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ANTIMICROBIAL ACTIVITY OF SOME SUDANESE MEDICINAL PLANTS AGAINST DIABETIC WOUNDS INFECTIONS

BY

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DECLARATION

Iam Ehsan Mohammed Abd El Rahman declare that this research work reported in this thesis entitled antimicrobial activity of some Sudanes medicinal plants against diabetic wounds infections, is the product of my own research efforts; undertaken under the supervision of Dr. Waleed Said Koko and has not been prese.

…… ……..

Ehsan Mohammed Abd ElRahman Date

Student.

DEDICATION

TO

MY GRAND MOTHER , MOTHER , FATHER ,

SMALL FAMILY

UNCLES ,UNTS, BROTHERS , AND SISTERS

CLOSE RELATIVES AND Mr. MOHAMMED MUSTAFA AHMAD

WITH LOVE AND RESPECT

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ABSTRACT

A total of twelve plant extracts of both chloroform and ethanol from 6 Sudanese medicinal plants *Ambrosi martima, Ammi visnaga, Nigella sativa, Peganum harmala, Punica granatum* and *Trigonella foenum-graecum*, distributed among 6 different families were screened for their antibacterial activity using the disk diffusion method . They were tested against five clinical isolates and standard bacteria, two Gram positive bacteria (*Bacillus subtilis* NCTC 8236 and *Staphylococcus aureus* ATCC 25923) and three Gram negative bacteria *(Escherichia coli* ATCC 25922*, Proteus vulgaris* ATCC 6380 and *Pseudomonas aeruginosa* ATCC 27853*)*.

The extracts exhibited inhibitory activity against one or more of the five tested bacteria. *S.aureus* was the most susceptible organism to the *N.sativa, P.harmala and P.granatum* chloroformic and ethanolic extracts (21,20; 34,34 and 30,30mm respectivily), while *P. vulgaris* showed the lowest susceptibility to the *A.visnaga* and *T. foenum-graecum* (0,10 and 0 respectivily). The Minimum Inhibitory Concentrations (MICs) and Minimum Bactericidal Concentrations (MBCs) of the most active ethanolic extracts of the plants against the standard and clinical isolates bacteria were determined using the agar tube dilution method.

The antibacterial activity of two reference drugs were determined against the tested bacteria, and compared to the antibacterial activity of the tested plant extracts. The extracts were tested against 100 clinical isolates collected randomly from Zeenm Center for Diabetes, Khartoum.

In this study the wound healing effect of *P. harmala* seeds ethanolic extract and *P. granatum* fruit peels ethanolic extract were investigated on open diabetic wound model on rats. Trial was performed using four groups of rats infected with standard *S. aureus*. Treated groups with *P. harmala* and *P. granatum* ointments were compared with non-treated groups and treated groups with tetracycline ointment. Healing was determined by reduction in wound area.

The results of this study confirmed that the 2% *P. harmala* and *P.granatum* ointments were potent healing agent even better than the tested Tetracycline ointment 3%.

ملخص الاطروحة

اشتملت الدراسة على اجراء مسح للفعالية المضادة للبكتريا ل 12 من مستخلصات الكلوروفورم والايثانول النباتية لستة نباتات طبية سودانية: الدمسيسة, الخلة, الكمون, الحرمل, الرمان والحلبة (*Ambrosi martima, Ammi visnaga, Nigella sativa, Peganum harmala, Punica granatum* and *Trigonella foenum-graecum*) تنتمي الى ستة عوائل مختلفة باستخدام طريقة الانتشار في الاجار. تم اختبار تاثير جميع المستخلصات ضد خمسة انواع من البكتريا المعيارية والبكتريا المعزولة طبيا من جروح مرضى السكري من مركز زينام لمرضى السكري بالخرطوم , نوعين من البكتريا الموجبة جرام (العصوية الرقيقة والعنقودية الذهبية) (*Bacillus subtilis* NCTC 8236 and *Staphylococcus aureus*) وثلاثة انواع من البكتريا السالبة جرام (الاشريكية القولونية, الزائفة الزنجبارية والمتقلبة الاعتيادية). *(Escherichia coli* ATCC 25922*, Proteus vulgaris* ATCC 6380 and *Pseudomonas aeruginosa* ATCC 27853*)*.

وجد ان جميع المستخلصات اظهرت فاعلية ضد نوع او اكثر من انواع البكتريا المختبرة بالاضافة الى ان لها مفعول مثبط لتلك الانواع البكترية , وكانت العنقودية الذهبية اكثر انواع البكتريا حساسية لمستخلصات الكلوروفورم والايثانول للكمون, الحرمل والرمان

(21,20; 34,34 and 30,30mm respectively), اما الزائفة الزنجبارية فقد اظهرت اقل حساسية لمستخلصات الكلوروفورم والايثانول للخلة والحلبة بين انواع البكتريا المختبرة

(0,10 and 0 respectivily). وكذلك شتملت الدراسة على تحديد اقل تركيز مثبط لنمو البكتريا وكذلك اقل تركيز قاتل للبكتريا المعيارية والمعزولة طبيا لاكثر المستخلصات فاعلية , وهي الاربع مستخلصات الايثانولية لبذور نبات الحرمل وقشور ثمار الرمان بطريقة تخفيف الاجار.

تم تحديد فاعلية اثنان من مضادات حيوية مرجعية وهي الاريثرومايسين والجنتامايسين ضد الانواع الخمسة البكترية المختبرة وقورنت فاعليتها مع المستخلصات النباتية. تلك المستخلصات تم اختبار فاعليتها على البكتريا الموجودة في عدد 100 عينة معزولة جمعت عشوائيا من مركز زينام لمرضى السكري بالخرطوم.

لقد تم في هذه الدراسة التحقق من ثاثير المستخلصات الايثانولية لنباتي الحرمل والرمان على التئام جروح السكري المفتوحة في 28 من الفئران السويسرية (البيضاء). وتم تحضير المستخلصات الايثانولية للحرمل والرمان ومن ثم تحضير المراهم 2% (وزن \ وزن) من المستخلصات في البولي ايثلين جليكول , مع استخدام مرهم التتراسيكلين 3% كحكم .

تم عمل تجربة مكونة من 4 مجموعات من الفئران المصابة بداء السكري والمصابة معمليا بالعنقودية الذهبية المعيارية . قورنت المجموعات المعالجة بالمراهم المعدة من المستخلصات الايثانولية للحرمل والرمان مع مرهم التتراسيكلين والمجموعات المصابة الغير معالجة بالمرهم , حيث تم تقدير الالتئام بالنقص في منطقة الجرح . واكدت النتائج ان مرهمي مستخلصي الايثانول بذور الحرمل وقشور ثمرة الرمان 2% هما عاملا التئام فعال , بل وجد انهما افضل من مرهم التتراسيكلين 3% المختبر.

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