The present study aimed at preparation and evaluation of microparticles for controlled release of Sotalol Hydrochloride in the treatment of Arrhythmia. Sotalol has both beta-adrenergic receptor blocking and cardiac action potential duration prolongation and antiarrhythmic properties. The microparticles of Sotalol Hydrochloride were prepared by solvent evaporation method. The prepared microparticles were evaluated for drug-polymer compatibility, the results shown that there were no significant interactions. The encapsulation efficacy was ranging from 66-85%. The in-vitro drug release studies indicate the release of drug in a controlled manner over a period of 12 hrs. It was found that the Sotalol Hydrochloride release rate increased with a decreased amount of Ethyl Cellulose since the drug is water soluble. This can be adjusted by maintaining the concentration of the polymers. The formulation F4 was found to be optimum formulation.

**KEYWORDS:** Sotalol Hydrochloride, Arrhythmia, Ethyl Cellulose, Controlled release.
Preparation of microparticles
Sotalol Hydrochloride microparticles were prepared by solvent evaporation method. Different ratios of HPMC and Ethyl cellulose combination were dissolved in 8.5 ml acetone separately and dispersed by using a magnetic stirrer. The core material, Sotalol Hydrochloride was added to the polymer solution and mixed for 15 minutes, followed by magnesium stearate (100mg) and then mixed thoroughly. The resulting dispersion was added in a thin stream to a mixture of 90 ml light liquid paraffin and 10 ml n-hexane contained in a 250 ml beaker, while stirring at 700 rpm using a mechanical stirrer. Stirring was continued for 3 hrs until the acetone evaporated completely. The microspheres formed were filtered using Whatman no.1 filter paper. The residue was washed 4-5 times with 50 ml portions of n-hexane. The product was then dried at room temperature for 24 hours.

<table>
<thead>
<tr>
<th>Formulation No.</th>
<th>Sotalol Hydrochloride</th>
<th>Ethyl Cellulose</th>
<th>HPMC</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>25</td>
<td>20</td>
<td>15</td>
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<tr>
<td>F2</td>
<td>25</td>
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<td>F3</td>
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<td>F4</td>
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<tr>
<td>F5</td>
<td>25</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>F6</td>
<td>25</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

Drug loading and encapsulation efficiency
100 mg of microparticles were weighed and transferred to 100 ml volumetric flask containing pH 7.4 phosphate buffer. From this, 1 ml of solution was transferred to 10 ml volumetric flask and diluted up to the mark. Further 1 ml of this solution was diluted to 10 ml and absorbance was measured. The drug content was calculated by using the formula.[7,8]

\[
\text{Amount of drug} = \frac{\text{Conc. from standard graph} \times \text{dilution factor}}{1000}
\]

Percentage encapsulation efficiency is found out by calculating the amount of drug present in 100 mg of microparticles. It is further calculated by using formula.

\[
\% \text{ Encapsulation Efficiency} = \frac{b}{a} \times 100
\]

Where, ‘a’ is the theoretical drug content and ‘b’ is the drug entrapped.

In vitro drug release studies
Release of Sotalol Hydrochloride was determined using dissolution test apparatus USP type II at 100 rpm. The dissolution was studied using 900 ml of 0.1 N HCl, phosphate buffer 5.5, phosphate buffer pH 7.2. The temperature was maintained at 37±0.5°C. Aliquots (10 ml) of dissolution media were sampled at specified time intervals and replaced with fresh media immediately after sampling. Samples were analyzed for drug content by UV Visible spectroscopy.[9,10]

RESULTS AND DISCUSSION

Ultraviolet spectroscopy
Accurately weighed 10 mg of Sotalol Hydrochloride was transferred to a 100 ml volumetric flask and 1% tween80 was added to increase the solubility of Sotalol Hydrochloride (stock solution). 3ml of stock solution was added to the 50ml volumetric flask and volume adjusted up to the mark with phosphate buffer. The scanning was done from 200-400 nm. The sharp peak was observed at 247.0 nm, which was taken as λ max.

![Fig 1: UV absorption spectra of Soalol hydrochloride chloride](image-url)
**Drug-excipient Compatibility Studies**

The compatibility of drug and polymers under experimental conditions is an important prerequisite before formulation. It is therefore necessary to confirm that the drug does not react with the polymers and excipients under experimental conditions and affect the shelf life of the product or any other unwanted effects on the formulation. The DSC thermograms of the pure drug and formulation were taken, the obtained results indicate that there were no significant interactions between drug and polymer.

![DSC Thermograms of pure drug and formulation](image)

**Drug loading and encapsulation efficiency**

The test for drug content was carried out to ascertain uniform distribution of the drug in the formulation. Drug loading and entrapment efficiency increase with increase in the polymer concentration. From the results it can be inferred that there is a proper distribution of Sotalol Hydrochloride in the microparticles and the deviation is within the acceptable limits. The decrease in the drug content in the product probably can be due to the loss of drug with the evaporation of the solvent.

![Drug loading and encapsulation efficiency of prepared microparticles](image)

**In-vitro drug dissolution**

Release of Sotalol Hydrochloride was determined using dissolution test apparatus USP type II at 100 rpm. The dissolution was studied using 900 ml of 0.1 N HCl, phosphate buffer 5.5, phosphate buffer pH 7.2. The temperature was maintained at 37±0.5°C. The sample were withdrawn at different time intervals 1,2,3,4,6,8,10 and 12 hrs filtered through whatman filter paper and replaced equal volume of dissolution medium. Sample was suitably diluted and analyzed for Sotalol Hydrochloride using UV-visible spectrophotometer. The percentage of Sotalol Hydrochloride release was calculated.

![In-vitro drug release profile of the formulations](image)
CONCLUSION
The objective of this study was to prepare and evaluate microparticles loaded with Sotalol Hydrochloride for controlled release using different ratios of drug to polymer and prepared microparticles were characterized. The method is simple, rapid, and economical and does not imply the use of toxic organic solvents. The method used was suitable for both water-soluble and insoluble drugs. The formulation (F5) produced discrete spherical microparticles. The DSC thermogram obtained for the pure drug and formulation shows no significant shift in the endothermic peaks confirming the stability of the drug in the formulation. From the results of drug loading and encapsulation efficiency, it can be inferred that there was a proper and uniform distribution of drug in the micro particles. The in vitro drug release data showed the release of a drug in a controlled manner.

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IV. REFERENCES
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