**Chitosan/β-Glycerophosphate Thermosensitive Aerosol Hydrogel as an Innovative Medical Device for Rapid Hemostasis in Emergency Related Physical Trauma**

F. Josse Pasca Pradana1, Salsabila Dwi Handayani1, Ghani Phalosa1 , Mirza Salsabila1, Ikhsan Adil Wicaksono1, **Muhammad Raafi Al Ghifary1**,Dita Sheilla Putri1, Arsyadi1, Syahrul Tuba1

Faculty of Military Pharmacy, The Republic of Indonesia Defense University, Bogor, West Java, Indonesia1

**Background and aims.** Uncontrolled hemorrhage is a leading cause of preventable mortality in trauma cases, necessitating rapid and effective hemostatic interventions. Conventional methods such as gauze dressings and tourniquets have limitations, including delayed clot formation, bacterial contamination, and potential tissue damage. Recent advancements in biomaterials have highlighted chitosan/β-glycerophosphate (CS/β-GP) hydrogels as promising thermosensitive agents for emergency hemostasis. This literature review explores the potential of chitosan/β-glycerophosphate (CS/β-GP) thermosensitive aerosol hydrogel as a novel hemostatic agent, emphasizing its physicochemical properties, gelation mechanisms, delivery innovations, and strategies to enhance its mechanical strength.

**Methods.** Relevant scientific literature was collected from Scopus, PubMed, CrossRef, and Semantic Scholar databases using targeted keywords. Selected publications focusing on CS/β-GP hydrogel formulation, gelation behavior, biomedical applications, and hemostatic performance were reviewed and synthesized.

**Results.** CS/β-GP hydrogels exhibit in situ thermoresponsive gelation at physiological temperature, enhancing mechanical stability and wound adherence. Chitosan provides procoagulant and antimicrobial properties, while β-GP modulates thermosensitivity and strengthens hydrogel structure. This review discusses the fundamental mechanisms of trauma-induced hemostasis, the role of CS/β-GP in accelerating clot formation, the advantages of aerosolized delivery for sterile wound management, and strategies to enhance mechanical strength through interpenetrating polymer networks and nanocomposite formulations.

**Conclusion.** CS/β-GP thermosensitive aerosol hydrogel demonstrates significant promise as a next-generation hemostatic agent, offering rapid bleeding control, infection prevention, and improved wound healing. Further research is needed to optimize its formulation and validate clinical effectiveness in diverse trauma scenarios.