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ANTIBACTERIAL PROPERTY ENHANCEMENT BY THE INCORPORATION OF HONEY INTO PVA-CHITOSAN ELECTROSPUN NANOFIBRES

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ABSTRACT
The polyvinyl alcohol (PVA) – chitosan nanofibres incorporated with honey were prepared using the electrospinning processing method. The antibacterial property of the prepared nanofibres was assessed using the well diffusion method. In the antibacterial test, the honey-incorporated PVA-chitosan nanofibres exhibited an inhibition zone of 1.3 cm.

INTRODUCTION
Electrospinning is a versatile technique used for the synthesis of nanofibres. Electrospun nanofibres have characteristic features such as high porosity and a large surface-to-volume ratio (Sarhan, W.A. and Azzazy, H.M., 2015). Recent studies have shown that nanofibrous mats were fabricated for applications requiring antibacterial properties. The most popular was the production of electrospun nanofibrous mats of polyvinyl alcohol (PVA) -chitosan. PVA/chitosan nanofibres revealed good compatibility and antibacterial properties of chitosan in the mixture, making it suitable for use in various medical fields (Sazegar, M., et al., 2020).
Studies have shown that PVA-chitosan nanofibres are promising candidates for demonstrating antibacterial activity; further research into the incorporation of natural additives like honey is ongoing. Honey, a natural material known for its inherent antibacterial properties, is a potential additive (Ullah, A., et al., 2020). In this study, the nanofibrous mat of PVA-chitosan incorporated with honey was fabricated.

OBJECTIVE
To study antibacterial properties of honey-incorporated PVA-chitosan electrospun nanofibres.

EXPERIMENTAL
First, a 7 wt.% PVA solution was prepared by dissolving 7 g of PVA in 93 g of distilled water using a ball mill for 24 h. Separately, 0.5 g of chitosan was mixed with a 2 wt.% acetic acid solution in a magnetic stirrer. Subsequently, both solutions were combined in an 8:2 ratio and stirred for 3 h, after which 2 g of honey was added and stirred for another 4 h. The prepared solution was loaded into a syringe fitted with a needle, and electrospinning was carried out at an applied voltage of 23 kV, a needle-to-collect distance of 11 cm, and with a flow rate of 1 mL per h.
The antibacterial activity of the obtained nanofibrous mat was assessed by the well diffusion method.

RESULTS AND CONCLUSION
In the antibacterial test, the nanofibrous mat of PVA-chitosan with honey showed an inhibition zone of 1.3 cm. Thus, it is proven that the antibacterial property was enhanced by the incorporation of honey.

FUTURE DIRECTIONS
Further research could focus on optimising the honey concentration and studying the sustained release of antibacterial agents. In addition, to improve antibacterial applications, evaluating its effectiveness against a broad range of bacteria could be beneficial.

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