CHAPTER I: INTRODUCTION

1.1. Background

Keloids are recurring pathological scars that mature beyond the initial injury site in an extensive manner. The condition arises from aberrant wound healing, usually from local trauma, inflammation, burns, surgery, vaccination, and many more. Individuals can experience pain, itching, discomfort and even psychological stress due to keloids. Both environmental and genetic factors play a role in the pathophysiology of keloids. The most heavily associated factor for keloids development is the over-proliferation of dermal fibroblasts due to decreased apoptotic activity. Additionally, the aberrant production and remodeling of the extracellular matrix (ECM) components and the excess production of collagen fibers also contribute to the development of keloids (Ojeh, Bharatha, Gaur & Forde, 2020). Throughout the years, there has been an increasing popularity of using biological substances as a therapeutic agent for keloid treatment, such as using botulinum toxin type A and plant-based compounds (Li et al., 2018; Unahabhokha *et al*., 2014).

Botulinum toxin type A (BTX-A) is a toxin produced by the anaerobic gram-positive bacterium *Clostridium botulinum*. It has advantageous qualities such as minimal side effects compared to other neurotoxins, high effectiveness in terms of patient satisfaction and versatility, which makes it a preferred choice and widely used product in both medical and aesthetic fields (Xiaoxue, Xi & Zhibo, 2014). There has been numerous research venturing into using BTX-A to treat keloids due to its promising effects.

Phytochemical compounds and herbal extracts have been increasing in popularity in a keloid treatment setting. Their versatility and availability makes it favorable for medical and pharmaceutical fields to start implementing them. The plant-based compounds can be found in nature without the requirement to synthesize it in a laboratory and possess less adverse effects. Recent studies have also found how phytochemical compounds can interfere directly with the molecular mechanisms behind various diseases, including keloids. The phytochemicals are able to

alter the expression of proteins and genes involved in the signaling pathways related to the wound healing process. This alteration is in favor of the treatment of keloids (Unahabhokha *et al*., 2014).

Currently, there is still no gold standard for keloid treatments. The molecular mechanism of keloids and keloid treatment itself is yet to be elucidated too. However, treatments using BTX-A and plant-based compounds are considerable options as they offer promising outcomes with beneficial effects.

1.2. Objectives / Aims

The aim of this study is to review the performance of botulinum toxin type A and plant-based compound as a treatment for keloids by achieving the following objectives:

- To determine the potential, efficiency and efficacy of both botulinum toxin type A and plant-based compounds in treating keloids,
- To investigate the alteration of gene expressions related to keloid molecular pathophysiology after treatment with botulinum toxin type A and plant-based compounds,
- To identify the gaps in research about keloid treatment involving botulinum toxin type A and plant-based compounds.

1.3. Research Scope

The research scope of this systematic review are as follows:

- Formulation of PICO
- Preliminary research and idea validation
- Database mining
- Title and abstract screening
- Literature review and refinement
- Manuscript writing and reporting