

**KARAKTERISTIK FILM DIAFRAGMA  
STETOSKOP DARI LATEKS KARET (*Hevea  
brasiliensis*) DENGAN PENAMBAHAN EKSTRAK  
DAUN SIRIH MERAH (*Piper crocatum*)**



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# **KARAKTERISTIK FILM DIAFRAGMA STETOSKOP DARI LATEKS KARET (*Hevea brasiliensis*) DENGAN PENAMBAHAN EKSTRAK DAUN SIRIH MERAH (*Piper crocatum*)**

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## **ABSTRAK**

Penelitian ini bertujuan mengetahui karakteristik fisik dan aktivitas antibakteri film diafragma stetoskop berbasis lateks karet (*Hevea brasiliensis*) dengan penambahan ekstrak daun sirih merah (*Piper crocatum*) yang dibandingkan dengan ekstrak kulit manggis (*Garcinia mangostana*) dan povidone iodine. Penelitian dilakukan secara eksperimental menggunakan empat perlakuan, yaitu kontrol (tanpa antibakteri), ekstrak daun sirih merah, ekstrak kulit manggis, dan povidone iodine. Pengujian meliputi kadar karet kering, kadar sisa pelarut etanol, aktivitas antibakteri, kekuatan tarik, dan warna film. Hasil penelitian menunjukkan kadar karet kering lateks sebesar  $65,89 \pm 0,44$  %, sedangkan kadar sisa pelarut etanol pada ekstrak daun sirih merah dan ekstrak kulit manggis masing-masing sebesar 0,06 % dan 0,13 %, sehingga masih berada pada batas aman. Povidone iodine menghasilkan aktivitas antibakteri tertinggi terhadap *Staphylococcus aureus* dengan zona hambat  $21 \pm 0,71$  mm, sedangkan ekstrak daun sirih merah memberikan aktivitas antibakteri tertinggi terhadap *Escherichia coli* dengan zona hambat  $19,50 \pm 2,12$  mm. Penambahan ekstrak daun sirih merah meningkatkan kekuatan tarik dan modulus elastisitas, tetapi menurunkan elongasi serta mengubah warna film menjadi hijau tua kekuningan akibat pigmen alami ekstrak. Berdasarkan seluruh parameter yang diamati, ekstrak daun sirih merah merupakan perlakuan terbaik karena memberikan aktivitas antibakteri tanpa menurunkan karakteristik fisik film secara signifikan, sehingga berpotensi digunakan sebagai agen antibakteri alami pada film diafragma stetoskop berbasis lateks.

**Kata kunci:** *Hevea brasiliensis*, *Piper crocatum*, film lateks, *Staphylococcus aureus*, *Escherichia coli*.

# CHARACTERISTICS OF STETHOSCOPE DIAPHRAGM FILM MADE FROM RUBBER LATEX (*Hevea brasiliensis*) WITH THE ADDITION OF RED BETEL LEAF EXTRACT (*Piper crocatum*)

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## ABSTRACT

This study aimed to determine the physical characteristics and antibacterial activity of a rubber latex (*Hevea brasiliensis*)-based stethoscope diaphragm film with the addition of red betel leaf extract (*Piper crocatum*), compared with mangosteen peel extract (*Garcinia mangostana*) and povidone iodine. The experiment was conducted using four treatments: control (without antibacterial agent), red betel leaf extract, mangosteen peel extract, and povidone iodine. The analyses included dry rubber content, residual ethanol content, antibacterial activity, tensile strength, and film color. The results showed that the dry rubber content of the latex was  $65,89 \pm 0,44$  %, while the residual ethanol contents of red betel leaf extract and mangosteen peel extract were 0,06 % and 0,13 %, respectively, indicating that both extracts were within acceptable safety limits. Povidone iodine exhibited the highest antibacterial activity against *Staphylococcus aureus* with an inhibition zone of  $21 \pm 0,71$  mm, whereas red betel leaf extract showed the highest activity against *Escherichia coli* with an inhibition zone of  $19,50 \pm 2,12$  mm. The addition of red betel leaf extract increased tensile strength and elastic modulus but reduced elongation and changed the film color to a dark yellowish-green due to its natural pigments. Based on the overall findings, red betel leaf extract was the best treatment because it provided effective antibacterial activity while maintaining good physical properties, indicating its potential as a natural antibacterial agent for rubber latex-based stethoscope diaphragm films.

**Keywords:** *Hevea brasiliensis*, *Piper crocatum*, natural rubber latex film *Staphylococcus aureus*, *Escherichia coli*