

ABSTRACT

Chronic kidney disease causes a decline in kidney function, resulting in impaired excretion of metabolic waste products such as urea and creatinine, thereby requiring hemodialysis therapy. The effectiveness of hemodialysis is influenced by the quality of the dialysis membrane. Chitosan has potential as a biopolymer membrane material, while the addition of pectin and tripolyphosphate (TPP) is expected to improve membrane properties through the formation of a polyelectrolyte network and ionic crosslinking. This study characterized and evaluated the performance of chitosan/pectin/tripolyphosphate (CS/PEC/TPP) membranes for the permeation of urea and creatinine. The membranes were synthesized using the solution casting method with TPP molar ratios of 1:40, 1:30, and 1:20, and were characterized using FTIR, SEM, and XRD, as well as evaluated for their physical, mechanical, and permeation properties. The results showed that the addition of pectin and TPP improved the swelling ratio, water uptake, porosity, hydrophilicity, and membrane flux compared with the pure chitosan membrane. The CS/PEC/TPP3 membrane exhibited the best performance, with urea and creatinine transport percentages of 39,62% and 37,49%, respectively, after 6 h, with creatinine and urea fluxes of $3,37 \times 10^{-6}$ g/m²s and $195,76 \times 10^{-6}$ g/m²s, respectively, although its tensile strength and elongation decreased. The results indicate that the CS/PEC/TPP3 membrane has the potential to serve as a promising biopolymer-based dialysis membrane with good transport performance.

Keywords: Chitosan, pectin, tripolyphosphate, dialysis membrane, urea, creatinine.