SUMMARY AND CONCLUSION

The present work envisages the feasibility of kondagogu gum and ghatti gum as pharmaceutical excipient/carrier for drug delivery. The drugs employed are metoprolol tartrate, diltiazem hydrochloride, metoprolol succinate and galantamine hydrobromide. The research consists of four studies, whose significant findings are summarized below.

I Kondagogu and ghatti gum as tablet binder

- The pH and viscosity of 5% ghatti gum was found to be 5.6 and 287 cps respectively. 2% kondagogu gum showed a pH of 4.9 and viscosity of 396 cps.
- Granules were prepared for metoprolol tartrate employing kondagogu gum and ghatti gum as binders.
- The data obtained from Carr’s index and Hausner ratio indicated good to excellent compressibility for the prepared granules. The formulations F1 and F6 containing 0.5%w/w of kondagogu and ghatti gum possessed fair compressible property.
- The percentage weight variation, percent friability and content of active ingredient for all the formulations were found to be well within United States Pharmacopoeia (USP) standards.
- From the SEM figures, it was clear that the granules were irregular in shape and the granules prepared with kondagogu gum as binder were porous in nature.
- The tablets prepared with kondagogu gum and ghatti gum as binders showed hardness in the range 1.8-9.1 and 2.2-10.1 Kg respectively. This result clearly
indicates that ghatti gum proved to be effective in increasing the hardness of the tablets.

- Tablets prepared with higher concentration of kondagogu gum (F2-F5) and ghatti gum (F7-F10) showed less % friability indicating that the gums were effective in higher concentration.

- The tablets prepared with kondagogu gum as binder showed disintegration time in the range 1.02-19.39 min. On the other hand, tablets prepared with ghatti gum as binder disintegrated within 1.35-18.38 min.

- From the results of disintegration time, friability and hardness, formulations containing 1.5% w/w of gums (F3 and F8) were selected as optimized formulations for tablets prepared with kondagogu gum and ghatti gum respectively.

- The DSC and FTIR studies of pure metoprolol tartrate and optimized formulations (F3 and F8) indicated that no chemical interaction occurred between the drug, polymers and the excipients used.

- In vitro drug release studies showed that entire amount of metoprolol tartrate was released from the formulations within 30 min.

- From the stability studies, it was clear that the formulations did not undergo any chemical change/interaction during the study period.

II Floating matrix tablets of diltiazem HCl using kondagogu and ghatti gum

- Floating matrix tablets of diltiazem hydrochloride were prepared by varying the concentration of polymers viz., kondagogu gum and ghatti gum, and sodium bicarbonate in the tablet.
• Formulation FKF6 containing kondagou gum and HPMCK4M at concentration of 50% and 15% w/w respectively showed a hardness of about 7.4 Kg/cm².

• Formulation FGF6 containing ghatti gum and HPMCK4M at concentration of 60% and 15% w/w respectively showed a hardness of about 7.8 kg/cm².

• Formulation FKF6 and FGF6 showed percent water uptake of 357 and 387% respectively.

• It was observed that as the polymer concentration increased, the percent water uptake and duration of floating also increased. Use of HPMCK4M significantly improved the floating lag time.

• FTIR and DSC data obtained indicated that diltiazem was stable in the prepared formulations.

• In vitro drug release indicated that formulations FKF2, FKF3, FGF4 and FGF 5 showed a drug release of 94, 91, 93 and 91% at the end of 12 hr study period indicating their suitability for showing 12 hr release profile.

• Mathematical model fitting indicated that the best-fit model for all the formulations was peppas and the release of drug from the polymer matrix followed super case-II transport.

• In vivo floating behaviour of the formulations FKF5 and FGF5 proved that the tablets could prolong the gastric retention time for more than 12 h in rabbits.

• Stability studies for FKF5 and FGF5 clearly showed that diltiazem hydrochloride maintained its integrity in the samples till the completion of stability studies.
III Intestinal release matrix tablets of diltiazem HCl using kondagogu and ghatti gum

- Wet granulation was employed to prepare the matrix tablets of kondagogu gum and ghatti gum.
- The percentage weight variation, percent friability and content of active ingredient for all the formulations were found to be well within limits.
- Formulation EKF5 and EGF5 showed hardness of about 6.8 and 7.4 Kg respectively.
- Water uptake studies indicated that formulation EKF5 and EGF5 showed maximum swelling for kondagogu gum and ghatti gum matrix tablets respectively.
- The matrix tablets were coated with shellac for preventing drug release in stomach.
- DSC and FTIR data proved that metoprolol succinate did not undergo any chemical interaction with the polymers and excipients used.
- *In vitro* drug release studies indicated that the formulations EKF3, EKF4, EGF3, EGF4 and EGF5 has showed a drug release of 91, 86, 98, 96 and 91% respectively indicating their suitability for 12 h drug release.
- Mathematical model fitting indicated that the best-fit model for all the formulations was peppas and the release of drug from the polymer matrix followed super case-II transport.
- Formulations EKF4 and EGF5 were found to be ideal and when subjected for stability studies showed that the drug was stable.
IV Preparation and evaluation of polymer-blend beads using kondagogu and ghatti gum

- Polymeric-blend beads of kondagogu gum / ghatti gum with sodium alginate were prepared by varying the gum concentrations and cross linkers viz., CaCl$_2$ and AlCl$_3$.

- It was found that in comparison between AlCl$_3$ and CaCl$_2$, the particle size, percent yield and drug entrapment efficiency was greater in beads prepared by AlCl$_3$ as cross linking agent.

- SKF6 and SGF6 formulations showed high percent yield which may be attributed for higher concentration of kondagogu gum and ghatti gum respectively.

- SEM photographs for SKF6 and indicated that the beads were having smooth and crack-free surface.

- FTIR and DSC spectra indicated that galantamine hydrobromide has not undergone any chemical interaction with the polymers and excipients used.

- *In vitro* drug release data indicated that formulations SKF3, SKF5, SKF6, SGF3, SGF5 and SGF6 showed a release of about 96, 93, 90, 99, 98 and 94% at the end of 12 h indicating their suitability for showing a 12 h release profile.

- Mathematical model fitting indicated that the best-fit model for all the formulations was peppas and the release of drug from the polymer matrix followed super case-II transport.

- Formulations SKF5 and SGF6 were found to be ideal and when subjected for stability studies showed that the drug was stable.
Thus the present research work has been carried out adopting standard procedures to meet the set objectives. The research findings obtained from the studies were found to be satisfactory. In conclusion all the objectives designed before the start of the study have been achieved and the selected gums proved effective to be used as pharmaceutical excipient.