescent girls.

Moringa leaf extract has many benefits that are beneficial to human health and well-being. The rich nutritional content, including vitamins, minerals, and protein, makes Moringa leaf extract a source of high-value nutrients (Muliawati, 2020; Odetta, 2019). Bioactive compounds such as polyphenols, flavonoids, and alkaloids in Moringa leaf extract have potential health properties, such as antioxidant and anti-inflammatory properties that protect the body from free radicals and inflammation. This is supported by research (Alfaruqi et al., 2021). On the socialization of the use of Moringa leaves to increase body immunity to prevent viruses and the practice of making food mixtures from Moringa leaves with the Village Head, students, and lecturers in Air Joman Village. The processed foods from Moringa leaves are Moringa leaf noodles, Moringa leaf sticks, Moringa leaf meatballs, Moringa leaf clear vegetables, Moringa leaf pastries, Moringa leaf steamed eggs, and Moringa leaf sponge. Moringa leaf nuggets and ice cream products are alternative food products that can be produced at affordable prices to meet the nutritional needs of toddlers in Bogo Village (Rani et al., 2021). The addition of Moringa leaf flour can also increase the crude protein content, as well as reduce crude fat and total cholesterol from nuggets (Suhaemi et al., 2021).

The nutritional content in Moringa leaves can help increase nutritional intake and nutrition in stunted children. Iron and vitamin A in Moringa leaves can help overcome nutritional deficiencies often associated with stunting. This was also done by Wahyuningsih & Darni who explained that efforts to improve stunting can be made by increasing knowledge so that it can improve feeding behavior in children with processed Moringa leaves as a snack to prevent stunting problems.

According to research (Damayanti & Widiawati, 2021; Editia & Sigahitong, 2023; Israwati et al., 2021), Moringa leaf extract is proven to increase weight in toddlers. In addition to toddlers, Moringa leaves

are also proven to increase weight in pregnant women; according to (Hadju & Bahar, 2014). The provision of Moringa leaf extract can increase the weight of pregnant women but cannot provide an increase in the intake of pregnant women informal sector workers. Moringa leaves contain important nutrients such as protein, calcium, iron, vitamin A, vitamin C, and other nutrients needed for healthy growth and development in children (Sormin, 2018). This nutrient content helps increase appetite, nutrient absorption, and weight growth in toddlers who experience nutritional problems or are underweight. Moringa leaf extract also contains phytochemical compounds such as beta-sitosterol, isothiocyanates, and flavonoids that positively affect the digestive system and body metabolism (Rahayu, 2020). These compounds help increase the absorption of nutrients from food and increase the efficiency of metabolic processes, thus helping to increase toddler weight more effectively (Rani et al., 2019).

The phytochemical compounds in Moringa leaves, such as alkaloids, flavonoids, and other polyphenolic compounds, are believed to affect breast milk production positively. This is evidenced in research (Johan et al., 2019), which explains that Moringa leaves can potentially increase breast milk production in postpartum mothers. According to Damayanti & Widiawati, (2021) Giving Moringa leaf extract can affect breast milk production and infant weight gain.

The use of Moringa leaf extract is also seen in the cosmetics, skincare, and animal feed industries because of its ability to moisturize the skin, care for hair, and increase the productivity of livestock. In addition, Moringa leaf extract is also used as a raw material in the production of oils used in various cosmetic and pharmaceutical products. In research (Sugihartini & Nuryanti, 2017), Moringa leaf extract caused a decrease in effective evenness at a concentration of 3%. The concentration of Moringa leaf extract that can be used as antiaging that reduces evenness is 3%. The utilization of Moringa leaf extract as an anti-aging agent offers a natural and sustainable approach to care for the skin without harmful side effects. Moreover, the natural properties of Moringa leaf extract make it an eco-friendly option in the skin care industry. Then, adding Moringa leaf extract affects the physical stability of the cream related to pH, adhesion, dispersion, and viscosity. There is a significant difference in the stability ratio between the two formulas on pH parameters (Muthoharoh & Rianti, 2020).

Moringa leaf extract also has superior potential as a galactagogue and, simultaneously, a supplement with high nutrition (Widowati et al., 2019). In addition, (Tjong et al., 2021) explained that there was a significant reduction in blood cholesterol levels when given Moringa leaves in lowering blood cholesterol levels and the dose given. In conclusion, antioxidants in Moringa leaves can reduce cholesterol levels in the blood. Moringa also contains bioactive compounds such as polyphenols that can function as natural antioxidants, so it is very good to be given to children as an addition to their food menu to optimize their growth and development. So, Moringa leaves can prevent malnutrition and stunting (Asmawati et al., 2022). While researching (Fauziandari, 2019), there is a significant difference between the levels before and after giving Moringa leaf extract. With the result of p-value 0.009 < 0.005. Based on this p-value, it can be concluded that Moringa leaf extract effectively increases hemoglobin levels in adolescent girls. With a myriad of benefits, Moringa leaf extract is a promising alternative to improve public health and welfare and expand the utilization of the potential of this plant in various fields of human life.

CONCLUSION

The study's results highlighted the various benefits of Moringa leaves in health and food. Moringa leaves have several uses, including its ability to lower cholesterol levels, increase milk production, and support weight growth in toddlers and pregnant women. The properties of lactogen and the nature of Moringa leaf supplements are also beneficial for nursing mothers and overall body health. The content of antioxidants in it protects against free radicals and can potentially prevent malnutrition or stunting in

children. Moringa leaves also increase body immunity and support the immune system. In the context of food, Moringa leaves can be used as an alternative to nutritious and healthy food products. The compounds in Moringa leaves can also affect the physical stability of the cream, allowing its use in the food and cosmetic industry. As a potential natural ingredient, Moringa leaves provide a valuable alternative to support human health and nutrition and provide a variety of products that benefit society. Suggestions for future research include a deeper analysis of the content of nutrients and active compounds, further understanding of the effects of extraction and processing, research on toxicity and safety of use, and exploration of potential use in organic farming and as raw materials for functional food.

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