Discussion
6.0 DISCUSSION

Development of herbal medicine for the newly emergence of unknown pathogens and continuous development of antibiotic resistant pathogens have gained top priority in recent years. Simultaneously, drug that can inhibit viral infections and cardiovascular degenerative process and help to restore normal functions in the aging nervous system are still in great demand. Studies of terrestrial organisms have proved to be most fruitful and hundreds of useful drugs with antibiotics, antitumour, neurotrophic and immunomodulatory activities have been discovered. Likewise, bioactive potential of marine plants in particular the mangrove plants have given top priority to find out the possibility of developing drugs for the treatment of variety of human ailments. But still majority of the plants have yet to be tested for their curative potential against infectious pathogens. Search for new drugs and also unexplored therapeutic potential of marine herbals viz., mangroves, seaweeds and seagrasses have also been undertaken (Ravikumar et al., 2002; Sureshkumar et al., 2002; Ravikumar et al., 2004). For instance, 600 secondary metabolites have been isolated from marine algae alone (Faulkner, 1984, 1988). Although a wealth of materials have been isolated from terrestrial and to some extent from marine sources, only a dearth of information is available for medicinal plants from coastal areas.
India dominates in production and market supply of product and their intermediate derivatives based on several medicinal plants. There is an awakening to screen the natural resources and identify new raw materials for changing the pattern of use. Therefore, new ones are discovered, cheap substitutes are attempted and safe synthesis is yet to be evolved. Urinary tract infections are a serious health problem affecting millions of people each year. Infections of the urinary tract are the second most common type of infection in the body. Urinary tract infection (UTI) is defined as the presence of multiplying micro-organisms (bugs) in the tract through which urine flows from the kidneys via the bladder to the outside world. Women are especially prone to UTIs, one woman in five develops a UTI during her lifetime. UTI is 50 times more common in women, with about 5 per cent per year developing symptoms UTIs in men are not as common as in women but can be very serious when they do occur. UTI is uncommon in men below 60 years of age, but the frequency is similar in men and women in older age groups. The condition ranges from cystitis (a mild but distressing inflammation that is limited to the bladder) to severe infections of the kidney such as pyelonephritis (when the infection has reached the kidney tissue itself). The symptoms of a UTI are many, but some of the most common include frequent urge to urinate, restricted urine flow, pain or a "burning
sensation" in the bladder area, discomfort or pressure above the pubic bone and cloudy, milky, or reddish urine.

The antibiotic options include a myriad of prescription antibiotics. Normally the antibiotics are typically effective in treating the UTI, many times they are not. And, unfortunately, the antibiotic option can cause side effects as detrimental as the UTI itself. Because the antibiotics are not discriminating, they kill any and all bacteria despite their purpose. The human body utilizes over 1,000 species of "good bacteria" -- each with their own particular "job" to do. Killing the "good bacteria" can cause a variety of unwanted and unpleasant side effects such as diarrhea, constipation, nausea and yeast infections.

Urologists have tended to ignore the clinical importance and urologic realities of community-acquired urinary tract infections (UTIs) despite their significant prevalence, cost, morbidity, and increasing management problems. This is primarily because of our perception that uncomplicated UTIs are common but not a serious problem easy to diagnose and simple to treat. Nevertheless, data on increasing prevalence, cost, morbidity, antibiotic resistance, recurrence, and relapse suggest that the urological community needs to have another look at community-acquired UTIs. Reinfections and relapses are common in women who develop uncomplicated UTI.
Understanding the pathogenesis of UTI may lead to better methods of prevention and treatment.

Nitrofurantoin (Furadantin, Macrodantin) is a relatively inexpensive antibiotic that is used specifically for urinary tract infections. The antibiotic fosfomycin (Monurol), which comes in an orange-flavored, soluble powder, is proving to be another good alternative. It can be an effective one-dose treatment for many women, including those who are pregnant. To date, bacterial resistance rates to this antibiotic are very low. Tetracyclines inhibit bacterial growth. They include doxycycline, tetracycline, and minocycline. Long-term treatment with tetracycline or doxycycline may be used for infections that are caused by Mycoplasma or Chlamydia. Tetracyclines have unique side effects among antibiotics, including skin reactions to sunlight, possible burning in the throat, tooth discoloration. Aminoglycosides (gentamicin, kanamycin, tobramycin, amikacin) are given by injection for very serious bacterial infections. They can be given only in combination with other antibiotics. Gentamicin is the most commonly used aminoglycoside for serious UTIs. A combination of amoxicillin-clavulanate antibiotics may be useful for UTIs caused by gram-positive organisms, including Enterococcus species and S. saprophyticus. First generation includes cephalexin (Keflex), cefadroxil (Duricef, Ultracef), and cephradine (Velosef). There are second and
third generation antibiotics available which much more effective than others used normally.

There are 2 theories as to cause of recurrence, whether reinfection or relapse. The classic model of pathogenesis is that *E. coli* emerge from an intestinal reservoir, colonize the vagina and periurethra, and ascend through the urethra to the bladder. Antibiotics are the mainstay treatment for all UTIs. A variety of antibiotics are available and choices depend on many factors, including whether the infection is complicated or uncomplicated or primary or recurrent. Treatment decisions are also based on the type of patient (e.g., man or woman, a pregnant or non-pregnant woman, child, hospitalized or non-hospitalized patient, person with diabetes.) Treatment should not necessarily be based on the actual bacteria count. For example, if a woman has symptoms, even if bacterial count is low or normal, infection is probably present and antibiotic treatment should be considered.

The rate of resistance is those in which antibiotics are heavily prescribed. Of major concern for physicians and the public is the emergence of strains of common bacteria, including *E. coli*, that are resistant to specific antibiotics. The prevalence of such bacteria has dramatically increased worldwide, in large part due to widespread use of antibiotics in people and animal feeds. Resistance to antibiotics is most often observed in the hospital
setting. Unfortunately, there has been a major worldwide increase within the community in *E. coli* resistance to standard antibiotics used for UTIs. In a recent report, 42% of *E. coli* was resistant to one or more of the 12 antibiotics investigated. Resistance was highest to ampicillin (29.8%). Resistance to TMP-SMX (Bactrim, Cotrim, Septra) was 14.1%. *E. coli* is the most common bacteria in urinary tract infections. Resistance to other common UTI antibiotics, including mecillinam, cefadroxil, nitrofurantoin, fosfomycin, gentamicin, and ciprofloxacin still averaged under 3%. The rates vary, however, depending on regions. In general, regions and institutions with the highest use of antibiotics the resistant organisms will be higher. Herbal remedies for urinary tract infection are certainly worth considering if your symptoms are mild. They can have a good success rate and the popularity of natural treatments is climbing generally due to concern over the widespread use of antibiotics. Other good natural treatments for urinary tract infections include drinking plenty of plain water and perhaps a couple of glasses of unsweetened cranberry juice each day. It is also good practice to avoid sugar, as this can aid the growth of bacteria within the urinary tract. You could also try placing a heat pad on the abdomen and avoid using any perfumed products around the vaginal area. Some of the herbs which have been shown to be beneficial for urinary tract health include rose hips, dandelion, fennel, marshmallow, oat straw and nettles. In addition to the above the following herbs were used to improve the health of the urinary tract. Parsley is also
another component of good herbal remedies and this can be eaten raw in salads or the dried variety can be liberally added to foods. *Agathosma betulina* (Buchu) has been used by the natives of the Western Cape of Southern Africa for many centuries. Buchu has been used traditionally to help cleanse the urinary tract and act as a natural tonic, helping to flush out and cleanse the bladder and entire urinary tract system. So there is an urgent need to find out therapeutic agents derived from biological resources. Hence, the present study was made an attempt to find out the therapeutic substances from mangroves.

The extracts were collected from the different parts (Hypocotyl, collar, flower, bark, still root) of the 8 mangrove plants for the screening. Among these, the extracts from bark samples of *Rhizophora mucronata* and *Avicennia marina* extracts showed maximum zone of inhibition than the other mangrove plants against UTI infectious pathogens. Thangam (1990) observed that the barks extract of mangrove plant shows maximum inhibitory activity against mosquitoes. Particularly, the leaf extract of *A. illicifolius* was most effective against the biting activity and also reduced the mosquito population in F1 generation. This present study observed that the barks extract of mangrove plants shows maximum inhibitory activity against *Pseudomonas, Enterobacter, and Klebsiella*. Particularly, the bark of *Rhizophora mucronata* was found more effective against *Pseudomonas aeruginosa*. The
mangrove species of *Avicennia marina* is traditionally proven to cure variety of diseases *viz.*, rheumatism, small pox, ulcers due to the presence of alcohols, aminoacids, carbohydrates, fatty acids, hydrocarbons, inorganic salts, minerals, phytoalexins, carboxylic acids, steroids, tannins, triterpenes, vitamins and phytoalexins the plant has scientifically proven to have analgesic and antiviral activity (Padmakumar and Ayyakkannu, 1997; Padmakumar *et al.*, 1993; Sutton *et al.*, 1985). Likewise, the bark, leaf and flower obtained from *Ceriops decandra* is traditionally known to cure hepatitis due to the presence of carotenoids, flavanoids, chlorophyll a, b, a+b, lipids and waxes, polyphenols, proteins, steroids, tannins, triterpenoids has scientifically proved to have antiviral activity (Basak *et al.*, 1996; Kathiresan and Pandian, 1991; Premnathan *et al.*, 1992, 1996). Moreover, the flower part obtained from *Lumnitzera racemosa* is traditionally known to have antifertility, treatment of asthma, diabetes and active against snake bite due to the presence of cyclitols, sugars, tannins in the bark and leaf is scientifically proved to have antiviral activity (Lin *et al.*, 1993; Popp, 1984; Premnathan *et al.*, 1992).

Padmakumar (1998) also reported that, the leaf extract of mangroves showed maximum inhibitory activity against human bacterial and fungal pathogens. Ramanathan (2000) reported that, the leaf extracts of *R. mucronata* and *E. agallocha* exhibits high level of antibiotic activity against
bacterial pathogens and also the leaf extracts of *R. mucronata* were particularly effective against *S. lactis* strain with a mean zone of inhibition of about 20mm and also the leaf extract and bark extracts of mangroves showed higher antibacterial activity against the strain *Bacillus megaterium* and *S. lactis* with a mean zone of inhibition of about 9mm. This present study also has a zone of inhibition of about 15.5mm in *Pseudomonas aeruginosa*. *Arctostaphylos uva-ursi* has historically been used as a traditional remedy for the cleansing and purification of the urinary tract and contains the glycoside arbutin. *Achillea millefolium* (Yarrow) contains alkamides and volatile oils rich in sesquiterpene lactones, which act as soothing agents and natural astringents. Yarrow can therefore be beneficial in supporting a healthy systemic environment within the bladder and urinary system. *Melissa officinalis* (Lemon Balm) is indigenous to the Eastern Mediterranean region, but is widespread throughout Africa. Its active ingredients include volatile oil (including citronella), tannins, flavinoids, tocopherols and choline. Studies have confirmed its beneficial effects on health and immune system functioning. *Avena sativa* (Green Oats) is a general tonic traditionally used in folk medicine as well as in modern herbalism. Active ingredients are saponins, flavonoids, minerals, alkaloids, steroidal compounds, Vitamins B1, B2, D, E, carotene and wheat protein - all of which are beneficial in supporting the immune system as well as the nervous system. *Hypericum perforatum* (St. John’s wort) The first recorded use of Hypericum for
therapeutic purposes dates back to ancient Greece. St John’s Wort has been shown to support emotional wellness. *Echinacea angustifolia* and *Vaccinium myrtillus* (Billberry) have been traditionally been used as an immune system tonic.

It is concluded from the present study that, the application of therapeutics from mangroves which this could be used for the treatment of UTI diseases however it is free from side effects. To clarify the side effects, experiment was conducted with the animal models and it shows that, the crude extracts from the bark doesnot showed any marked changes in the histopathological analysis and histological analysis. And also the extracts doesnot have any chemical and biological toxicants. It is obvious that, the elite organs have mild changes but it is negligible. Aranha *et al.* (2004) reported that, the mice groups treated with Nisin did not induce any abnormalities. No histopathology abnormalities or any change in blood and serum biochemical profiles. Moreover, the physicochemical biological characteristics of the most effective crude methanolic extract of *Avicennia marina* met the desirable odor, taste, consistency and permissible levels of heavy metal/trace metals, microbial contaminants and hence it is suggested that, the extract from *Avicennia marina* with antibacterial activity could be developed as a potent antibacterial agent for future treatment of UTI in humans.