

Properties of bacterial cellulose wound dressing containing sericin and polyhexamethylene biguanide - Supamas Napavichayanun- Chulalongkorn University

Supamas Napavichayanun
Chulalongkorn University, Thailand

Abstract

Polyhexamethylene biguanide is a germicide with antiviral and antibacterial properties utilized in an assortment of items including wound consideration dressings, contact focal point cleaning arrangements, perioperative purifying items, and pool cleaners. The perfect injury dressing ought to be a wet and oxygen-pervaded condition, exudate adsorption, upgraded wound conclusion, and contamination security. The bacterial cellulose wound dressing containing sericin and polyhexamethylene biguanide (PHMB) is a characteristic injury dressing that is effortlessly delivered from bacterial cellulose (*A. xylinum* strain in coconut water medium), silk sericin (protein from silk case), and clean (PHMB). Segments of this dressing contain numerous advantages near the perfect injury dressing properties. For the dressing creation, the bacterial cellulose dressing was stacked with 1% w/v silk sericin followed by 0.3% w/v PHMB stacking. All procedures were done in sterile conditions. After arrangement, the dressings were sanitized with gamma radiation at 25 kGy. The properties of the dressing were tried in term of sericin and antimicrobial discharging, antimicrobial property, and collagen type I creation test contrasting and business item. The outcomes indicated that the adequate focus for disposal everything being equal (*S. aureus*, MRSA, *B. subtilis*, *E. coli*, *P.aeruginosa*, *A. baumannii*) of PHMB was discharged from the dressing inside 30 minutes and ideal fixation for collagen type I creation of sericin was discharged inside 4 hours. The dressing was unrivaled regarding antimicrobial action against every single bacterial strain than Bactigras[®]. In correlation with silver-stacked Acticoat[®], the antimicrobial movement of the dressing was better against Gram-positive microbes frequently found in incessant injuries (*S. aureus* and MRSA).

To test different recipes and methods for assembling dry-created bio-film (DFBF) that shows physical properties worthwhile to the utilization of the DFBF in wound dressings, a DFBF was manufactured by including chitosan (Chi) and alginate (Alg) to homogenized bacterial cellulose (BC) acquired from vinegar pellicles in vinegar blending side-effects in this investigation. The outcomes uncovered that the level of oxidation in DFBF made utilizing hydrogen peroxide oxidized BC (HOBC), with 0.092% carboxyl gathering content, was lower than that in DFBF produced utilizing occasional corrosive oxidized BC (POBC), yet DFBF made utilizing HOBC showed higher prolongation, rehydration, expanding proportions, and

water fume transmission than that created utilizing POBC. A DFBF composite gel with 98.5% water content had fitting ease for trim. After 10 min of washing cross-connected HOBC, 72 ppm of calcium stayed in the last DFBF, which forestalled cell poisonousness as well as showed attractive mechanical and rehydration properties. By and large, the altered DFBF had a high rehydration proportion of 51.69% and could ingest and bit by bit discharge naringin by up to 80% inside 24 h. This adjusted DFBF has the potential for exudate assimilation and the controlled arrival of restorative substances at the underlying phase of recuperating when utilized in wound dressings.

Bacterial cellulose wound dressings containing silk sericin and PHMB (BCSP) were created in our past investigations. It had great physical properties, viability, and security. For additional utilization as a clinical material, this dressing was explored for its viability and wellbeing in split-thickness skin join (STSG) benefactor site wound treatment contrasted with Bactigras[®] (control). Besides, the provocative reactions to the two dressings were additionally profoundly explored. For in vivo examination, articulations of calming cytokines were seriously considered in the tissue interfacing territory. The outcome demonstrated that IL-4 and TGF- β from BCSP-rewarded tissue had focal points over Bactigras[®]-rewarded tissue at 14 and 21 days post-implantation. For clinical investigation, a solitary blinded, randomized controlled examination was produced. The half of STSG giver site wound was arbitrarily relegated to cover with BCSP or Bactigras[®]. Twenty-one patients with 32 STSG contributor site wounds were selected. The outcomes demonstrated that injury mending time was not altogether unique in the two dressings. Be that as it may, twisted nature of BCSP was better than Bactigras[®] at recuperating time and following multi month ($p < 0.05$). The torment scores of BCSP-rewarded wound were measurably huge lower than Bactigras[®]-rewarded wound ($p < 0.05$).

Biography

Supamas Napavichayanun is a PhD student at the Faculty of Pharmaceutical Sciences, Chulalongkorn University, Thailand. She earned a BSc from Faculty of Pharmaceutical Sciences, Chulalongkorn University in 2010. Her research experience has ranged from protein including silk proteins and biomaterials. She also did clinical researches in the area of dermatology especially materials for wound healing application.