

TITLE

CONTRIBUTION OF STRESS INDUCED CHANGES IN THE VIRULENCE
ATTRIBUTES OF *KLEBSIELLA PNEUMONIAE* AND HOST FACTOR IN THE
PATHOGENESIS OF URINARY TRACT INFECTION.

NAME

SUBBIAH ANAND DEVAR

Thesis submitted to the University of Kelaniya, Sri Lanka
in partial fulfilment of the requirement for the degree
Master of Science in Applied Microbiology.

ABSTRACT

The present study was performed to evaluate the impact of acid stress over the iron scavenging system by means of siderophore production by *Klebsiella pneumoniae* (4 urinary & 4 non-urinary isolates) *in-vitro*, in close resemblance to urinary tract and the ability of *Klebsiella pneumoniae* pre-exposed to diabetic urine or normal human urine to cause urinary tract infections in diabetic and non-diabetic LACA female mice their susceptibility rate and severity of infection.

During this investigation 4 urinary and 4 non-urinary isolates of *Klebsiella pneumoniae* were studied for their growth pattern in various media including TSB and normal human urine; with and without acid stress and iron stress or the combined stress. All the strains grew well in all media. Growth in iron-depleted media however was comparatively lesser than the normal urine and TSB. Difference in pH in the media influenced the growth of the organism. According to the observed results growth in pH 7 was always higher than that observed in pH 5. Irrespective of the source of isolation no difference in the growth profile was observed under the studied growth conditions.

The growth profile of urinary and non-urinary isolates of *Klebsiella pneumoniae* was studied in urine collected from diabetic patients and normal urine with added glucose, with and without acid stress. The growth was always glucose concentration dependent and the growth was higher at increased glucose concentration.

The ability to produce enterobactin was found in all isolates of *Klebsiella pneumoniae* in iron-depleted media, irrespective of the source of isolation. Iron sequestration by means of aerobactin production was found only in 1/4 non-urinary isolates and 3/4 urinary isolates by cross feeding bio assay in an iron-depleted medium. Both aerobactin and enterobactin were not observed in M9 minimal media, normal urine and diabetic urine. The data also showed that the acid stress or the combined stress as such had no deleterious effect on the production of aerobactin and enterobactin.

The ability to acquire iron directly from two iron containing compounds showed all the four non-urinary isolates and only one urinary isolate to utilize haemoglobin as an iron source at pH 7, whereas all the eight isolates were unable to use FeCl_3 as an iron source at both pH 5 and pH 7.

Finally, the incidence and severity of UTI in both diabetic and non-diabetic mice were investigated. The incidence of infection is always same in both the groups but the histopathological examination of the bladder and kidney of infected mice revealed that the severity of infection is more in diabetic mice.