

CONQUERING THE MYTH OF MORINGA OLEIFERA TREES OF INDONESIAN PEOPLE

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ABSTRACT

The mythical influence that the Moringa oleifera can expel the spirits has penetrated so deeply into the minds of the Indonesian people. This study aims to conquer the myths of Moringa oleifera by providing health benefits of this tree. A scoping review of peer-reviewed was conducted to explore the health benefit of Moringa oleifera as part of nutrition promotion interventions. Electronic databases were searched for studies published between 1 December 2020 and 14 February 2021. Out of 359 articles retrieved and 31 peer-reviewed sources met inclusion criteria. Findings from 12 papers were organised into 6 categories of the health benefit from root, leave, stem bark, gum, flower, and seed based on Moringa oleifera's plant part. This review has identified health benefits that hold potential for tackling the myth of Moringa oleifera. Various parts of this plant have been proven to have health benefits such as anti-inflammatory, anti-hypertensive, cholesterol lowering, antioxidant, antidiabetic, antibacterial and antifungal activities. Findings from this study suggest that health benefit of Moringa oleifera's tree should be widely promoted to increase the health status and wellness of Indonesian people.

Keywords: health benefit, kelor, food plant.

1. INTRODUCTION

Moringa oleifera is locally known in Indonesia as ‘kelor’ that can grow up to 10 m under the tropical insular climate or hot dry lands (Karim et al., 2016). *Moringa oleifera* is native to India but it is widely grown tree in tropical areas such as Florida, Sudan Caribbean, Pacific Islands, Ethiopia, Philippines, South Africa, Asia, and Latin America (Gopal, Nagendra, & Manthey, 2015). *Moringa oleifera* has variety names in different regions, for instance drumstick tree or horseradish tree in India and “Shiferaw” in Ethiopia (Bhattacharya, Tiwari, Sahu, & Kumar, 2018). Xianjuan et al. (2018) study has reported 33 species of *Moringaceae* family. *Moringa oleifera* is one of the *moringaceae* families. Among those, best known of the thirteen species namely: *M. arborea*, *M. borziana*, *M. concanensis*, *M. drouhardi*, *M. hildebrandtii*, *M. longituba*, *M. oleifera*, *M. ovalifolia*, *M. peregrina*, *M. pygmaea*, *M. riviae*, *M. ruspoliana*, *M. stenopetala* are well known and found worldwide. Numerous studies have reported its multipurpose use like medicinal and nutritional benefits (Bhattacharya et al., 2018; Razis, Ibrahim, & Kntayya, 2014).

However, *Moringa oleifera* is unpopular food for Indonesians because the magic myth and supernatural power has penetrated so deeply to Indonesian people. Most of Indonesian people believe that if someone is sick in long period but not died yet, then that person is suspected to have certain supernatural powers that should be removed from his body. To eliminate the unknown supernatural power, the person is usually bathed with *Moringa oleifera* leaves until the sick person can die peacefully (Unknown, 2016). When his body was bathed, the person also washed again with *Moringa oleifera* leaves to remove all mystical creatures and objects that are still attached to his body (Unknown, 2016). The myth of *Moringa oleifera* are also believed to reject the appearance of spirits. Hence, in the main entrance of some houses in Indonesia has been placed a bundle of *Moringa oleifera* as some repellent reinforcements (Unknown, 2016). Those magic myth has caused Indonesian people prefer not to consume *Moringa oleifera* as their daily food.

Apart from the myth, *Moringa oleifera* has globally known as the natural nutritious food commodity of the tropics. *Moringa oleifera* has been identified a plant with many health benefits including nutritional and medicinal benefits (Paikra, Dhongade, & Gidwani, 2017). The *Moringa oleifera* is a multi-purpose herbal plant used as human food and an alternative for medicinal purposes in Hawaii, Philippines, India, Pakistan, and other African countries. In South India, the *Moringa oleifera* is consumed into varieties of curry by mixing with coconut, poppy seeds and mustard (S Balamurugan, Vijayakumar, Prabhu, & Yabesh, 2017). In Philippines, the *Moringa oleifera* can just be boiled, until the leaves are semi-soft and consumed directly without any extra processing or cooking (Pasaporte, Rabaya, Toleco, & Flores, 2014). In Pakistan, the *Moringa oleifera* is cooked in sambars, kormas, curries, dals, and cutlets, etc (Shah, Razaq, Ali, Han, & Chen, 2017). In West Africa, tender *Moringa oleifera* leaves, finely chopped, make an excellent garnish for any vegetable dishes, dals, sambars, salads, etc (Fernandes et al., 2021).

Therefore, this study aims to conquer the myths of *Moringa oleifera* by providing health benefits of this tree. A scoping review of peer-reviewed was conducted to explore the health benefit of *Moringa oleifera* as part of nutrition promotion interventions

2.MATERIALS AND METHODS

This study has conducted a scoping review to identify numerous studies that addressed the health benefit of *Moringa oleifera* as part of nutrition promotion interventions. A comprehensive literature search has been done in some international electronic databases, namely: Science Direct ProQuest, PubMed, Scopus, and Embase. Those electronic databases were searched for studies published between 1 December 2020 and 14 February 2021.

The selection criteria was performed using the keywords: *Moringa oleifera*, drumstick tree, horseradish tree, shiferaw, root, leave, stem bark, gum,

flower, or seed. Inclusion criteria were: articles published in English or Bahasa that contained the keywords in their title, abstract or keywords, and their full-text was available. This study analyzes all articles that addressed the health benefit of *Moringa oleifera* trees. Those articles without reporting the health benefit of *Moringa oleifera* was excluded.

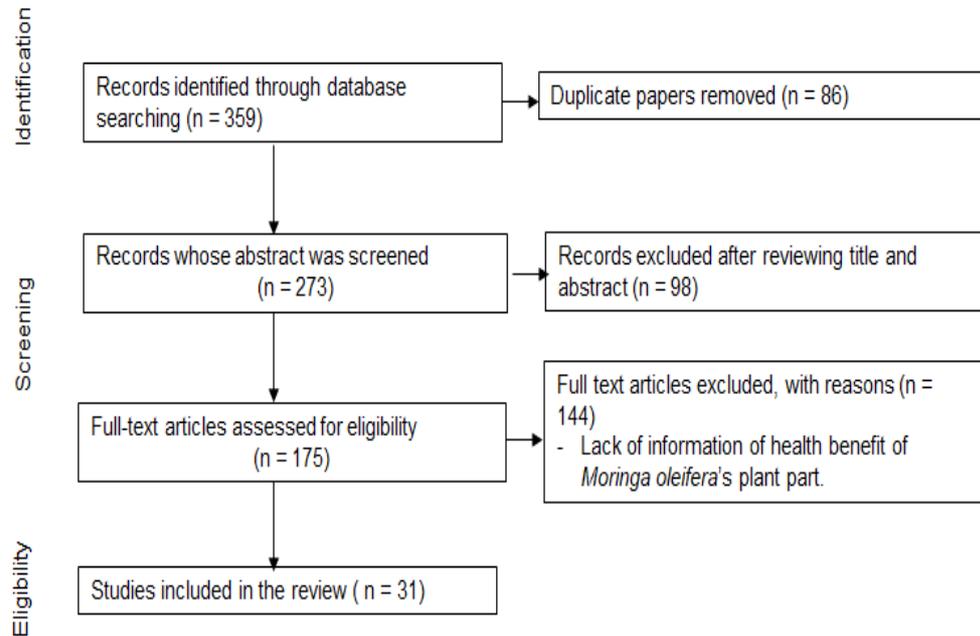


Figure 1. The Study's Selection Process

The selection process of the studies is represented in Fig. 1. The initial database screening of the titles and abstracts were accomplished by the author. Afterwards, the author classified those selected literature as: relevant and irrelevant. After all relevant articles were analysed, the author studied full texts of all identified literature and extracted the data based on 6 categories of the health benefit from root, leave, stem bark, gum, flower, and seed based on *Moringa oleifera*'s plant part. Out of 359 articles retrieved and 31 peer-reviewed sources met inclusion criteria.

3.RESULTS

As revealed from Figure 1., about 359 studies were found through database searching. However, this study found 86 similar studies that were excluded from this study. This study reviews 273 abstracts but excluded 98 abstracts because irrelevant with the health benefits of *Moringa oleifera*'s plant part. A total of 175 full articles were reviewed and 144 full papers were excluded

because of a lack of information on the health benefits of *Moringa oleifera*'s plant part. As the result, 31 full papers were finally included in the analyses.

Table 1. Health benefits of *Moringa oleifera*'s plant part

No	Part of <i>Moringa oleifera</i>	Main benefit(s)
1	Flower	Antioxidant dietary fibre (Madane et al., 2019); decrease lipid profile of liver (Kalaiselvi, Mathammal, Vijayakumar, & Vaseeharan, 2018); 261 proteins were annotated as carbohydrate-active enzymes, 16 protease, 22 proteins (Shi et al., 2018); anti-tumor (Patriota et al., 2020); antimicrobial (Bindhu, Umadevi, Esmail, Al-Dhabi, & Arasu, 2020); antibacterial (Anand et al., 2016); lower the serum cholesterol (Hussain, Malik, & Mahmood, 2014).
2	Root	Anti-inflammation (Cui et al., 2019); antiurolithiatic activity (Karadi, Gadge, Alagawadi, & Savadi, 2006); antiulcer, antisecretory, and cytoprotective activity (Choudhary, Bodakhe, & Gupta, 2013); treating rheumatism, inflammations, articular pains, lower back or kidney pain and constipation (Anwar, Latif, Ashraf, & Gilani, 2007)
3	Leave	Antimicrobial (Bagheri et al., 2020); anticancer (Mansour et al., 2019); gynaecological disorder treatment (S Balamurugan et al., 2017); eye health (Pasaporte et al., 2014); anti-tumour cells growth (Fernandes et al., 2021).
4	Stem bark	Urinary tract infections (UTI)'s treatment (Maurya & Singh, 2014); antioxidant and anti-cancer (Atawodi et al., 2010); cure eye (Anwar et al., 2007); the juice from the root bark is put into ears to relieve earaches and also placed in a tooth cavity as a pain killer, and has anti-tubercular activity (Anwar et al., 2007).
5	Gum	Used for dental caries, and is astringent (Gupta, Kachhwaha, Kothari, Bohra, & Jain, 2020); Gum, mixed with sesame oil, is used to relieve headaches, fevers, intestinal complaints, dysentery, asthma and sometimes used as an abortifacient, and to treat syphilis and Rheumatism (Anwar et al., 2007).
6	Seed	Seed extract exerts its protective effect by decreasing liver lipid peroxides (Padla, Solis, Levida, Shen, & Ragasa, 2012), antihypertensive compounds thiocarbamate and isothiocyanate glycosids have been isolated from the acetate phase of the ethanolic extract of <i>Moringa</i> pods (Anwar et al., 2007)

After several studies have been selected, table 1 showed all information was obtained from each included study: characteristics of the study including author's name, date of publication, the objective of the study, and the details on the possibility of the health benefits of *Moringa oleifera*'s plant part.

4. DISCUSSION

It was also found that each different part of *Moringa oleifera*, i.e. the flowers, fruits, seeds, leaves, bark and roots, all resulted in the discovery of at least one, or in most studies, a number of beneficial nutrients. *Moringa oleifera* has been found as an important food commodity. *Moringa oleifera* leaves has been reported to be a rich source of β -carotene, protein, vitamin C, calcium and potassium (Bagheri, Martorell, Ramírez-Alarcón, Salehi, & Sharifi-Rad, 2020). *Moringa oleifera* is distributed throughout the world across dry tropical areas, and it is a very promising plant from which to produce oil for human consumption and for non-food uses. Information about available commercial varieties, and their agronomic performance of *Moringa oleifera* is scarce.

Given the nutritional composition of the seeds and oil, *Moringa oleifera*, could respectively provide a cheap source of protein and a good source of monounsaturated fatty acids of high nutrients, sterols and tocopherols (Shah et al., 2017). Moreover, the consumption of *Moringa oleifera* products has an effect on the nutritional status, body composition, status of growth and the risk of diseases in populations of developing countries (Bhattacharya et al., 2018; Kou et al., 2018; Razis et al., 2014). A study of Stohs and Hartman (2015) found that a single dose study with six type 2 diabetic subjects, the feeding of 50 g of a *M. oleifera* leaf powder with a standard meal on a one-time basis decreased blood glucose levels by 21 percent. Folk medicine utilized raw or crushed *Moringa oleifera* as a treating stomach pain, ulcers, poor vision, joint pain and for aiding digestion (Leone et al., 2016).

The *Moringa oleifera* has been found to possess good antimicrobial activity against numerous bacterial and fungal species (Cui et al., 2019; Leone et al., 2016; Maurya & Singh, 2014). Many of the phytochemical compounds isolated from the seeds are able to inhibit the growth of certain pathogenic microorganisms responsible for human infections (Leone et al., 2016). The *Moringa oleifera*'s antimicrobial activity is also related to the presence of a

short cationic protein (Shi, Wang, & Huang, 2018) . This protein, known as the *M. oleifera* cationic protein, causes bacterial cell damage through rapid flocculation and the fusion of cell inner and outer membranes (Leone et al., 2016). Because of their antimicrobial activity, *Moringa oleifera*'s are used as nature-based solutions for the problem of water purification in developing countries, using them as an alternative to Western methods (Leone et al., 2016).

5. CONCLUSION

The results from published research studies to date with *Moringa oleifera* are very promising. It is rare for a single plant to contain many essential nutrients in high quantities. Nevertheless, further studies are required to address various points of unidentified health benefits of *Moringa oleifera*'s part plant.

6. ACKNOWLEDGMENT

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7.CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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