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Pathological condition known as surgical site infection (SSI); is the 3rd most common nosocomial infection. The condition is expected to have a morbidity rate of 3% and is majorly accounted to be due to micro-organisms and biofilm formation. Administration of antibiotics is majorly done for treatment in the condition. Centre for Disease Control and Prevention (CDC) commented upon benefits of using IV bolus pre-operative antibiotic therapy followed by oral antibiotics post-operatively. Polymeric microparticles containing antibiotics were developed focusing on switching over to local therapy regimen. The microparticles were prepared using re-emulsification-solvent removal technique. Formulated microparticles were screened for factors affecting the process by Placket Burman design containing 10 factors each considered at 2 levels. Further optimization was carried out using Box-Behnken design considering 3 factors each at 2 levels. The microparticles were characterized using UV-VIS spectrophotometry (encapsulation profile and drug loading), drug release from microparticles (in-vitro evaluation) and dynamic light scattering (DLS) technique. Further acceptability in terms of administration safety will be evaluated with the help of gas chromatography studies.

TARGETING LOCAL RECEPTORS FOR SURGICAL SITE INFECTION

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INTRODUCTION

- A surgical site infection (SSI) is a pathological condition that occurs after surgery
- It accounts for 3rd most common nosocomial infection and more than 15 million cases per year in USA
- The nosocomial infection may be superficial or associated with the implants
- Micro-organisms and biofilm is the major cause of SSI
- Different micro-organisms such as *E. Coli, S. Aureus, P. Aeruginosa, Corynebacterium* and *Methicillin resistant S. Aureus* have been reported with conditions of SSI.
- Although advancements have been made in infection control practice through improved ventilation, sterilization procedures, obstacles, surgical procedures and prophylactic antibiotics; SSIs remain a substantial cause with morbidity rate of 3%
- Centre for Disease Control and Prevention has commented upon the importance of preparation of patient before surgical procedure and care to be taken during and after the surgeries
- Intra-operative and post-operative care are contributing factors in relation to incidence of SSI

CONTROL OF SSI

- It was shown that antibiotics administered before the surgical procedures decrease incidence of SSI
- Oral anti biotics post surgical procedure such as: Gentamicin, Vancomycin, Metronidazole etc can be used
- Collagen implant containing gentamicin has proved beneficial for the treatment of SSI and its incidence
- Researchers have found that 80% reduction in incidence of SSI was seen with patients undergoing cardiac surgery
- Intra-cranial cefazolin after cataract surgery reduce the SSI to 0.011%
- Novel approaches to the field as controlled release mediated local delivery of anti-microbial
- Mucoadhesive carriers such as films or in-situ gel system might be beneficial carriers of microparticles

India is one of the major consumer of antibiotics and hence, lies in controlling the consumption in order to reduce drug resistance and overloading.

Aminoglycosides possess broad spectrum antimicrobial acitvity and hence can be employed in controlling the surgical site infections

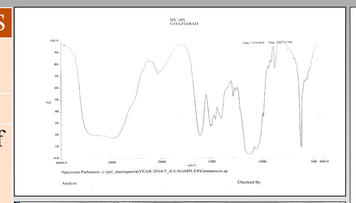
Preparing local drug delivery systems, with a controlled behavior suggest a novel approach towards treating SSI's.

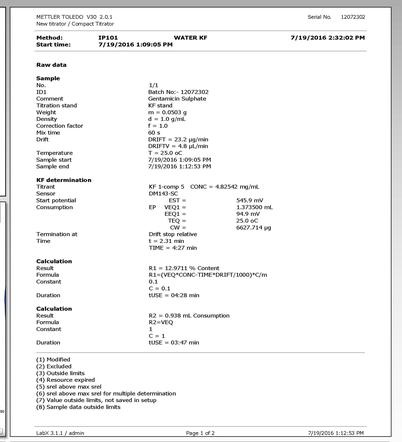
Microparticles or nanoparticles loaded in a suitable carrier like films and in-situ gels will be helpful in delivering the drug at the target site before suture.

Diffused drug predicts to maintain minimum inhibitory concentration for the target microorganisms.

CHARACTERIZATION OF DRUG

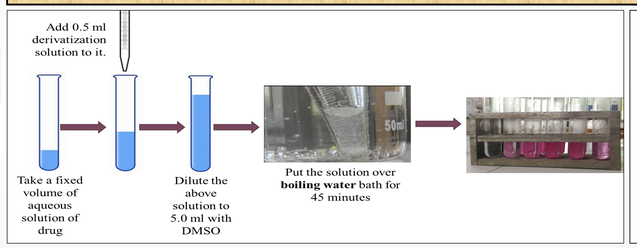
S.NO	PERFORMED TEST	OBSERVATION	LIMITS AND RESULTS
1	Determination of % water content	12.97%	Less than 15% (REF IP 2014) Pass
2	DSC melting point	162.91 °C	210—235 °C
3	FT-IR spectral Scan	Shows a vibrational band for Phenoloc compound, Ketone, amino acids, alkanes and benzene ring	Stretching near reigon of Phenolics, Ketone and amino groups

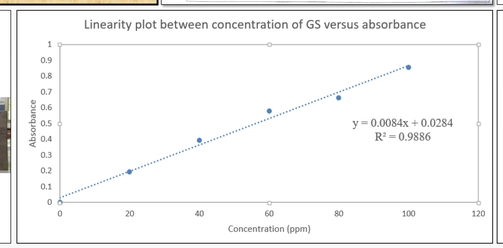


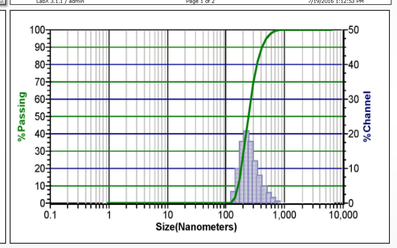


UV-DERIVATIZATION

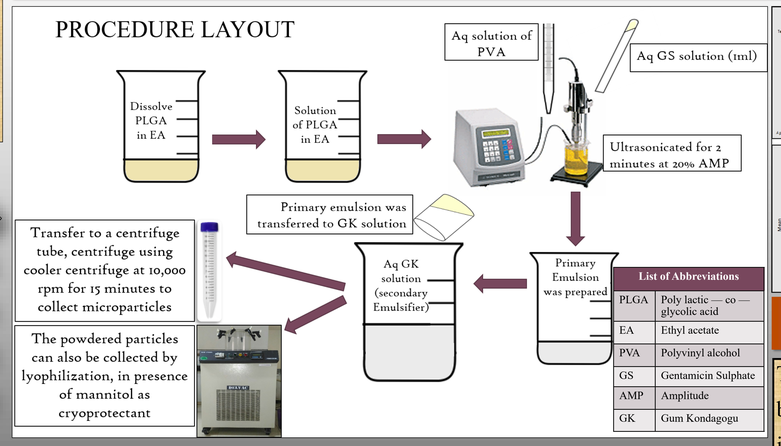
The selected aminoglycoside does not possess UV activity, therefore there lies an importance of derivatization using specific agent, for its identification in developed formulation. On the developed method Linearity plot was constructed.



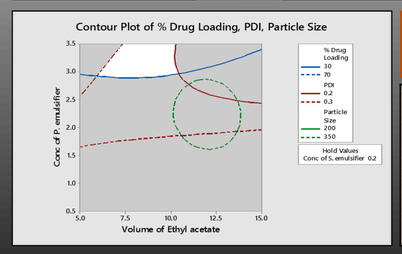




DEVELOPMENT OF MICROPARTICLES



List of Abbreviations	
PLGA	Poly lactic — co — glycolic acid
EA	Ethyl acetate
PVA	Polyvinyl alcohol
GS	Gentamicin Sulphate
AMP	Amplitude
GK	Gum Kondagogu



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CONCLUSION

These developed microparticles can be delivered to the surgical site using films as a carrier. The sustained release activity of the microparticles will help in maintaining drug concentration above the MIC levels of various microbes thereby inhibiting their growth and cases of SSI worldwide.

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