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RESEARCH ARTICLE

HENNA AND MICROBIAL GROWTH

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Abstract

Aim: The current review will highlight the antimicrobial effects of henna (Lawsonia inermis). Medicinal plants are being widely used, either as single drug or in combination in health care delivery system. Lawsonia inermis Linn. is commonly known as henna, which is recognized in traditional system of medicine. It. is a much branched glabrous shrub or small tree (2-6 m in height), cultivated for its leaves although stem bark, roots, flowers and seeds have also been used in traditional medicine. It has been traditionally reported in use of headache, hemicranias, lumbago, bronchitis, boils, ophthalmia, syphilitis, sores, amenorrhea, scabies, diseases of the spleen, dysuria, bleeding disorder, skin diseases, diuretic, antibacterial, antifungal, anti- amoebiasis, astringent, anti-hemorrhagic, hypotensive and sedative effect. Several studies are being carried towards it activates like cytotoxic , hypoglycaemic , nootropics, antimicrobial, antibacterial , trypsin inhibitory , wound Healing , antioxidant , anti-corrosin , anti-inflammatory, analgesic and antipyretic, anti-parasitic, tuberculostatic , protein glycation inhibitory, hepatoprotective , anti-tumoral activity. With all these potential benefits, this plant is not widely utilized. This review gives a view mainly on the traditional uses, phytochemistry and pharmacological actions of the plant.

Key Words: Henna, Antimicrobial Activity, Herbal medicine, lawsone

عنوان البحث

الحناء والنمو الميكروبي

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المستخلص

الهدف: ستسلط المراجعة الحالية الضوء على التأثيرات المضادة للميكروبات للحناء. تستخدم النباتات الطبية على نطاق واسع ، إما كدواء منفرد أو مجتمعة في نظام تقديم الرعاية الصحية. Lawsonia inermis تُعرف باسم الحناء ، وهي معترف بها في نظام الطب التقليدي. هي شجيرة مجردة متفرعة إلى حد كبير أو شجرة صغيرة ، تُزرع لأوراقها على الرغم من استخدام لحاء الساق والجذور والأزهار والبذور أيضًا في الطب التقليدي. تم الإبلاغ عنه تقليديا في استخدام الصداع ، نصفي ، ألم الظهر ، التهاب الشعب الهوائية ، الدمامل ، العيون ، الزهري ، القروح ، انقطاع الطمث ، الجرب ، أمراض الطحال ، عسر البول ، اضطراب النزيف ، الأمراض الجلدية ، مدر للبول ، مضاد للبكتيريا ، مضاد للفطريات ، مضاد للأميبا ، قابض ، مضاد للنزيف ، تأثير خافض للضغط ومهدئ. ويتم إجراء العديد من الدراسات نحو فعاليتها مثل التاثير السام للخلايا ، ونقص سكر الدم ، منشطه للذهن ، مضادات الميكروبات ، مضاد للجراثيم ، مثبط التربسين ، التئام الجروح ، مضاد للأكسدة ، مضاد للتآكل ، مضاد للالتهابات ، مسكن وخافض للحرارة ، مضاد للطفيليات ، مثبط للسكر ، مثبط للبروتين ، نشاط مضاد للأورام. مع كل هذه الفوائد المحتملة ، لا يتم استخدام هذا النبات على نطاق واسع. تعطي هذه المراجعة وجهة نظر بشكل رئيسي حول الاستخدامات التقليدية ، والكيمياء النباتية والإجراءات الدوائية للنبات.

الكلمات المفتاحية: حناء, نشاط مضاد للميكروبات ، طب الأعشاب ، لاوسون

Introduction:

The increase of multi-drug resistance in human and animal pathogenic microbes likewise adverse side effects of some antibiotics has triggered immense interest in the search for novel antimicrobial drugs of vegetable origin. Vegetation have played a substantial role in retaining human health and improving the quality of human life for many years and have assisted humans well as valuable components of medicines, seasonings, beverages, cosmetics and dyes. In recent times, focus on plant research has increased all over the world and a large body of evidence has collected to show immense potential of medicinal plants used in various traditional systems. Nowadays, we are seeing a great deal of public interest in the use of herbal remedies. There are many herbs, which are mostly used for remediation of central nervous system, cardiovascular problems, digestive and metabolic disorders and liver disorders. Studies on pharmacological field on such medicinally important plants stay to interest researchers throughout the world. One these plant, Henna (Lawsonia inermis Linn) attracts the care of the scientists for its therapeutic activities ranging from anti-inflammatory to anticancer activities [(1)]. Lawsonia inermis Linn (Family: Lythraceae) which is commonly known as henna, mainly present in subtropical and tropical areas and is used in all over the world. It was used for thousands of years for its cosmetic values as a dye. The analysis of Lawsonia inermis phytochemically shown the presence of proteins, carbohydrates, phenolic, flavanoids, quinones, saponins, alkaloids, terpenoids, xanthones, coumarins, resin, fat and tannins, furthermore contains 2-hydroxy-1,4- naphthoquinone (lawsone). With the pharmacological studies Lawsonia inermis revealed antibacterial, antiparasitic, antifungal, molluscicidal, antioxidant, central nervous, analgesic, anti-inflammatory, hepatoprotective, antipyretic, wound and burn healing, immunomodulatory, antiurolithiatic, antidiabetic, hypolipidemic, antiulcer, antidiarrhoeal, anticancer and many other pharmacological properties [(2)].

Lawsonia inermis (Henna) and Fungi

Suleiman E A and Mohamed E A [(3)] revealed that the effect of antifungal activity of L. inermis leaf extracts was found to be reliant on the dose against C. albicans and S. cerevisiae. Petroleum ether extract indicated a wide-ranging antifungal spectrum compared to ethanol extract against tested yeasts, and showed inhibition zone broader

than the commercial Nystatin. Thus, petroleum ether is a well solvent for consistent extraction of antifungal materials from L. inermis plant[4], but S. cerevisiae had more sensitivity to ethanol extract at the concentration of 10 mg/mL compared to C. albicans, meaning a species susceptibility to the extract used. And the tested moulds were sensitive to ethanol extract at a concentration of 5 mg/mL except Aspergillus flavusmeaning that A. flavus had less sensitivity of the extract. Zakaria M M [5] informed that 100% inhibition of Trichophyton mentagrophytes growth was detected on using 10 mg/mL of L. inermis ethanol extract, which shows great sensitivity of dermatophytes to L. inermis plant.

Screening of Sudanese Henna plant phytochemically exposed naphthoquinone as an active component which may exhibit the antifungal activity to the tested fungi [6]. Previous revisions [7] concluded the same result when they studied the antifungal activity of higher plants; L. inermis leaves were showed strong fungicidal influence an account of naphthoquinone that found to be the chief active ingredient. Tannin presence may had a vital role as antimicrobial agent as proposed by Banerjee and his collaborators [8].

Lawsonia inermis linn. (henna) and burn wound infections:

Burn wounds complication appear from the colonization of the burn position by such organisms as Streptococci sp., Straphylococcus aureus, Pseudomonas aeruginosa, Fusarium oxosporum, Aspergillus niger and Candida alblicans. That complications may be avoided by good quick therapy. Treatment with penicillin frequently undertaken in hospital. Though, in third world countries like Nigeria where therapeutic care is sometimes poor, patients stay home and nurse themselves back to health using local medications, like the application of tea leaves, castor oil, aloe vera gel in its crudest form, egg yolks or the dried leaves of henna plants.

As stated by Muhammad and Muhammad [9] the antibacterial effect of henna is noted when the zone of inhibition is more than 6 mm. The antibacterial activity against S. aureus, was reported for wholly concentrations in both the water and chloroform extracts. For *P. aeruginosa*, just slight antibacterial activity was noted at the highest concentration in both the water and chloroform extracts. According to Streptococcus, there was no effect at the low concentration but when the concentration increased

antibacterial activity was documented. Extracts had no effect against the yeast C. albicans. There was a slight inhibition in growth for A. niger and Fusarium. As yet the concentration increased, inhibition was completed for the first 2-3 days and finally there was whole inhibition by the chloroform extracts. That study indicated henna leaves extracts were able to inhibit the growth of microbes that triggering burn wound infections. Thus, these results support the use of henna in the controlling of burn wound infection. Burns treatment with henna may exclude the complication that rise in the use of conventional wound dressings such as silver nitrate which imparts stains and is time consuming apart from being able to cause hyponatraemia or hypokalaemia in addition to the usage of mafenide (sulphamylin) which can be painful thus worrying the patient.

Henna and bacterial growth

Twenty plants species ethanol extracts were used by Yemeni traditional therapists to treat infectious diseases were tested for their antibacterial activity for gram positive and gram negative bacteria. The most active against all the bacteria in the test system was the ethyl acetate extract of L. inermis L. was [10]. Henna Quinonic compounds were tested in-vitro for antimicrobial effects [11]. Genotoxic studies on lawsone suggested that it was a weak bacterial mutagen for Salmonella typhimurium strain TA98 and was more clearly mutagenic for strain TA2637[12]. leaves aqueous extract of L. inermis exhibited a significant antibacterial result [13]. Crude extraction of leaf with methanol, chloroform and Aqueously, revealed in vitro antimicrobial activity for inhibiting the growth of six human pathogenic fungi and four types of bacteria in dose dependent mode [14, 15].

N. Choukchou-Braham, *et al* suggests that the chief antimicrobial effect is due to polyphenolic compounds (naphtoquinones derivatives). The major bioactive constituent in L.inermis is Lawsone that recognized for its antibacterial action [7, 13,21] and holds a wider spectrum of activity due to coumarins, flavonoïds and tannins compounds are not responsible of antimicrobial activity of L.inermis extracts[16], also they referred that the antimicrobial activity of henna leaves were mostly affected by the action of Lawsone. Conversely Lawsone isn't the only composite that responsible for the whole of this activity, at least in the free form, knowing that Lawsone is an

heteroside form in the leaves [16]

A study carried out by Ahmad and Begs [17], with 45 plants of Indian origin where the alcoholic extract of L.inermis leaves exhibited antimicrobial effect with broad spectrum against the multi-drug resistant strains: E.coli, S.aureus, S.paratyphi, B.subtilis, S.dysenteriae and C.albicans. Some authors stated that the origin of L.inermis leaves antibacterial activity against S.aureus strain to gallic acid [18], whereas others link this activity to naphtoquinones compounds (Lawsone) against Mycobacterium tuberculosis [19].

Henna and inflammation

Isoplumbagin and lawsaritol, isolated from stem bark and root of L. inermis L. showed an anti- inflammatory activity. Phenylbutazone, isoplumbagin and lawsaritol these compounds at the oral dose of 100 mg/kg exhibited 61, 60 and 40 percent inhibition in contrast with controls. Isoplumbagin showing substantial anti- inflammatory activity like to that of phenylbutazone [20]. Butanol and chloroform fractions presented the strong anti-inflammatory, antipyretic and analgesic effects than aqueous fraction of crude ethanol extract of L. inermis in a dose dependent mode [21], also the leaves displayed major anti-inflammatory effect [22].

Virus, parasite and henna

The ethanol soluble fraction of L. inermis exposed high activity against Sembiki forest virus (SFV) in swiss mice and chick embryo models [23]. Anti-trypanosomal effect, raw Methanolic extraction of L. inermis leafs displayed in vitro activity against Trypanosoma brucei with the concentration of 8.3 mg/ml of blood in mice but not in-vivo. The treatment tends to improve the disease circumstance but not influence the level of parasitaemia and pack cell volume [24]. During an ethnopharmacological survey of antiparasitic medical plants used in Ivory Coast, seventeen plants were collected and recognized. Alkaloidal, Polar and non-polar extracts of several parts of these species were assessed invitro in an antiparasitic drug analysis. Leishmanicidal, antimalarial, antiscabies, trypanocidal, and antihelminthiasis actions were determined. From the selected plants L. inermis displayed interesting trypanocidal actions[25], also displayed a significant molluscicidal activity[26]. Ethanol, hexane and ethyl acetate extracts of L. inermis were tested for antidermatophytic effect on five strains each of Tinea rubrum

and Tinea mentagrophytes. Altogether these extracts indicated significant antidermatophytic properties invitro[27]. Henna activity as tuberculostatic were screened in-vitro and in-vivo. On the media Lowenstein Jensen the tubercle bacilli growing from sputum and of Mycobacterium tuberculosis H37Rv was repressed by 6 µg/ml of the herb. In vivo studies on mice and guinea pigs presented that the herb at a dose of five mg/kg body weight led to a substantial resolve of experimental tuberculosis after infection with Mycobacterium tuberculosis H37Rv[28].

Conclusion:

From the literature it has been noted that L. inermis L. exhibited significant antibacterial, antiparasitic, antifungal, antiviral, molluscicidal, analgesic, anti-inflammatory antipyretic, wound and burn healing and another effects, which was a safe substance to be used as a drug generally, also the most compound that responsible of the antimicrobial activity was Lawsone. We recommended that another studies are needed to investigate the effect of that plant against other diseases or microbial species and medical conditions.

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