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**PREPARATION OF HYDROGEL FROM
RAW STINGLESS BEE HONEY**

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ABSTRACT

Chitosan/PVA hydrogel layers are used in the preparation of a hydrogel containing raw stingless bee honey for potential use as wound dressing materials. The effects of stingless bee honey addition on the tensile strength, gel fraction, and porosity of the samples were studied. The samples' physicochemical properties were compared using pH, refractive index, moisture content and hygroscopicity. The hydrogel with different of raw stingless bee honey volume (3g, 6g, 9g) with different concentrations of distilled water (10%, 15%, 20% w/v) were used resulting in three samples of different value of tensile strength, gel fraction and porosity. The addition of raw stingless bee honey increased the porosity and cell proliferation of the chitosan/PVA films. It also decreased the gel fraction but had no effect on the tensile strength. Because of hydrogen bonding interactions with the PVA and chitosan chains, the presence of raw honey reduced the tensile strength of the hydrogels. The presence of raw stingless bee honey, on the other hand, significantly increased the biocompatibility of the hydrogels.

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CHAPTER ONE

BACKGROUND

1.1 Introduction

Honey is an energy rich medical product produced from flowers by different kind and species of honeybees including stinged bee and stingless bee. Since ancient times, honey was widely use in treating various, antimicrobial characteristics and the ability to store chemicals safely. Mellified man, also known as human mummy confection, was a fabled medicine made by soaking a human corpse in honey. Honey was used to keep flesh fresh for several days in ancient Rome. Due to its high acidity, hydrogen peroxide action, and low water activity, honey has antibacterial characteristics. Honey's strong acidity, hygroscopicity, and antibacterial properties make it a logical choice for use in mummy making. (Chettiar, Marla and Srii, 2016) The honey can be preserved for a long time due to the low water content and high in sugar which bacteria cannot afford to live.

Meanwhile for stingless bee honey, the sting is greatly reduced, so the defence behaviour is to chase the intruders by biting, becoming entangled in the intruder's hairs, and getting into the nose, ears, and eyes. Most species construct their nests in pre-existing cavities such as hollow trees or in the ground. A few species construct their nests in exposed locations. (Taye, 2020) The stingless bees honey is sold in marketplaces at a higher price than honey from *Apis* bees due to its high medicinal value. (Chidi and Odo, 2017) Malay, Arabian, Hebrew, Persian, Indian, Roman, and Chinese communities have all historically practised it. It was previously known as pot honey, a relic of the stingless bee. The Malay refer to it as "madu kelulut." (IJ *et al.*, 2018). Based on the study and research of stingless bee honey or *kelulut* recently, some journals, though not detailed and generally being used like the stinger bee on this type of bee species' honey, specifically *Heterotrigona Itama*, which is commonly found in Southeast Asia, have been published. (IJ *et al.*, 2018) Current studies are working on the raw honey which was anti-inflammatory, antioxidant and antibacterial agent, safe to be eaten and practically able to use it on the skin and applied it as a wound in preventing bacterial infections and repairing skin cells efficiently faster. Honey and hydrogel in dressings are perfect for use as wound dressings.