

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

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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). The antimicrobial distinction between the dressing and Suprasorb®X + PHMB was just seen for *B. subtilis*. Also, the cells refined from the discharged arrangement of our novel dressing delivered essentially higher measure of collagen type 1 than those refined with the bacterial cellulose twisted dressing without silk sericin. Along these lines, the bacterial cellulose wound dressing containing sericin and PHMB contains numerous points of interest to be the perfect injury.

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 researched for its viability and wellbeing in split-thickness skin unite (STSG) contributor site wound treatment contrasted with Bactigras® (control). In addition, the provocative reactions to the two dressings were likewise profoundly explored. For in vivo examination, articulations of calming cytokines were strongly considered in the tissue interfacing region. The outcome demonstrated that IL-4 and TGF- β from BCSP-rewarded tissue had points of interest 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 allotted to cover with BCSP or Bactigras®. Twenty-one patients with 32 STSG giver site wounds were enlisted. The outcomes indicated that injury mending time was not fundamentally extraordinary in the two dressings. Be that as it may, twisted nature of BCSP was better than Bactigras® at mending time and following multi month ($p < 0.05$). The torment scores of BCSP-rewarded wound were factually huge lower than Bactigras®-rewarded wound ($p < 0.05$). No indication of contamination or unfriendly occasion was seen after treatment with the two dressings. Taking everything into account, the aggravation reactions of the dressing were plainly explained. The benefits of BCSP were wound-quality improvement, torment decrease, and contamination insurance without antagonistic occasions. It was fit to be utilized as the elective treatment of STSG giver site wound.