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RESEARCH ARTICLE

ANTIBACTERIAL ACTIVITY OF SMILAX CHINA AGAINST HUMAN PATHOGENIC BACTERIA

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Abstract

Many plant species that are employed in herbalism are considered medicinal plants and some of these species even have therapeutic properties. In third world countries, using herbs to cure and control illnesses is common. Pharmacokinetic and metabolic research in conventional medicine have produced a lot of interest among the researchers all over the world. The Plant *Smilax china* is regarded as a powerful resource for the synthesis and development of drugs. *Smilax china*root extract has a good antimicrobial activity. In order to detect the antimicrobial activity of the root extract of *Smilax china*on *Escherichia coli*, *Staphylococcus aureus* and *Streptococcus pyogenes*, a Zone of Inhibition was observed. *Smilax china* root extract containing test disk inhibited growth of pathogenic bacteria. Test disk containing 250 µg, 500 µg and 1000 µg showed 10 mm, 14 mm and 18 mm zone of inhibition against *Escherichia coli*. 8 mm, 9 mm and 14 mm zone of inhibition against *Staphylococcus aureus*. 7 mm, 8 mm and 11 mm zone of inhibition against *Streptococcus pyogenes*. Whereas 30 µgAmikacin containing standard antibiotic disk showed 14 mm, 12 mm and 10 mm zone of inhibition against *Escherichia coli*, *Staphylococcus aureus*and *Streptococcus pyogenes*. This research concluded that *Smilax china*root extract contain antimicrobial properties. Proper and systemic study of *Smilax china* may enlighten this formulation as natural origin for antimicrobial drug production.

Introduction:-

An organism that may infect a host and cause sickness is considered a pathogenic organism.[1] Host usually infected by microorganisms through five roots of entry i.e., mouth, eyes, nose, urogenital openings and wound or bites that breach the skin barriers.[2]Typically, pathogens may be distinguished from the native flora. Our regular microbial residents only become problematic when they penetrate a typically sterile area of the body, such as when a bowel rupture allows the gut flora to enter the abdomen's peritoneal cavity and induce peritonitis, or when their immune systems are compromised.[3]Nowadays natural medicine is very effective against pathogenic bacteria.A species of climbing plant in the Smilax genus is called *Smilax china*. China, Korea, Taiwan, Japan, Philippines, Vietnam, Thailand, Myanmar, and India are among its originating countries. It goes by the name china root as well.The genus Smilax contains more than 300 species of flowering climbing shrubs that belong to the Liliaceae family. They can

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be found in large quantities in the warm regions of North America and East Asia.[4] The leaves are leathery, shining, about 7-15 x 4-11 cm, broadly ovate to elliptic having rounded base or shortly wedge-shaped; 3-5- nerved. The stalk of leaf is 1.5 cm long, base sheathing, with tendrils at the end. Flowers white, in dense umbels in leaf axils, 1-3 on a common peduncle.[5] Saponin and tannin are known to be the principal components of *Smilax China* L., which refers to the rhizome of *Smilax China* L. It also contains a significant amount of glycoside ophiopogonin and mucilage compounds that are isolated from the roots, despite the fact that the components of this plant have not been well studied. It has been demonstrated to be useful in strengthening the body's defenses against bacterial infections, shielding vital organs from harm, and aiding in the detoxification of heavy metal toxicity.[6]*Smilax china* L. rhizome was used to isolate kaempferol-7-O-bD-glucoside, which in turn caused apoptosis and G2/M phase arrest in HeLa cells without the need for p53.*Smilax china*L.'s sieboldogenin has been shown to have anti-inflammatory properties.[7]In our study to investigate the antimicrobial activity of *Smilax china*root,methanolicextract of *Smilax china* rootwas used to observe the zone of inhibition against *E. Coli*,*Staphylococcus aureus*and*Streptococcus pyogenes* in Mueller Hinton agar media.

Materials And Methods:-

Plants extraction preparation

Theroot of*Smilax china* plant used in this study were obtained from the campus of Hamdard UniversityBangladesh. Therootwas thoroughly cleanedand rinsed with distilled water before being dried in the shade. The dried rootof *Smilax china* wasgrounded into fine powder to pass 100mm 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, Munshiganj. Mueller Hinton agar media and Blank 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^{o}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 *Smilax china* root extract. The plant extract residues (50 mg) were re-dissolved in 2.5 ml of methanol, sterilized through Millipore filter (0.22 mm) then loaded over sterile blank diskto 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. Blankdisk loaded with 30 µgAmikacinwas used as positive control. The plates were kept in the fridge at 5^{o}C for 2 h. to permit plant extracts diffusion then incubated at 35^{o}C for 24 h. The presence of inhibition zones was measured by Vernier caliper, recorded, and considered as indication for antibacterial activity.

Result:-

Zone of inhibition produced by methanolic extract of *Smilax china* rootextract 250 µg, 500 µg and 1000 µg containing paper disk and 30 µgAmikacin containing antibiotic disk against *E. coli, S. aureus* and *Streptococcus pyogenes*.

Concentration of *Smilax china*root extract	Zone of inhibition in *E. coli*by *Smilax china*root extract	Zone of inhibition in *Staphylococcus aureus* by *Smilax china*rootextract	Zone of inhibition in *Streptococcus pyogenes* by *Smilax china*rootextract
250 µg	10mm	8mm	7mm
500 µg	14mm	9mm	8mm
1000 µg	18mm	14mm	11mm
Zone of inhibition by 30 µgAmikacin containing antibiotic disk in Selected Bacteria	14mm	12mm	10mm

Discussion:-

Seo, Lee, Kim,Lee,and Lee told their study that the*Smilax china* extract has present antimicrobial activity in selected microorganisms.[8]In this study *Smilax china*rootextract used for the antimicrobial activities assessed by disk diffusion method. The result showed good zone of inhibition against *E. coli*, *Staphylococcus aureus* and *Streptococcus pyogenes*is significant.

Conclusion:-

The result of this experiment suggest that Methanolic extract of *Smilax china*roothave antimicrobial capacity to pathogenic bacteria. In antimicrobial research, the extraction procedure is crucial since it largely dictates the study's outcome.

Conflicts of Interests

No conflicting interests are stated by the authors.

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