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RESEARCH ARTICLE

ANTIBACTERIAL ACTIVITY OF LAWSONIAINERMISAGAINST HUMAN PATHOGENIC BACTERIA

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Abstract

Natural medicine has been the main source of primary healthcare all over the world. Since ancient times, plants have been used as a rich source of effective and safe medicines.*Lawsoniainermis*has efficacy on skin disease.Leaves of *Lawsoniainermis* provide an important cosmetic dye. Henna leaves were extensively used for centuries in the Middle East, the Far Eastand Northern Africa as dye for nails, hands, hair and textile.*Lawsoniainermis* contained 2-hydroxy-1,4-naphthoquinone (lawsone).Properties of *Lawsoniainermis* include antimicrobial, antifungal, antitumor, antiangiogenic, larvicidal, antileishmanial,antimalarial, hepatoprotective, anti-inflammatory, analgesic, and antipyretic characteristics.In this study the antibacterial activity of the leaf extract of *Lawsoniainermis*on *Escherichia coli*, *Staphylococcus aureus*, and*Streptococcus pyogenes*. Zone of Inhibition was observed.*Lawsoniainermis*leaves extractcontaining test disk inhibited growth of pathogenic bacteria. Test disk containing 250 µg, 500 µg and 1000 µg showed 11mm, 14mm and 18 mm zone of inhibition against *E. coli*. 8 mm, 11mm and 13 mm zone of inhibition against *Staphylococcus aureus*. 7 mm, 9mm and 12 mm zone of inhibition against *Streptococcuspyogenes*. Whereas 30 µg Amikacin containing standard antibiotic disk showed 14 mm, 12 mm and 10 mm zone of inhibition against *E. coli*, *S. aureus* and *S. pyogenes*. This research concluded that *Lawsoniainermis*leaves extractcontain antimicrobial properties. The formulation of *Lawsoniainermis* leaves extract as a natural source for the development of drugs.

Introduction:-

Since the beginning of civilization, medicinal plants have been an integral element of human society in the fight against disease. Pathogens continue to exhibit alarming levels of resistance to such antimicrobial drugsworldwide.[1]The widespread use of antibiotics has led to an increase in antibiotic resistance, which may make some bacterial illnesses more difficult to treat with current antimicrobials.[2]Therefore, steps must be taken to decrease bacteria resistance, and other antibiotic sources must be investigated.[3]Products are utilized in the pharmaceutical business in their purified form or in their natural forms in conventional herbal remedies.[4] The tropical and subtropical shrub *Lawsoniainermis* Linn, sometimes known as henna, is found in North Africa, the

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Middle East, and the Indian subcontinent. Henna is the name of the dried, ground-up leaf powder.[5]*Lawsoniainermis* Linn. (Family: Lythraceae) is a tiny tree or shrub with many branches that grows to a height of 2 to 6 meters. It is grown mostly for its leaves, however traditional medicine has also made use of the stem bark, roots, flowers, and seeds. This plant is widely used as a cosmetic to dye nails, skin, and hair.[6]*Lawsoniainermis* exhibited a wide range of pharmacological effects, including those that were antibacterial, antifungal, antiparasitic, antioxidant, hepatoprotective, analgesic, anti-inflammatory, antipyretic, woundhealing, immunomodulatory, antidiabetic, hypolipidemic, antiulcer, antidiarrheal, diuretic, and anticancer.[7]

Materials and Methods:-

Plants extraction preparation

The leaves of*Lawsoniainermis*plant used in this study were obtained from the campus of Hamdard University in Bangladesh. The leaves were thoroughly cleanedand rinsed with distilled water before being dried in the shade. The dried leaves of *Lawsoniainermis*were grounded into fine powder to pass 100 mm sieve. 100 g of the fine powder was soaked in 400 ml of methanol with stirring for 72 hours, filtered through double layers of muslin, centrifuged at 9000 rpm for 10 min and finally filtered again through Whatman filter paper No. (1) to attain a clear filtration. The filtrate was evaporated and dried at 45^{o}Ctemperature, using water bath. The extract yield was weighted, stored in small bottle in fridge at 5^{o}C and their yield percentages were calculated using the following formula: Extract yield% = R/S×100 (Where R; weight of extracted plant residues and S; weight of plant raw sample).

Antibacterial activity of the plant extracts

E. Coli,*Staphylococcus aureus* and *Streptococcus pyogenes*were provided from the diagnostic centers of Hamdard General Hospital, Gazaria, Munshigonj. Mueller Hinton agar media andblank disk was purchased from Tradesworth Ltd. &Technoworth Associates Ltd. Dhaka, Bangladesh.

The inoculum of bacterial stain was prepared by sub-culture of each bacterial stain at the temperature of 35^{0}C incubated overnight in Mueller-Hinton agar SLANTs. The bacterial growth was harvested using 5 ml of sterile saline water, its absorbance was adjusted at 580 nm and diluted to attain viable cell count of 10^{7} CFU/ml using spectrophotometer.

The disk diffusion method is used to evaluate antimicrobial activity of *Lawsoniainermis*leaves extract. The plant extract residues (50 mg) were re-dissolved in 2.5 ml of ethanol, sterilized through Millipore filter (0.22 mm) then loaded over sterile blank disksto obtain final concentration of 10 mg/disc. 10 ml of Mueller-Hinton agar medium was poured into sterile petri dishes followed with 15 ml of seeded medium previously inoculated with bacterial suspension (100 ml of medium/1 ml of 10^{7} CFU) to attain 10^{5} CFU/ml of medium. Sterile blank discs loaded with plant extract concentration of (10 mg/ml) were placed on the top of Mueller-Hinton agar plates. Blank disk loaded with 30µgof Amikacin was used as positive control. The plates were kept in the fridge at 5^{0}C for 2 hours to permit plant extracts diffusion then incubated at 35^{0}C for 24 h. The presence of inhibition zones was measured by Vernier caliper, recorded, and considered as indication for antibacterial activity.

Result:-

Table1:Zone of inhibition produced by methanolic extract of *Lawsoniainermis*(MELI) leaves extract 250 µg, 500 µg and 1000 µg containing paper disk and 30 µg Amikacin containing antibiotic disk against *E. coli*, *S. aureus* and *S. pyogenes*.

Sample Name	Concentration	Zone of inhibition (mm)		
		E. coli	*S. aureus*	*S. pyogenes*
MELI	250µg	11	8	7
MELI	500µg	14	11	9
MELI	1000µg	18	13	12
Amikacin	30µg	14	12	10

Note: MELI (Methanolic extract of Lawsoniainermis)

Discussion:-

Raja et al., (2013) showed their study that methanolic leaves extracts of *Lawsoniainermis*Linn inhibit the growth of microorganism dose dependently.[8]In this study *Lawsoniainermis*leaves extract used for the antimicrobial activities

assessed by disk diffusion method. The result showed good zone of inhibition by against *E. coli*, *Staphylococcus aureus* and *Streptococcus pyogenes*.

Conclusion:-

The result of this experiment suggest that Methanolic extract of *Lawsoniainermis*leaves have antimicrobial capacity to pathogenic bacteria. *Lawsoniainermis* is a good source of natural antibacterial material.

Conflicts of interests

No conflicting interests are stated by the authors.

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