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Review Article

Pharmacological Application of *Moringa oleifera*: A Mini Review

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All part of the *Moringa tree* is useful in some way and people depends on it for their livelihood. Oral diseases persist to be a major health problem all over the world. Various microorganisms are found to be the possible pathogens responsible for the oral diseases. The leaves of the *Moringa tree* are an excellent source of Nutrients like Minerals, Protein and Vitamins (A and C). *Moringa tree* has approximately 46 antioxidants and it is one of the cheapest sources of natural anti-oxidants. Anti-oxidants supply the free atoms needed by the human body and mitigate the effect of free radicals. *M. oleifera* contains active compounds such as flavonoids, tannins, saponins, alkaloids, phenolics, and triterpenoids which possess antibacterial effects. *Moringa oleifera* has high mineral and protein content and has been previously investigated for its potential in treating different oral soft tissue diseases. This review explores the various pharmacological application of *Moringa oleifera*

Keywords: *Moringa oleifera*, Anti-oxidants, Minerals, Vitamins

Introduction

Moringa oleifera is the most widely cultivated pan-tropical species of a monogeneric family, the Moringaceae, which is native to the sub-Himalayan tracts of India, Pakistan, Bangladesh and Afghanistan. *Moringa oleifera* is known by such regional names as benzolive, drumstick tree, kelor, marango, mlonge, mulangay, nébéday, saijhan, and sajna.¹ Virtually every part of the tree is beneficial in some way and both rural and urban people depend on it for their livelihood. In developing tropical countries, *Moringa trees* have been used to combat malnutrition, especially among infants and nursing mothers^{2,3}. The leaves of the *Moringa tree* are an excellent source of Nutrients like Minerals, Protein and Vitamins (A and C)^{4, 5, 6}, *Moringa* has approximately 46 antioxidants and is one of the most powerful sources of natural anti-oxidants. Anti-oxidants supply the free atoms needed by the human body and mitigate the effect of free radicals. *M. oleifera* contains active compounds such as flavonoids, tannins, saponins,

alkaloids, phenolics, and triterpenoids which possess antibacterial effects.

Pharmacological application of *Moringa oleifera*

Moringa has approximately 46 antioxidants and is one of the most powerful sources of natural anti-oxidants. Anti-oxidants supply the free atoms needed by the human body and mitigate the effect of free radicals. *M. oleifera* contains active compounds such as flavonoids, tannins, saponins, alkaloids, phenolics, and triterpenoids which possess antibacterial effects hence it can be used as safe and cheap plant antimicrobial agent.

The extract from leaves of *Moringa oleifera* has high mineral and protein content and its historic reputation as a traditional medicine for different diseases has been previously investigated for its potential in treating different oral soft tissue diseases^{7,8}.

Hanaa Elgamily et al carried out a study to assess the antibacterial and antifungal potentials of different parts of *Moringa oleifera* plant using different extraction methods in attempts to formulate natural dental remedies from this plant. The different extracts of different parts of *Moringa oleifera* showed an antibacterial effect against *Staphylococcus aureus* and *Streptococcus mutans* growth. The novel toothpaste of ethanolic leaves extract has antimicrobial and antifungal potential effects all selected strains.⁹

Based on the results of the study by Risnayanti Anas et al, it can be concluded that there is an increase in the amount of calcium in the teeth after the application of *Moringa oleifera* based paste and Casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) application. *Moringa oleifera* based paste and CPP-APP are effective to increasing calcium levels in teeth compared to the pre-test group.¹⁰

Dental caries is closely related with cariogenic biofilm, an oral biofilm containing a high proportion of *Streptococcus mutans*¹¹. Generally, oral biofilm is structurally and functionally organized and contains a balance of normal flora and pathogenic bacteria like *S. mutans*¹². Su-Kyung Jwa has investigated the antimicrobial effects of the *M. oleifera* leaf extracts on *S. mutans* and formation of cariogenic biofilm. Extract

from *M. oleifera* leaves was derived using distilled water (DW) and ethyl alcohol (EtOH). *S. mutans* susceptibility assays were performed for each extract. Cariogenic biofilm was formed with or without DW and EtOH extract, and cariogenic biofilm was treated with both extracts. Both extracts showed antimicrobial activity against *S. mutans* and inhibited formation of cariogenic biofilm.¹³

Moringa has been shown to cure both Type 1 and Type 2 diabetes. Several studies have shown that, moringa can act as an anti-diabetic agent. A study has shown that the aqueous extracts of *M. oleifera* can cure streptozotocin-induced Type 1 diabetes and also insulin resistant Type 2 diabetes in rats¹⁴.

Moringa is also used as an anti-atherosclerotic agent and this activity due to the antioxidant properties of *Moringa*¹⁵.

M. oleifera can be used as an anticancer agent as it is natural, reliable and safe, at established concentrations. Studies have shown that moringa can be used as an anti-neoproliferative agent, thereby inhibiting the growth of cancer cells. Soluble and solvent extracts of leaves have been proven effective as anticancer agents.¹⁶ The compounds of the leaves that are held responsible for the anticancer activities are glucosinolates, niazimicin and benzyl isothiocyanate¹⁷.

Table 1: Application of *Moringa oleifera* in Dentistry

S.N.	Author	Objective of study	Application	Ref
1	Hanaa Elgamily et al 2016	To assess the antibacterial and antifungal potentials of different parts of <i>Moringa oleifera</i>	For dental remedies, experimental toothpaste exhibited higher mean inhibition than the mouthwash against <i>Staphylococcus aureus</i> , <i>Streptococcus mutans</i> and only the toothpaste revealed antifungal effect against <i>Candida albicans</i>	7
2	Su-Kyung Jwa et 2019	to investigate the antimicrobial effects of the <i>M. oleifera</i> leaf extracts	extracts showed antimicrobial activity against <i>S. mutans</i> and inhibited formation of cariogenic biofilm	13
3	Rao P K, et al 2011	To assess the antibacterial activity of isolated compounds from <i>M. oleifera</i> against selected oral bacteria	All the isolated compounds from <i>M. oleifera</i> were active against <i>Streptococcus mutans</i> (MTCC 497), <i>Streptococcus salivarius</i> , <i>Lactobacillus fermentum</i> , <i>Streptococcus anginosus</i> , <i>Streptococcus gordonii</i> , <i>Lactobacillus acidophilus</i> .	18
4	Carranza J B, 2017	To identify the secondary compounds of three varieties of <i>Moringa oleifera</i> Lam. Extracts namely; Native, Chinese, and Yard Long malunggay using phytochemical analysis	The extracts of moringa varieties contain flavonoids, alkaloids and tannins that are known to have antimicrobial and anti-inflammatory properties; thus, these have potential natural components in the manufacture of toothpastes	19

Conclusion

M. oleifera contains active compounds such as flavonoids, tannins, saponins, alkaloids, phenolics, and triterpenoids which possess antibacterial effects hence it can be used as safe and cheap plant antimicrobial agent. The extract from leaves of *Moringa oleifera* has

high mineral and protein content. As traditional medicine it has potential in treating different oral soft tissue diseases. Further research on *Moringa oleifera* needed to exploit the pharmacological uses for management and prevention of oral disease.

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