Application of Moringa oleifera in Dentistry

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Article Info:

Abstract

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. Present review summarises the various application of Moringa oleifera in the field of dentistry.

Keywords: Moringa oleifera, Anti-oxidants, Oral diseases, dentistry

Introduction

Moringa oleifera is the most widely cultivated pantropical species of a monogenic 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, nëbédai, 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.
**Moringa oleifera in Dentistry**

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. 15, 16

*Moringa oleifera* extract contains the highest values of calcium and phosphate that are required for the remineralization process. Therefore *Moringa oleifera* extract is investigated by Younis et al for its ability to treat induced enamel lesion. 17 Scanning electron microscopy revealed that Leaves extract of *Moringa oleifera* loaded-varnish groups IV & V showed the most re-establishment of normal enamel architecture. Elemental analysis of the treated surfaces of Groups IV and V showed the surfaces treated by *Moringa oleifera* leaf extract loaded-varnish groups had significantly higher Ca, P, and O deposition than the fluoride varnish group. Leaves extract of *Moringa oleifera* might be considered as a biomimetic material which having capacity to guiding enamel tissue remineralization. 17

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. 18

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. 19

Dental caries is closely related with cariogenic biofilm, an oral biofilm containing a high proportion of *Streptococcus mutans*. 20 Generally, oral biofilm is structurally and functionally organized and contains a balance of normal flora and pathogenic bacteria like *S. mutans*. 21 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. 22
Table 1: Application of Moringa oleifera in Dentistry

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Author</th>
<th>Objective of study</th>
<th>Application</th>
<th>Ref</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rao P K, et al 2011</td>
<td>To assess the antibacterial activity of isolated compounds from M. oleifera against selected oral bacteria</td>
<td>All the isolated compounds from M. oleifera were active against Streptococcus mutans (MTCC 497), Streptococcus salivarius, Lactobacillus fermentum, Streptococcus anginosus, Streptococcus gordonii, Lactobacillus acidophilus.</td>
<td>23</td>
</tr>
<tr>
<td>2</td>
<td>Hanaa Elgamily et al 2016</td>
<td>To assess the antibacterial and antifungal potentials of different parts of Moringa oleifera</td>
<td>For dental remedies, experimental toothpaste exhibited higher mean inhibition than the mouthwash against Staphylococcus aureus, Streptococcus mutans and only the toothpaste revealed antifungal effect against Candida albicans</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>Carranza B, 2017</td>
<td>To identify the secondary compounds of three varieties of Moringa oleifera Lam. Extracts namely; Native, Chinese, and Yard Long malunggay using phytochemical analysis</td>
<td>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</td>
<td>24</td>
</tr>
<tr>
<td>5</td>
<td>Su-Kyung Jwa et al 2019</td>
<td>To investigate the antimicrobial effects of the M. oleifera leaf extracts</td>
<td>Extracts showed antimicrobial activity against S. mutans and inhibited formation of cariogenic biofilm</td>
<td>22</td>
</tr>
<tr>
<td>6</td>
<td>Piasti Sopandani et al 2020</td>
<td>To assess the antibacterial effect of M. oleifera extract as an irrigation solution against E. faecalis</td>
<td>M. oleifera extract solution at concentrations of 75% and 100% is as effective as 5.25% NaOCl against E. faecalis</td>
<td>25</td>
</tr>
<tr>
<td>7</td>
<td>Mahassen M Farghaly et al 2020</td>
<td>To formulate a nontoxic mouthwash from Moringa oleifera</td>
<td>Moringa extract showing antibacterial and antiplaque effect will be used</td>
<td>26</td>
</tr>
<tr>
<td>8</td>
<td>Younis SH 2020</td>
<td>To assess the effect of Leaves extract of Moringa oleifera loaded-varnish groups IV &amp; V on enamel</td>
<td>Moringa leaf extract loaded-varnish groups had significantly higher Ca, P, and O deposition than the fluoride varnish group. Leaves extract of Moringa oleifera might be considered as a biomimetic material which having capacity to guiding enamel tissue remineralization</td>
<td>17</td>
</tr>
<tr>
<td>9</td>
<td>Anas R et al 2021</td>
<td>To study the Effectiveness of Paste Based Moringa oleifera To Increase Calcium Levels Human Tooth</td>
<td>Results of this research showed that Moringa Oleifera paste has higher calcium level compared to Pre-test groups and Moringa oleifera paste can be effective in increasing calcium levels of human teeth</td>
<td>19</td>
</tr>
<tr>
<td>10</td>
<td>Nawal Aidaros et al 2021</td>
<td>To investigate and compare the effect of green tea, black tea and Moringa oleifera on artificially demineralized enamel and dentin</td>
<td>In dentin, the highest mean value was found in Moringa oleifera. Study concluded that Moringa tree enhanced the remineralization process and thus, might be considered as an effective natural remineralizing agents</td>
<td>27</td>
</tr>
<tr>
<td>11</td>
<td>Buakaew et al 2021</td>
<td>Moringa oleifera and Azadirachta indica were assessed for oral healthcare and gingivitis adjunctive treatment</td>
<td>Author state that accumulative reduction percentages of both Staphylococcus spp. and Candida spp. were found and indicated that the herbal mouthwashes reduced Gingival index and plaque index and showed potential as oral healthcare products</td>
<td>28</td>
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</table>

**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. Study by Nawal Aidaros et al concluded that *Moringa oleifera* enhanced the remineralization process of demineralized enamel and dentin, and thus, might be considered as an effective natural remineralizing agent. Further research on *Moringa oleifera* needed to exploit the pharmacological uses for management and prevention of oral disease.
References


17. Younis SH, Obeid RF, Ammar MM. Subsurface enamel remineralization by Lyophilized Moringa leaf extract loaded vanish, Heliyon. 2020; 6(9):e05054. 10.1016/j.heliyon.2020.e05054 PMCID: PMC7522384 PMID: 33015394


