International Journal of Education, Modern Management, Applied Science & Social Science (IJEMMASSS)
ISSN : 2581-9925, Impact Factor: 6.882, Volume 04, No. 03(II), July - September, 2022, pp. 26-32

A REVIEW ON MORINGA OLIFERA BASED ON CHEMICAL COMPOSITION AND WOUND HEALING ACTIVITIES

Hansraj Bishnoi*
Shailesh Sharma**
Gajendra Singh Thakur***
Shreyasi****

ABSTRACT

Moringa has been long used to treat the infections and diseases that is the common cold and diabetes. In which several of the steroids, alkaloids, glycosides compounds along with lipids and varieties of protein were also available as an important bioactive constituent in moringa. Rich sources of Vitamin A, Vitamin C and milk proteins, glucosinolate and isothiocyanate, terpene, anthocyanins and phenolic acids. It belongs to the family Moringaceae and its genus which consists of 13 species that are mostly cultivated in all over the Asia and Africa. These plants possess various medicinal properties which can be founded in every section of it such as anti-asthamatic, anti-diabetic, hepatoprotective, anticancer, antimicrobial, anti-inflammatory and antioxidant etc. The purpose of this review is to discuss and concluded the knowledge about on phytochemical composition and wound healing activity of moringa Olifera.

Keywords: *Moringa Olifera, Pharmacological Activities, Wound Healing Activity.*

Introduction

Plants are used by about 80% of the world people for health and welfare, and fragrant and medicinal plants description for 25% of pharmaceuticals.[1]A artificial rotation developed over the last few decagon, with chemical substances living incorporated into all most foods, beverages, agriculture, and the environment.[2]Gradually new discoveries are affected the province on chemical supplementation and junk food is growing and development of hostility to medicines growing for that reason human being make an effort to shift the attention towards the utilization of natural, herbal as well as organic farm based drugs. The traditional Ayurveda is still in practice.[3] The Miracle tree or Moringa contains highest antioxidant in food and has remarkable medicinal uses and nutritional value.[4]

Wounds are unavoidable events in life. Wounds may occur due to physical, chemical, accidental or microbial agents.[5] Wound healing involves a complex phenomenon of interactions between different cell chemicals like, cytokine mediators and the extracellular matrix. The Process of normal wound healing involves hemostasis, inflammation, proliferation and remodelling. Every phase of wound healing is distinct, although the wound healing process is continuous, with each phase overlapping the next. Because successful wound healing requires sufficient blood and nutrients to be supplied to the site of damaged tissue.[6]

The Moringa has been utilized in traditional medicine. Moringa's taxonomic classification following as: Kingdom &Plantae. Tracheobionta is a sub-kingdom of Tracheobionta. Division – Magnoliophyta, Super Division – Spermatophyta, Order – Capparales and belongs to family respectively. Moringceae with the genus and species of moringa and oleifera, properly.[7]

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* Associate Professor, Dr. K. N. Modi University, Newai, Rajasthan, India.
** Professor, Dr. K. N. Modi University, Newai, Rajasthan, India.
*** Research Scholar, Department of Pharmaceutical Science, Guru Ghasidas Central University, Bilaspur, Chhattisgarh, India.
**** Assistant Professor, Dr. K. N. Modi University, Newai, Rajasthan, India.

Figure 1: Leaves of *M. oleifera*

These plants possess various medicinal properties which can be found in every section of it such as anti-asthamatic, anti-diabetic, hepatoprotective, anticancer, antimicrobial, anti-inflammatory and antioxidant etc. In this review paper are highlight the phytoconstituents and wound healing activity of moringa aoleifera.

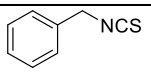
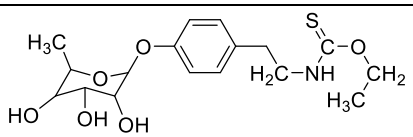
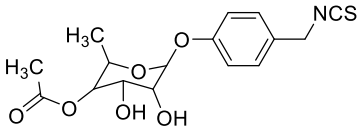
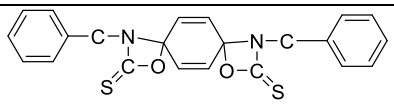
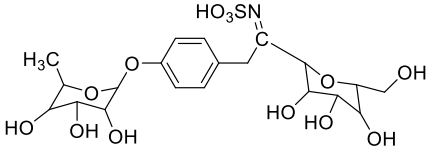
Phytoconstituents and Pharmacological activity of *Moringaoleifera*

Table 1: Phytoconstituents & Biological activity of plant *Moringaoleifera*[18-23]

Parts of Plant	Phytochemical constituents	Pharmacological activity
Seeds	Moringine, niazimicin, niazirin	Acts against asthma,
Leaves	Niazirin, Niazirinin, Niaziminin, Niazimicin A, Niazimicin B.	Anticonvulsant, Antioxidant, Antihypertensive, antibacterial, anticancer
Flowers	Present some chemical constituents like as quercetin, isoquercetin, kaemopherol, kaempferitin,	Act against inflammation
Stem	Chemical constituents are extracted from stem Vanillin, beta- sitosterone,	Act against inflammation
Pods	Isothiocyanate, nitrites, beta- sitosterol.	Act against inflammation & helmintics
Bark	Benzylgiucosinolate derivatives.	Act against urolithiatic
Root	Some chemical constituents are extract from root are Moringine, moringinine, spirachin,also p-cymene	Antifertility

Chemicals and Structures

Table 2: Phytoconstituents & Chemical Structure [4-10]

Phytoconstituents	Chemical Structure
Benzyl Isothiocyanate	
Niazimicin	
4-[(4'-O-acetylalpha-L-rhamnosyloxy) benzyl isothiocyanate	
Pterygospermin	
4-(alpha-L-rhamnopyranosyloxy) benzylgiucosinolate	

Wound Healing and Related Activity

In albino rats, an aqueous extract of the leaves increased wound healing properties. This is due to the presence of wound healing components like quercetin, kaempferol, phytosterols, and vicenin-2 in ethyl acetate extract of leaves as well as dexamethasone in parts of plant bark.

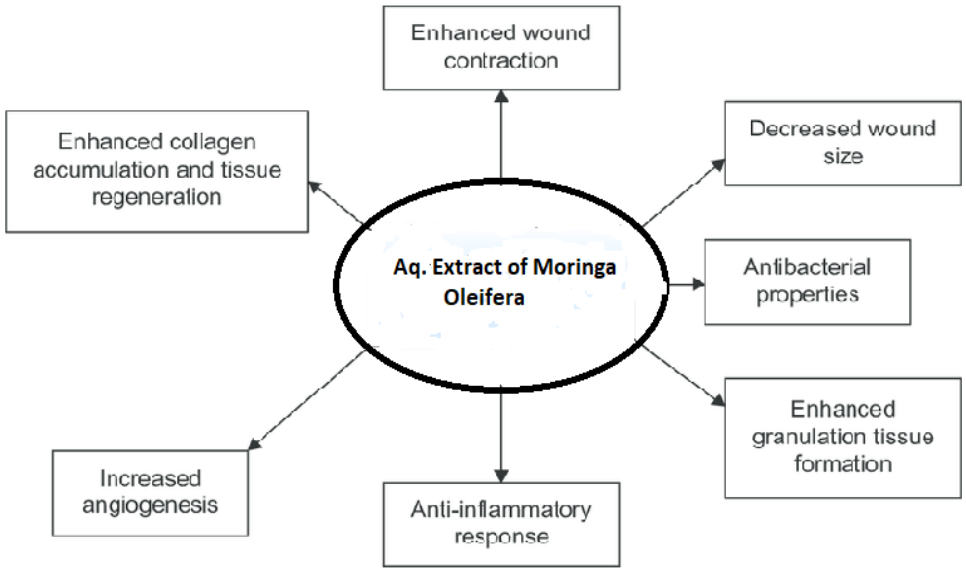


Fig. 2: Wound Healing Mechanism of Moringa Olifera[24,25]

Antioxidant Activity

Anti - oxidant chemicals present in Moringa olifera include ascorbic acid, carotene, qurecitin, kaempferol, and flavonoids. Whereas, in leaves portion it majorly include; myriceti, tocopherols, and lectins. In seeds procyanidins was found. Although, in stem and root portion, the excess quantity of palmitic acid, phytosterols, and 9-octadecenamide was found Hydrophilic and alcoholic leaf extracts and roots (methanolic and ethanolic) have potent antioxidant and radical scavenging properties. Along with, Isoquercetin has the strongest antioxidant properties.[14]

Anti-Inflammatory Activity

The involvement of 4[(Lrhamnosyloxy) benzyl] isothiocyanate, 4[(4′Oacety-l-L-rhamnosyloxy) benzyl] isothiocyanate, 4 (2OacetylLrhamnosyloxy) benzyl isothiocyanate, 4 (3Oacetylrhamnosyloxy) benzyl isothiocyanate, 4 (4Oacetylrhamnosyloxy) benzyl isothiocyanate, quercetin, quercetin 3 Oglucoside, crypto chlorogenic acid, aurantiamide acetate, 1,3-dibenzyl urea and 4 (α-L-rhamnosyloxy) -benzyl glucosinolate and kaempferolglucosides may be responsible for the anti-inflammatory activity.*Moringaoleifera* root as well as bark methanolic and aqueous extracts, leaves and flowers methanolic extract, and seeds ethanolic extract have anti-inflammatory action. An ethanolic extract of the leaves was obtained to be anti-inflammatory by plugging the chemotactic oxidation of polymorphonuclear leukocytes, keratinocytes, and multiple sclerosis cascades.[21]

Antimicrobial Activity

It is very effective against bacterial species, since it shows antibacterial activity against both gram-negative and gram-positive bacteria. Bacterial species *Pseudomonas aeruginosa* and *Staphylococcus aureus*against effective leaf extract of M.*oleifera* (Caceres, Cabrera, Morales, methanol leaf extract was evaluated in contrast to 13 different bacterial species; such as E, coli, S.aureus and P. aeruginosa was evaluated using chloroform as well as ethanol extracts of seeds and leaves. Although, Brilhante and co-workers studied the effect of flower and pods via utilizing the extract of ethanol as well as chloroform against the species of V. vulnificus, cholera and mimicus. S. aureus, Citrobacterfreundii, B. megaterium, and P. fluoescens were all killed by an ethyl acetate extract of bark.[8]Additionally, 4-(L-rhamnopyranosyloxy) benzyl isothiocyanate, methyl N-4-(L-rhamnopyranosyloxy) benzyl carbamate, and 4-(Dglucopyranosyl-1- 4-L-rhamnopyranosyloxy) benzyl thiocarboxamide contains antimicrobal properties.[5,6]

Other Pharmacological Activity of *Moringaoleifera*

This plant has several activities with or without wound healing activity such as-

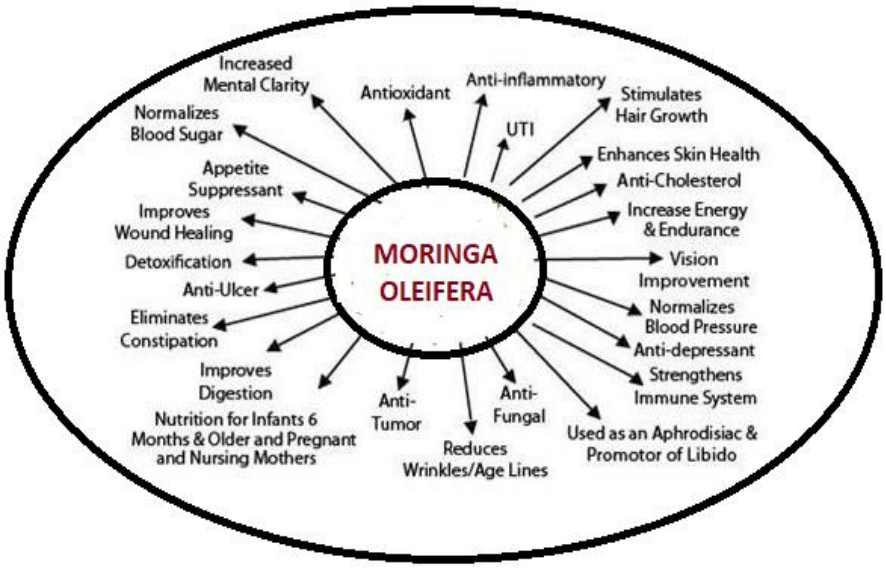


Fig. 3: Other Activity of Moringa Oleifera Lam[26,27]

Antifungal Activity

Because of the existence of numerous phytoconstituents ingredients, it has been utilised to suppress antifungal activities. It works against a variety of fungus species. Ethanolic extracts of seeds have been tested for antifungal activity against *T. mentagrophyte*, Pull (T. rubrum, E. xoccosum, M. canis). A fungicidal compound Griseofulvin has the ability to stop fungus from growing. It was extracted from the *M. oleifera* species of endophytic fungus.[9]

Antiviral Activity

As an indigenous herbal plant, it has been utilised to improve antiviral treatments. This is effective in number of viruses i.e., HSV bursal adenoviruses, foot as well as mouth and rhinovirus and seed extract against HSV-1 were all inhibited by ethanolic leaf extracts. The activity of aqueous seed extract against Newcastle disease virus was negative.[13]It can also be utilized as a medication for HIV infected individuals. Although, it has been used to treat HIV-related adverse effects and to fight the Hepatitis B virus.[11]

Antidiabetic Activity (Antihyperglycemic)

Due to the general abundance of terpens as well as flavonins, those are essential in stimulating pancreatic cells and resulting in the production of insulin hormone, it is particularly helpful in diabetes mellitus, antihyperglycemic, and hypoglycemic. Active compounds such of glucosinolates, flavonoids along with aschlorogenic acid are capable of possessing hypoglycemic action. Streptozocin induced cytotoxicity test was performed on diabetic Wistar rats, the study revealed that the ethanolic leaf extracts was reported to have hypoglycemic action discovered that benzylamine, which is derived from moringaolifera leaves extract, In elevated diet-induced rats, it lowers cholesterol levels, fat mass, diabetic reactions, and sugar levels. In diabetic animals, a watery extract of the leaves increased insulin levels. The leaves' methanolic extract showed protective effect against diabetic-induced kidney damage, reactive oxygen species (ROS), and inflammation.

Antioxidant Activity

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Anti-inflammatory Activity

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Antihelmintic Activity

Fresh and embroys eggs along with L1 and L2 larvae of H. contortus were evaluated with macerated and injected hydrophilic leaf extract as well as ethanolic extracts of Moringaoleifera. At 3.75 and 5 mg/mL, the efficiency was found to be efficient on eggs, inhibiting 60.3 percent 8.2 percent and 92.8 percent 6.2 percent egg embryonation, respectively.[15]

Anti-urolithiatic Activity

The bark of Moringaoleifera was tested for anti-urolithiatic action in both aqueous and alcoholic extracts. It results in a decrease in the weight of the stone caused by ethylene glycol-induced urothiasis. Moringaolifera has antiuothiatic activity that is both protective and healing properties.

Cardio Protective Activities

Each section of the plant is used to stimulate the cardiovascular system, as well as to reduce the cholesterol and blood pressure levels in our bodies.This is because presence of cardio stimulants such as N-α-L-rhamnopyranosylvincosamide, gossypetin, quercetagenin, proanthocyanidins and β-sitosterol. *Moringaolifera* fruits reduced the cholesterol level of hypercholesteremic rabbits' liver, heart, and arota. Because of the existence of multiple leaf additives such as niazinin, niazimicin, niaziminin, niazimin, 4 (4′Oacetylrhamnosyloxy) benzyl isothiocyanate, ethanolic leaf extract exhibits significant antihypertensive and hypotensive properties. The hypotensive activity was tested in the heart of an animal and found that glycosidal compounds like thiocarbamate and isothiocyanate were identified to be responsible for this powerful hypotensive characteristic.[16]

Anticancer and Antitumor Activities

Ethanolic extract of leaves contains chemoprotective, cytotoxic, antihepatocarcinoma, antimyelomic and antiproleferative activities. Besides, in the leaves, eugenol and isopropyl isothiocynate and in the bark of, palmitic acid was found.[12]

Antiepileptic Activity and Anti-Convulsant Activity

At doses of 200/400 mg/kg injected IP, methanolic leaf extracts exhibits effective anti-convulsant property against pentylenetetrazole. The ethanolic extract of *Moringa concanensis* leaves may exert anticonvulsant effects via different mechanism, as it inhibited MES-induced hind limb extension and abolished PTZ-induced seizures.[17]

CNS Activity

The extract of the leaves replenishes monoamine activity in the brain tissues, which may be beneficial in contrast to Alzheimer treatment. The anti - convulsant activity of aqueous extracts of Moringa oleifera roots as well as ethanolic leaves extracts was investigated *in vitro* on seizures caused by penicillin, locomotor movement, and rates of serotonin, dopamine, and norepinephrine in the brain.\

Anti –Fertility Activity

In the inclusion or exclusion of estradioldi propionate and progesterone, a hydrophilic abstract of roots was reported to be beneficial for an antifertility property.

Anti-Asthmatic Activity

A study found that the moringa plant can help asthmatic patients. For three weeks, they were given 3 g of finely powdered dried kernels. Aspirometer was used to assess clinical effectiveness before and after the treatment. The percentage of patients exhibited higher haemoglobin (Hb) levels and lower platelet counts. After 3 weeks of therapy, by 32.97 ±6.03, percent,30.05 ± 8.12 and 32.09 ±11.75 percent, the medication increased required pulse rate, pushed expiratory flow rate, and peak expiratory volume in 1second, respectively. In acetylcholine, histamine, Bacl2, and 5HT-induced bronchiospasm, alcohol extracts seedof kernels were found to be spasmolytic.[18]

Conclusion

In this review the various Phytochemicals and pharmacological studies on *M. Oleifera is* reported and support its traditional uses and convince be useful for clinical evaluation and development of economic drugs as well as formulation in special case of wound healing.

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