SUMMARY & CONCLUSION

The present effort was made to investigate the epidemiological distribution of *K. pneumoniae* in Gulbarga region, by using the conventional methods and molecular methods.

The observations were summarized as follows:

1. The incidence of *K. pneumoniae* colonization in Gulbarga region was found to be 36.09%. The isolation rate among the clinical samples were observed to be 31.25% in sputum, 22.91% in urine, 14.58% and 14.06% in blood and pus, followed by 6.77%, 6.51% in stool and cervical swab, followed by 1.82%, 1.04%, 1.04% in ear swab, CSF and peritoneal fluid obtained during 2008 July to March 2010.

2. The location wise incidence of *K. pneumoniae* among the different zones of Gulbarga region has been reassessed and highest 38.83% and 38.61% incidence was reported in zone-D and E and the lowest was 34.88% from zone-A.

3. Economic group wise incidence of *K. pneumoniae* was assessed. The highest 55% and 54.76% in UIG and LIG of zone D and E and lowest was in MIG of zone A 22.95% but this was varying with other zones.

4. Over all incidence of colonization was highest in age group of 26-50 and >50.

5. Age wise incidence of *K. pneumoniae* showed the highest incidence in age group 0 – 5 years (72.5%) belongs to zone-D, and lowest was in 0-5 years (5.12%) belongs to zone-E.

6. Among the 18 antibiotics tested against all the *K. pneumoniae* we found 17 different antibiotic patterns, this indicated diversity in distribution of antibiotic resistance.
7. Six isolates were susceptible to all antibiotics tested however, the analysis of the data for multiple antibiotics resistance showed minimum percentage of resistance among the isolates was 1.30% with all 18 antibiotics tested and more was 13.80% against 13 antibiotics.

8. The percentage of resistance was observed as follows, 83.59% of the isolates were resistant to amoxicillin / clavulanic acid, cefpodoxime (75.25%), ceftazidime (72.13%), cefuroxime (69.27%), aztreonam (67.96%), cefotaxime (65.36%), co-trimoxazole (64.58%), ceftriaxone (63.54%), norfloxacin (51.56%), gentamycin (48.69%), nalidixic acid (47.39%), neomycin (45.05%), ciprofloxacin (41.92%), amikacin (36.71%), meropenem (27.86%), imipenem (25.78%), piperacillin (25.26%), chloramphenicol (16.92%).

9. Over all zone wise incidence of resistance was noted highest in zone-D and zone-E 38.83% and 38.61% followed by 36.66% in zone-C, 35.66% in zone-B and 34.88% in zone-A.

10. Zone wise incidence of resistance against antibiotic groups shown that in zone-A incidence of resistance against sulfonamides is high when compared with β-lactams followed by fluroquinolones, aminoglycosides and chloramphenicol, this was analogous with all other zones, but lower rate of resistance was observed with chloramphenicol in all zones and also explains the efficacy of this antibiotic to cure *K. pneumoniae* infections.

11. When the strains were screened for ESBL production, it was observed 78.21% of the strains were ESBL producers among the isolated strain.

12. Our screening for the co-existence of both ESBL and AmpC producers was 33.33%.
13. MIC study revealed high level resistance with cefotaxime (60%), cefuroxime (64%), gentamycin (26%), ciprofloxacin (25%) and imipenem (4%) with ≥128μg/ml.

14. The microtitre plate method is more sensitive and accurate technique in enhancing and observing the biofilm formation as compared to test tube method in elucidating with antibiotic and glucose as *K. pneumoniae* as become multidrug resistant to different antibiotic.

15. Protein profiling by SDS-PAGE was assessed and observed the high discriminatory potential of 30 – 90Kda and reliable method for characterization of *K. pneumoniae* strains.

16. Plasmid profiling is used for typing of *K. pneumoniae* showed presence of molecular size of 20Kbp.

17. Some of the isolates have shown resistance to potent antibiotics imipenem (25.78%) and meropenem (27.86%).

18. Phylogenetic analysis showed significant aligned sequence of 16s rDNA.

**CONCLUSION**

In conclusion, the present study showed the increasing trend of drug resistance in *K. pneumoniae* specially ESBLs type of resistance and also a novel type of resistance mechanism due to AmpC type of β-lactamases which was not studied in this region of north east Karnataka.

MDR among *K. pneumoniae* and appearance of AmpC β-lactamases is of serious concern. To treat such Gram negative pathogen options are very limited and expensive
antibiotics such as carbapenems like imipenem and meropenem has to be used to treat these patients.

Some of the isolates have shown resistance to potent antibiotics imipenem and meropenem also which may be due to appearance of yet another type of resistance mechanisms such as metallo $\beta$-lactamases. This needs further study on the prevalence of metallo $\beta$-lactamases. Routine screening for ESBL and AmpC $\beta$-lactamases needs to be included in the clinical laboratories in the large referral hospitals.

Resistance to $\beta$-lactam antibiotics will continue to rise unless inappropriate use of antibiotics is curtailed. Hospitals ideally should have antibiotics policy and should be reviewed once in six months. Hospital infection committee needs to be utilized so as to curtail the spread of antibiotic resistant organisms. Referring specimens for culture and sensitivity should not become a mere formality. Relevance of the culture and sensitivity reports should be consulted with clinical microbiologist to understand the underlying mechanism of resistance.

Present situation needs to consider clinical microbiologist as a responsible partner in assisting to minimize the spread of multi drug resistant Gram negative pathogen in the hospitals. In view of this an alternative therapy to combat these highly drug resistant pathogen.