1. Introduction

Urinary tract filters and eliminates waste substances from our blood and also maintains the body's water balance and ensures that our tissues receive enough volume of water to carry out the cell function properly and be healthy. The kidneys secrete the hormone erythropoietin, which stimulates the production and also controls red blood cell. It also regulates the acid-base balance of the body fluids. Diseases associated with urinary system are called as a urinary tract infection (UTI). Acute pyelonephritis, cystitis, urethritis and asymptomatic bacteriuria are considered to be a urinary track infection (UTI). Renal scarring, hypertension and chronic renal failure are the complications of UTI (Elder, 2011). Sex, not being circumcised, constipation, unhygienic condition and vesicoureteral reflux influence are the factors that increase the incidences of UTI (Bhat et al., 2011).

Infectious pathogens associated diseases are responsible for about 70% of all deaths in the world (Young, 2012). Bacterial pathogens are responsible for higher incidence of UTI. About 150 million cases of UTI were recognized each year from throughout the world (Ohieku and Magaji, 2013). The prevalence of UTI in males and females were 2% and 7-8% respectively (Abolfazl et al., 2014). In Asia, incidences of Urinary tract infections were about 8.3 million per year. In India, it is one of the most common causes of morbidity and mortality, affecting all age groups across the life span. Women are susceptible to UTI due to short urethra and hormonal changes. Untreated upper UTI in pregnancy carries well documented risks of morbidity and rarely, mortality to the pregnant women (Maraki et al., 2013).
Source for bacterial UTI etiology may be endogenous or exogenous. One of the recent report indicated that 74% of UTI infections are due to endogenous microbial flora, which are acquired from our own gastrointestinal system through anus. *Escherichia coli* (*E. coli*), *Klebsiella* sp., *Enterobacter* sp., *Proteus* sp., *Enterococcus* sp., *Staphylococcus saprophyticus* and *Citrobacter* sp., are the most common agents. These organisms ascend through the urinary passage to the urinary bladder and the kidneys to produce infection (Pintar et al., 2003). These organisms have the capability to cause infection individually or in combination.

*Escherichia coli* (*E. coli*) normally live in the colon (Adeniyi et al., 2006) and are present in the gastrointestinal tract as a normal flora. They are the common cause of community as well as hospital acquired infections of UTI (Sobel and Kaye, 2005). Studies from various parts of India have shown the occurrence of high rates of UTI incidence (Niranjan and Malini, 2014). In human, *E. coli* associated with extra intestinal disease are termed as extra intestinal pathogenic *E. coli* (ExPEC). These strains related to UTI are called UPEC (Maluta et al., 2014). The uropathogenic *Escherichia coli* (UPEC) strains are responsible for the majority of urinary tract infections (UTIs) that occur in 70-90%. The clinical management of UTI is complicated by increasing incidence of infections caused by multidrug resistant *E. coli* strains (Pintar et al., 2003). In recent years, incidence of cephalosporins, fluoroquinolones and trimethoprim resistant *E. coli* causing UTIs shows special clinical importance, because they cause multiple virulence and are not responding to common therapeutic applications.
Virulent factors of bacteria are highly responsible for increased incidence of infectious diseases. Biofilm forming ability of the *E. coli* protects the bacteria against high antimicrobial concentration and phagocytosis. Detection of virulent factor producing strains is relevant for the design of adequate control measures for UPEC infection. Biofilm resistance is commonly multifactorial and can vary from one organism to another. Treatment of infections associated to biofilms with existing approved therapies remains a significant medical challenge. Moreover, the eradication of biofilms with single target antimicrobials is difficult to perform and a combination of distinct bacterial targets is needed for treating biofilm infections. Therefore, the ability of sessile bacteria to resist antimicrobial agents clearly shows that new control approaches are required. An important strategy to fight the resistance problem involves the search of novel antimicrobials capable of suppressing bacterial resistance mechanisms, or of working in synergy with the currently available antimicrobial agents. The use of compounds with different targets in the cell of pathogenic bacteria in this mode of growth is another possible mechanism. This has led to an increased interest in natural antibacterial products, which can restrict the ability of bacteria to adhere, communicate, and form complex biofilms. In fact, motility, adherence and biofilm formation are from the primary steps in bacterial pathogenesis and in the development of antimicrobial resistance (Abreu *et al.*, 2012).

The knowledge of etiology, virulence factors and antibiotic resistance pattern of the organisms causing urinary tract infection is essential. This study was taken up to determine the presentation and risk factors associated with community-acquired urinary tract infection. The distribution of bacterial strains isolated from these patients and their resistance pattern were also studied.
Multidrug resistance is the major threat of UTI management. To overcome these problems, CDC recommends guidelines. They recommended that UTI in young individuals should be treated with short term antibiotics. Therefore it is important that the susceptibility data of major uropathogens should be known. Hence in the present study antibiotic sensitivity pattern of the uropathogens were assessed. Antibiotic resistance is caused by acquisition of a plasmid. The major mechanisms of antibiotic resistance are Prevention of accumulation of antibiotics either by decreasing uptake or increasing efflux, Inactivation of antibiotics either by hydrolysis or by modification, Qualitative alteration of the target (Muratani and Matsumoto, 2004). A single plasmid has multidrug resistance property (Pitout, 2012). The acquisition of multiple transposons and plasmid bearing genetic determinants for different mechanisms of resistance is called multidrug resistance.

Pathogenic entry to the host cells are mediated by virulent factors like bacterial enzymes, adherence factors like fimbriae, pili (Ofek and Doyle, 1994), flagellin, urease, the hemolysin HmpA, the IgA metallo protease ZapA (Fraser et al., 2002) and extended spectrum β-lactamases (ESBLs) (Coque et al., 2008).

Proper control of pathogens in a geographical area needs the knowledge of etiology of infection, drug resistance pattern and the formulation of an appropriate hospital antibiotic policy. This work was undertaken to study the etiology of UTI in and around Namakkal district along with their prevalence pattern, virulence factors of etiological agents and antibiotic susceptibility pattern. Molecular characterization was also done to study the specific pattern of UTI Escherichia coli.
To overcome the problems of modern medicine and antibiotic resistance among microorganisms, people have now turned towards traditional system of medicine. Traditionally peoples knew the use of medicinal plants as a cure for various diseases. India is sitting in a goldmine of well recorded and well practiced knowledge of traditional herbal medicine (Kamboj, 2000). World health organization also recognizes and recommends the use of medicinal plants. Demand for herbal medicine is increasing year after year all over the world. It may have slower action when compared to modern chemotherapeutic agents but is popular due to their long term effectiveness against many chronic disorders. They are considered to be safe, relatively free from side effects and problems of over dose. The major drawback of traditional system of medicine is the lack of documentation of scientific analysis and proof (Kamboj, 2000).

Now a days, scientists from all over the world are validating the use of medicinal plants. In this stream, fruit of *Emblica officianal*, seed kernel of *Mangifera indica*, leaves of *Aegle marmelos* and leaves of *Catheranthes roseus* were selected and screened for antibacterial activity against antibiotic resistant uropathogens. Traditionally these plants and their products were used for the treatment of gastrointestinal, urinary tract and skin disorders (Komboj, 2000).

In molecular modeling, docking is a method which predicts the preferred orientation of one molecule to a second when bound to each other to form a stable complex. Knowledge of the preferred orientation in turn may be used to predict the strength of association or binding affinity between two molecules using for example scoring functions (Rajeshwari and Ramachandramurthy, 2013). The protein structure and a database of potential ligands serve as inputs to a docking program. Molecular docking algorithms fit molecules together in complementary fashions. The technique
has attracted increasing attention as a way to predict the geometries of bimolecular complexes. Most of the docking programs in use account for a flexible ligand, and several are attempting to model a flexible protein receptor. The present study has been carried out to test the efficiency of the naturally occurring plant compounds such as phyllantidine against uropathogenic *E. coli* virulence factor eae (intimin) using molecular docking studies.

Having known the incidence of UTI, prevalence of uropathogens, its virulence, antibiotic susceptibility, RAPD pattern, importance of medicinal plants and molecular docking mechanisms, the present study was undertaken with the following aim and objectives.