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# Synthesis and Development of Some Biodegradable Polypeptides as Antimicrobial Agents

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**Abstract :** Biodegradable and bioactive polymers are gaining considerable attention in the field of biomedical research to achieve therapeutic effects, drug-targeting and as drug carriers. Two acidic amino acid (glutamic and aspartic acids) monomer units were converted into polyanionic long chain polypeptides- poly-glutamic acid (PGA) and poly-aspartic acids (PAA). The synthesized derivatives were characterized by various physicochemical and spectral methods. The approximate molecular weight of the synthesized polypeptides were determined by Sorenson's method, and further confirmed by gel electrophoresis and MALDI-TOF techniques. The *in vitro* hydrolysis studies of the synthesized polypeptides was performed in simulated conditions outside the body, which mimic truly the *in vivo* scenario, and was used to study biodegradation. Results of the study clearly demonstrated that PGA and PAA are less prone towards hydrolytic degradation under acidic conditions in comparison to that in slight alkaline medium. Finally, the synthesized polypeptides were subjected to biological screening for antibacterial activity, at 10 and 50 µg/mL concentrations, against *P. morganii* and *S. aureus* bacterial strains using agar diffusion (filter paper disc) method. The antibacterial activity was exhibited by both PGA and PAA against both the selected strains, with the potency of PGA being slightly more than that of PAA. This could be attributed to the selective uptake of the compound by the particular strains of microorganisms. Thus, it can be concluded that polyanionic polypeptides can exert broad spectrum antimicrobial activity, and shall be biodegradable by physiological enzymes into smaller non toxic fragments/monomeric units having essential dietary value.

**Keywords :** Biopolymers, Drug-Polymer conjugates, Biodegradable polypeptides, Antibacterial, Polyglutamic acid, Polyascorbic acid.

## Introduction

Recent years have seen a growing interest in biodegradable and bioactive polymers in biomedical applications to achieve therapeutic effects, drug targeting and as drug carriers. Biodegradable polymers degrade to release individual polymer molecules or smaller fragments during or after the drugs are released. Most of the bioactive polymers are poly-electrolytes which exert bioactivity, but the exact relationship between polymer structure and bioactivity is not well established. Thus, it may be difficult to find polymers with specific bioactivity. Nevertheless, the idea of using bioactive polymers as a part of biodegradable polymers presents new opportunities in the development of future drug delivery devices [1]. A large number of natural polyanions possess innate physiological properties alongside various synthetic polymers which elicit significant