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MEDICINAL USES AND EFFECT OF DIFFERENT PROCESSING TECHNIQUES (BLANCHING AND DRYING) OF DRUMSTICK LEAVES (*MORINGA OLEIFERA*)

Home Science

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ABSTRACT

Moringa oleifera, popularly known as Drumstick, is a highly valued plant grown in the tropics and subtropics and one of the vegetables of the Brassica order and belongs to the family Moringaceae. It shows impressive medicinal properties and have great nutritional value. The leaves are rich in vitamins, minerals and have other essential phytochemicals which shows positive physiological benifits. Moringa plant provides a rich and rare combination of zeatin, quercetin, kaempferol and many other phytochemicals. Extracts from the leaves are used to treat malnutrition. It contains antioxidant and shows anticancer, anti-inflammatory, antidiabetic and antimicrobial properties. Scientific studies have given insight about usage of *Moringa oleifera* as a fortifying agent in foods as a cure of diabetes and cancer. Researches on efficacy of various processing techniques like drying, dehydration, blanching etc. are done to check the efficacy of the process and to check the loss of nutrients during processing.

KEYWORDS

Moringa oleifera, Drumstick, Brassica, phytochemicals, antidiabetic

INTRODUCTION

Moringa oleifera is universally referred to as the miracle plant or the tree of life. *Moringa oleifera* is one of the vegetables of the Brassica order and belongs to the family Moringaceae. The Moringaceae is a single genus family with 13 known species (Mahmood, et al., 2010). The Moringa plant derives this name based on its uses, particularly with regard to medicine and nutrition. It is a plant native to the sub-Himalayan tracts of India, Pakistan, Bangladesh and Afghanistan (Fahey, 2005). Almost all the parts of this miracle tree have been found to be very useful. Leaves are used as forage, tree trunk for making gums, flower nectar in honey and powdered seeds for water purification (Fuglie, 1999).

M.oleifera leaf has been used as an alternative food source to combat malnutrition, especially among children and infants (Anwar et al., 2007). *M.oleifera* leaves are reported to contain substantial amounts of vitamin A, C and E. The leaves of *M.oleifera* have also been found to contain appreciable amounts of total phenols, proteins, calcium, potassium, magnesium, iron, manganese and copper (Hekmat et al., 2015). *M.oleifera* leaves are also good sources of phytonutrients such as carotenoids, tocopherols and ascorbic acid (Saini.et al.,2014). These nutrients are known to scavenge free radicals when combined with a balanced diet and may have immunosuppressive effects (DanMalam et al., 2001). Besides the leaves, the flowers and fruits of *M.oleifera* have also been found to contain appreciable amounts of carotenoids (Oyeyinka et al.,2018). Moringa plant provides a rich and rare combination of zeatin, quercetin, kaempferol and many other phytochemicals. It is also a very important plant well known for its medicinal value. Various parts of the plant such as leaves, roots, seeds, bark, fruit, flowers and immature pods etc. contain cardiac and circulatory stimulants, possess antitumor, antipyretic, antiepileptic, anti-inflammatory, antiulcer, antispasmodic, antihypertensive, cholesterol lowering, antioxidant, antidiabetic, antibacterial and antifungal properties. (Bukar, et al., 2010).

MEDICINAL USES:

The *Moringa oleifera* leaves contain nutrients especially essential amino acids, vitamins, minerals and β-carotene (Sharma et al., 2012). For this reason, it is used as an alternative source for nutritional supplements and growth promoters in some countries (Anwar et al., 2007).

Anti-inflammatory activity- Several parts of Moringa plant have been shown to possess anti-inflammatory activity. Poultice of leaves helps in glandular swellings (Dubey et.al., 2013).

Antioxidant activity- *Moringa oleifera* has antioxidant galore (Kumar et.al., 2013). Aqueous extracts of leaf, fruit and seed of Moringa act as an antioxidant (Singh et.al., 2009). Methanol and ethanol extracts of Indian origin Moringa were shown to have the highest antioxidant activity of 65.1% and 66.8%, respectively in a study on freeze dried Moringa leaves (Siddhuraju, 2003).

Antinociceptive activity- Several Moringa species have demonstrated analgesic activity. The antimigraine potential of leaf juice alcoholic fraction of Moringa, which is traditionally used in the treatment of migraine, was studied. The study showed that Moringa may be effectively used in the treatment and management of migraine (Upadhye et.al., 2012).

Spasmolytic and antiulcerogenic effect- Moringa root and leaves contain several compounds with Antispasmodic activity. Thus, the plant has been used in gastrointestinal motility disorder (Faizi et.al., 1994).

Anticancer activity- *Moringa oleifera* has several bioactive compounds showing antitumor activity. Niazimicin, is a bioactive compound found in Moringa leaves, has anticancer activity (Hamza, 2010). Moringa leaf extract have shown potential cytotoxic effects on human multiple myeloma cell lines (Mishra et.al., 2011).

Antifertility activity- *Moringa oleifera* leaf extracts were 100% abortive with doses equivalent to 175 mg/kg of starting dry material in a study analyzing anti reproductive potential of folk medicine plants (Nath et.al., 1992).

Cardio protective, antihypertensive, and cholesterol lowering activities- A study performing comparison of *Moringa oleifera* leaf extract with antenolol (a selective ß1 receptor antagonist drug, used for cardiovascular diseases) reported leaf extract as hypolipidimic, lowering body weight, heart weight, serum triglyceride level and serum cholesterol level in experimental animals (Ara et.al., 2008). Moringa leaves contain -sitosterol, a bioactive phytoconstituent, having cholesterol reducing effect. This compound has been shown to decrease cholesterol level in high fat diet fed rats (Ghasi et.al., 2000).

Protection in eye diseases- Vitamin A deficiency is a major cause of blindness. Consumption of *M.oleifera* leaves, and pods and leaf powder, rich source of vitamin A, can prevent night blindness and eye problems in children. Consumption of drumstick leaves with oils can improve vitamin A nutrition and can delay the development of cataract (Pullakhandam, 2007).

Antidiabetic activity- *Moringa oleifera* potential as a therapeutic agent for diabetes has been explored. In type 2 diabetic rats, *Moringa oleifera* leaves significantly reduce blood glucose concentration. Leaves are potent source of polyphenols, responsible for hypoglycemic activity (Ndong et.al., 2007). The extract from its leaf decreases sugar levels in the blood within 3 h after intake (Bello et.al., 2017). Moringa has been used as a traditional medicine around the world, for anemia, skin infections, blackheads, anxiety, bronchitis,

catarrh, chest congestion, asthma, blood impurities, cholera, glandular, swelling, headaches, conjunctivitis, cough, diarrhea, eye and ear infections, fever, abnormal blood pressure, hysteria, pain in joints, pimples, psoriasis, respiratory disorders, scurvy, semen deficiency, sore throat, sprain, tuberculosis, for intestinal worms, lactation, diabetes and pregnancy. The healing properties of Moringa oil have been documented by ancient cultures. Moringa oil has tremendous cosmetic value and is used in body and hair care as a moisturizer and skin conditioner. Moringa oil has been used in skin preparations and ointments since Egyptian times (Varmani & Garg, 2014). Moringa leaves have been used to combat malnutrition, especially among infants and nursing mothers. Six rounded spoonful of leaf powder will satisfy nearly all of a woman's daily iron and calcium needs during pregnancy and breast-feeding. Three non-governmental organizations in particular—Trees for Life, Church World Service and Educational Concerns for Hunger Organization—have advocated Moringa as "natural nutrition for the tropics." Leaves can be eaten fresh, cooked, or stored as dried powder for many months without refrigeration, and reportedly without loss of nutritional value. Moringa is especially promising as a food source in the tropics because the tree is in full leaf at the end of the dry season when other foods are typically scarce. Leaves were also used for food fortification. Spoonful of the powder can then be added to baby food, soups, and vegetables, adding nutrition but not changing the taste. This powder can be used in place 27 of fresh leaves to make lead sauces, or few spoonsful of the powder can be added to other sauces just before serving. Addition of small amounts of leaf powder will have no discernible effect on the taste of a sauce. In this way, Moringa leaves will be ready available to improve nutritional intake on a daily basis (Mishra et al.,2012). Plant such as leaves, roots, seeds, bark, fruit, flowers and immature pods etc. contain cardiac and circulatory stimulants, possess antitumor, antipyretic, antiepileptic, anti-inflammatory, antiulcer, antispasmodic, antihypertensive, cholesterol lowering, antioxidant, antidiabetic, antibacterial and antifungal properties (Bukar, et al., 2010).

EFFECT OF DIFFERENT PRESERVATION TECHNIQUES (BLANCHING AND DRYING):

The *Moringa oleifera* leaves contain nutrients especially essential amino acids, vitamins, minerals and β-carotene (Sharma et al., 2012). For this reason, it is used as an alternative source for nutritional supplements and growth promoters in some countries (Anwar et al., 2007).

Blanching- *Moringa oleifera* leaves have been used as food material because it has high nutritional value. Many researches have been conducted on its leaf extract as functional food and the additional material of nutrient for some food products (biscuit, bread, jelly drink), which it looked that adding the leaf extract above 5% decrease the consumer acceptance level toward the product because of the strongest unpleasant aroma and bitter taste, which is caused by saponins content in Moringa leaves extract is still high enough (Indriasari et al.,2019). Adeboye and Babajide (2007) in their research, it is stated that some anti-nutrition compound as oxalic acid, tannins, HCN and saponins that contain at the vegetable can be decreased by blanching process, especially when the process using boiled water. But there is no specific research about declining saponins content on Moringa leaves using blanching process (Kumalaningsih et al.,2018). It is necessary to remember that thermal process such as blanching can decrease nutritional content from the material, especially the component that is susceptible to high temperature and dissolved in water easily such as protein and vitamin C. According to Fuglie (2001), *Moringa oleifera* leaves have a high amount of protein and vitamin C content. Blanching proved to reduce saponins content on Moringa leaves. Blanching process at temperature 85 ˚C for 7.5 minutes proven as the best treatment, in order to decrease saponins content on Moringa leaves till the lowest level, but still able to maintain the nutritional value. Blanching is one of the most possible strategies for preservation of *Moringa oleifera* leaves, which are highly seasonal and perishable. The abundantly available inexpensive leaves of *M. oleifera* can serve as a pool house of nutrients and can be used in the developing countries to combat micronutrient deficiencies (Indriasari et al.,2019).

Drying- The preservation of green leafy vegetables was very important. The leaves of *Moringa oleifera* have various uses in human life. *Moringa oleifera* leaves can be used in various foods like soup, sauces and it also used for medicine preparation. A Study was conducted to assess the best drying technique and the efforts have been made to prepare powder of *Moringa oleifera* by applying drying technique viz. Sun drying, Shadow drying, Cabinet drying and Oven drying. The drying was done at 60°C to minimize the drying losses. The results obtained from cabinet dried sample were better than other and it had highest nutrient retention followed by shadow, sun drying and oven dried sample. The rehydration ratio calculated at 55°C, 65°C, 75°C temperature for 60, 45, 30 minutes respectively. The rehydration ratio of cabinet dried sample was more than other samples. The study revealed that the cabinet tray drying method was observed suitable for dehydration of drumstick leaves (Satwase AN et al.,2013).

The cabinet tray drying method was the best method of dehydration of drumstick leaves. There was better retention of nutrients like protein, carbohydrates, crude fiber, minerals and dehydrated characteristics as compared to the oven, shade and sun drying methods. The preparation of drumstick leaves powder for addition in to various processed food products and to ascertain acceptability also needs investigation. Dehydration technique resulted in concentration of nutrients. Dehydration was one of the most possible strategies for preservation of green leafy vegetables, which were highly seasonal and perishable too. The abundantly available inexpensive leaves of *Moringa oleifira* can serve as a pool house of nutrients and can be used in the developing countries to combat micronutrient deficiencies. (Sirsat PG et al.,2013) *Moringa oleifera* leaf powder was processed using oven, sun and shade drying techniques to study the effect of drying on the proximate and mineral properties. Proximate analysis of dried leaf powder samples showed that oven drying technique effectively decrease the moisture and fat contents of the powder to 1.65% and 9.12%, respectively and increased the fibre value to 6.34%. The highest protein value (32.14%) was observed on the sun dried sample and there was significant difference ($p<0.05$) in the magnesium content of the samples while there was in the calcium, iron and zinc contents. Oven dried sample had the highest calcium (190.5mg/100g), sun dried highest zinc (7.1mg/100g) and shade dried highest iron content of 51.3mg/100g. (Wade YR et al.,2013). Cabinet tray drying was found as efficient as lyophilisation to retain maximum content of total carotenoids (60.1 %), trans-β-carotene (90.1 %) in Moringa leaves (Saini et al., 2014).

CONCLUSION:

The research on *M. oleifera* is needed to gain more importance in India. It contains essential nutrients and can be exploited for a variety of purposes. It seems to have potential anti-diabetic and anti-cancer properties. However, more double blind researches are required to further substantiate these properties. The exact mechanism is yet to be explored. Further analysis are needed to study the effect of environmental factors affecting the nutrient levels of M.oleifera grown across the world. In-depth studies are very crucial to explore its potential as fortifying agent and and ascertain the effect of different processing techniques on its nutritional value to promote it further in the commercial market.

REFERENCES:

[1] Adeboye, A. S., & Babajide, J. M. (2007). Effect of processing methods on antinutrients in selected leafy vegetables.
[2] Anwar, F., & Rashid, U. (2007). Physico-chemical characteristics of Moringa oleifera seeds and seed oil from a wild provenance of Pakistan. Pak. J. Bot, 39(5), 1443-1453.
[3] Anwar, F., Latif, S., Ashraf, M., & Gilani, A. H. (2007). Moringa oleifera: a food plant with multiple medicinal uses. Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives, 21(1), 17-25.
[4] Ara, N., Rashid, M., & Amran, M. S. (2008). Comparison of Moringa oleifera leaves extract with atenolol on serum triglyceride, serum cholesterol, blood glucose, heart weight, body weight in adrenaline induced rats. Saudi J Biol Sci, 15(2), 253-58.
[5] Bello, O. S., Adegoke, K. A., & Akinyunni, O. O. (2017). Preparation and characterization of a novel adsorbent from Moringa oleifera leaf. Applied Water Science, 7(3), 1295-1305.
[6] Bukar, A., Uba, A., & Oyeyi, T. (2010). Antimicrobial profile of Moringa oleifera Lam. extracts against some food–borne microorganisms. Bayero Journal of Pure and Applied Sciences, 3(1).
[7] DanMalam, H. U., Abubakar, Z., & Katsayal, U. A. (2001). Pharmacognosostic studies on the leaves of Moringa oleifera. Nigerian Journal of Natural Products and Medicine, 5, 45-49.
[8] Dubey, D. K., Dora, J., Kumar, A., & Gulsan, R. K. (2013). A multipurpose tree-Moringa oleifera. International Journal of Pharmaceutical and Chemical Sciences, 2(1), 415-423.
[9] Fahey, J. W. (2005). Moringa oleifera: a review of the medical evidence for its nutritional, therapeutic, and prophylactic properties. Part 1. Trees for life Journal, 1(5), 1-15.
[10] Faizi, S., Siddiqui, B. S., Saleem, R., Siddiqui, S., Aftab, K., & Gilani, A. U. H. (1994). Isolation and structure elucidation of new nitrile and mustard oil glycosides from Moringa oleifera and their effect on blood pressure. Journal of Natural Products, 57(9), 1256-1261.
[11] Fuglie, L. J. (1999). The miracle tree: Moringa oleifera, natural nutrition for the tropics.
[12] Fuglie, L.J. (2001). The miracle tree: The multiple attributes of Moringa. CTA, Wageningen and CWS, New York, Dakar. 1-172.
[13] Ghasi, S., Nwobodo, E., & Ofili, J. O. (2000). Hypocholesterolemic effects of crude extract of leaf of Moringa oleifera Lam in high-fat diet fed Wistar rats. Journal of ethnopharmacology, 69(1), 21-25.
[14] Hamza, A. A. (2010). Ameliorative effects of Moringa oleifera Lam seed extract on liver

fibrosis in rats. Food and Chemical Toxicology, 48(1), 345-355.
[15] Hekmat, S., Morgan, K., Soltani, M., & Gough, R. (2015). Sensory evaluation of locally-grown fruit purees and inulin fibre on probiotic yogurt in Mwanza, Tanzania and the microbial analysis of probiotic yogurt fortified with Moringa oleifera. Journal of health, population, and nutrition, 33(1), 60.
[16] Indriasari, Y., Basrin, F., & Salam, M. B. H. (2019). Effect of Decreasing Saponin Levels to Nutrition of Extracted Moringa Leaf Powder. Journal of Food Research, 8(5).
[17] Kumalaningsih, S., & Arwani, M. (2018). Nutritious Pure Herbal Whitening Sun Cream Processed from Seed and Leaf of Moringa oleifera Fortified with Red Rice. Pharmacognosy Journal, 10(1).
[18] Kumar, V., Verma, A., Ahmed, D., Sachan, N. K., Anwar, F., & Mujeeb, M. (2013). Fostered antiarthritic upshot of Moringa oleifera lam. stem bark extract in diversely induced arthritis in wistar rats with plausible mechanism. International journal of pharmaceutical sciences and research, 4(10), 3894.
[19] Mahmood, K. T., Mugal, T., & Haq, I. U. (2010). Moringa oleifera: a natural gift-A review. Journal of Pharmaceutical Sciences and Research, 2(11), 775.
[20] Mishra, G., Singh, P., Verma, R., Kumar, S., Srivastav, S., Jha, K. K., & Khosa, R. L. (2011). Traditional uses, phytochemistry and pharmacological properties of Moringa oleifera plant: An overview. Der Pharmacia Lettre, 3(2), 141-164.
[21] Mishra, S. P., Singh, P., & Singh, S. (2012). Processing of Moringa oleifera leaves for human consumption. Bulletin of Environment, Pharmacology and Life Sciences, 2(1), 28-31.
[22] Nath, D., Sethi, N., Singh, R. K., & Jain, A. K. (1992). Commonly used Indian abortifacient plants with special reference to their teratologic effects in rats. Journal of Ethnopharmacology, 36(2), 147-154.
[23] Ndong, M., Uehara, M., Katsumata, S. I., & Suzuki, K. (2007). Effects of oral administration of Moringa oleifera Lam on glucose tolerance in Goto-Kakizaki and Wistar rats. Journal of clinical biochemistry and nutrition, 40(3), 229-233.
[24] Oyeyinka, A. T., & Oyeyinka, S. A. (2018). Moringa oleifera as a food fortificant: Recent trends and prospects. Journal of the Saudi Society of Agricultural Sciences, 17(2), 127-136.
[25] Pullakhandam, R., & Failla, M. L. (2007). Micellarization and intestinal cell uptake of β-carotene and lutein from drumstick (Moringa oleifera) leaves. Journal of medicinal food, 10(2), 252-257.
[26] Saini, R. K., Shetty, N. P., Prakash, M., & Giridhar, P. (2014). Effect of dehydration methods on retention of carotenoids, tocopherols, ascorbic acid and antioxidant activity in Moringa oleifera leaves and preparation of a RTE product. Journal of food science and technology, 51(9), 2176-2182.
[27] Saini, R. K., Shetty, N. P., Prakash, M., & Giridhar, P. (2014). Effect of dehydration methods on retention of carotenoids, tocopherols, ascorbic acid and antioxidant activity in Moringa oleifera leaves and preparation of a RTE product. Journal of food science and technology, 51(9), 2176-2182.
[28] Satwase, A. N., Pandhre, G. R., Sirsat, P. G., & Wade, Y. R. (2013). Studies on Drying Characteristic and Nutritional Composition of Drumstick Leaves by Using Sun, Shadow, Cabinet and Oven Drying Methods.
[29] Sharma, V., Paliwal, R., Janmeda, P., & Sharma, S. (2012). Chemopreventive efficacy of Moringa oleifera pods against 7, 12-dimethylbenz [a] anthracene induced hepatic carcinogenesis in mice. Asian Pac J Cancer Prev, 13(6), 2563-2569.
[30] Sharma, V., Paliwal, R., Janmeda, P., & Sharma, S. (2012). Chemopreventive efficacy of Moringa oleifera pods against 7, 12-dimethylbenz [a] anthracene induced hepatic carcinogenesis in mice. Asian Pac J Cancer Prev, 13(6), 2563-2569.
[31] Siddhuraju, P., & Becker, K. (2003). Antioxidant properties of various solvent extracts of total phenolic constituents from three different agroclimatic origins of drumstick tree (Moringa oleifera Lam.) leaves. Journal of agricultural and food chemistry, 51(8), 2144-2155.
[32] Singh, B. N., Singh, B. R., Singh, R. L., Prakash, D., Dhakarey, R., Upadhyay, G., & Singh, H. B. (2009). Oxidative DNA damage protective activity, antioxidant and anti-quorum sensing potentials of Moringa oleifera. Food and Chemical Toxicology, 47(6), 1109-1116.
[33] Upadhye, K. P., Rangari, V. D., & Mathur, V. B. (2012). Antimigraine activity study of Moringa oleifera leaf juice. International Journal of Green Pharmacy (IJGP), 6(3).
[34] Varmani, S. G., & Garg, M. (2014). Health benefits of Moringa oleifera: A miracle tree. International Journal of Food and Nutritional Sciences, 3(3), 111.