SCREENING OF ANTIBACTERIAL ACTIVITY OF CRUDE LEAF EXTRACTS OF CASSIA TORA ON UTI PATHOGENS

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ABSTRACT
Antibacterial effect of crude methanolic and aqueous extracts of leaves of Cassia tora against pathogenic bacteria E. coli, P. aeruginosa, S. aureus and K. pneumoniae isolated from patients of U.T.I, were investigated using agar well diffusion method. Among the various concentration tested (ranging from 0.0625 to 6.0 mg/mL), 1.0-2.0 mg/mL of methanolic extract was found to be the minimum inhibitory concentration (MIC) for almost all the test organisms while aqueous extract showed MIC at > 6.0 mg/mL. P. aeruginosa and K. pneumoniae were resistant to aqueous extract. Methanolic extract was more effective over aqueous extract producing larger zone of inhibition ranging between 12-24mm. The traditional claims of leaves of C. tora as an antibacterial ability have been confirmed as the extracts displayed activity against the pathogens associated with UTI. This study indicates that the leaves of C. tora can be used as a source for new broad spectrum oral drug.

INTRODUCTION
Urinary Tract infections (UTI’s) are the most common form of bacterial infections affecting people throughout their life span (Barnett et al., 1997; Foxman, 2002) Leading etiological agent of UTI’s include –Escherichia coli, Pseudomonas aeruginosa, Klebsiella pneumoniae, Proteus mirabilis and Staphylococcus aureus (Svanbory and Godaly, 1997). The incidence of UTI is greater in women as compared to men, which may be either due to anatomical predisposition or urothelial mucosal adherence to mucopolysachharide lining or other host factors (Schaeffer et al., 2002). The incidence of acute uncomplicated UTI is estimated to exceed 0.5 episodes per annum among women between 18-30 years (Hooton et al., 1996) The increasing drug resistance among these bacteria has made the therapy of UTI difficult and has led to a greater use of expensive broad-spectrum drugs. This resistance problem needs a re-new effort, resulting in searching effective antibacterial agents against pathogenic micro-organism resistant to current antibiotics (Soulsby, 2005) For centuries plants have been used throughout the world as drugs and remedies for various diseases (UNESCO report, 1988-1997). The herbal drugs serve as prototype to develop more effective and less toxic medicines. According to World Health Organization (WHO report, 2000), medicinal plants would be the best source to obtain a variety of drugs. Therefore, such plants should be investigated for better understanding of their properties, safety and efficacy (Nascimento et al., 2000). Many of the developing countries practice traditional medicine as its main source of healthcare, which is usually of plant origin (Ahmad et al., 2008; Bent, 2008). Today, nearly 88% of the global populations switch to plant derived medicines as their first line of defense for maintaining health and combating diseases (Kintzios et al., 2006). Pathogenic bacteria have developed resistance against existing antibiotics due to indiscriminate use of antimicrobial drugs to treat the infectious diseases (Pattnaik and Sharma, 2004; Qadrie et al., 2009) as a result the treatment failure and health care cost have raised day by day. This has encouraged the microbiologists all over the world to formulate new antimicrobial agents and evaluation of the efficacy of natural plant products as the substitute for chemical antimicrobial agents (Cowan, 1999; Alviano and Alviano, 2009). The review of literature revealed that considerable contributions have been made on medicinal plants by many workers (Dadsena et al., 2013; Dandapat et al., 2013; Kullu et al., 2013; Kumar et al., 2013; Kumar et al., 2013a; Mahato et al., 2013; Tabassum et al., 2013; Toppo et al., 2013). In view of increasing resistance to existing antimicrobial agents, herbal drugs are being looked as very importance source for discovery of new agents for treating various ailments related to bacterial infections.

Cassia tora L, family Leguminosae/ Caesa lipioidaeia a herb being used in India as folk remedy in the form of decoctions and infusions to treat bacterial infections and also claimed to be an effective against variety of skin conditions like psoriasis, acne, wounds and urinary tract infection.

The present investigation has been carried out to study the unexplored area of this herb towards their antibacterial activity with respect to their traditional use in urinary tract infection.
Mahmood (Rabe and Van Staden, 1997, Parekh and Chanda, 2006) attributed this to the differences in their cell wall structures against gram-positive than gram-negative bacteria and authors have reported that plant extracts are more effective closely followed by whereas inhibition of difference in results in the present study. Several factors are known to influence yield and biological activities of plant based products, including the age of the plant, time of harvest, drying and processing of the materials, methods of extraction and the solvents used (El-Mahmood et al., 2002) were also smaller in size than those obtained in the present study. Our findings are similar to De and Ifeoma (2002) as they reported that aqueous extract exhibited the findings of Roopashree et al. (2008), as they reported that aqueous extract exhibited high antibacterial activity than methanolic extracts, in term of the tested concentration of aqueous extract and other pathogens E. coli, S. aureus, did not responded at this lower concentration but responded better in concentration >6.0 mg/mL. Similarly the low MIC value of methanolic extract of C. tora leaves found in the present study were different from the findings of Roopashree et al. (2008) with high MIC value for S. aureus and E. coli i.e. 64mg/mL. Our findings were also vary with the reports of Nadkarni et al. (1982), Brown and Dattner (1998), Grover and Yadav (2004) and Christopher et al. (2005), as they reported that aqueous extract exhibited high antibacterial activity than methanolic extracts, in term of zone of inhibition for the same test organism.

Amongst the test bacteria, E. coli (E1) was the most susceptible, closely followed by P. aeruginosa (P1) and S. aureus (S1) whereas K. pneumoniae (K1) was less susceptible. Several authors have reported that plant extracts are more effective against gram-positive than gram-negative bacteria and attributed this to the differences in their cell wall structures (Rabe and Van Staden, 1997, Parekh and Chanda, 2006) El-Mahmood et al. (2010), who reported S. aureus susceptibility of higher than all the same test bacteria against the crude plant extract. Control bacteria were more susceptible to the toxic effects of the crude extracts than the test bacteria though the sensitivity also varied according to strains, (El-Mahmood et al. 2010).

The standard antibiotic chloramphenicol, (30ug/mL) demonstrated highest activity than the crude extracts for E. coli and S. aureus (Table 1). This is because the antibiotic is in pure state and has undergone some refining processes that have established it as standard antibiotic. The present study stipulated that methanolic extract of C. tora leaves possess antibacterial activity against UTI pathogens, and supports the finding of Dewenjie et al. (2007).