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**TITLE:**  
**THE EFFECT OF USING DIFFERENT TYPES OF  
SOLVENTS TOWARDS QUALITY OF  
*AZADIRACHTA INDICA* CRUDE EXTRACT**

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## ABSTRACT

*Azadiractha indica* is one of the greatest herbs and contains several bioactive compounds which are believed to possess several therapeutic properties such as antibacterial, antimicrobial and anti-inflammatory disease. These bioactive compounds can be obtained by using an optimum and appropriate extraction parameter. The extraction parameters include suitable drying methods, suitable solvents to extract polar or non-polar compounds, types of extraction technique and others. However, the comparative scientific study on the effect of using different extraction parameter towards the extraction yield and amount of extracted bioactive compound has been very limited. Therefore, this study aimed to determine the effect of using different types of extraction parameters focusing on different types of solvents towards the extraction yield and amount of extracted bioactive compound. The extraction process was implemented by using maceration technique by using aqueous, methanol, and ethanol as solvents. Then, the concentration of Gallic acid was determined by using High-Performance Liquid Chromatography (HPLC). The findings revealed that the highest extraction yield was shown by the extract from methanol with the value of 15.79%. While Gallic acid was present in every extract and that the highest amount of Gallic acid shown by the extract from Aqueous with the value of 44.70ppm. This finding showed that extraction efficiency varied depending on the solvent utilized.. This study highlights that *Azadirachta Indica* or neem leaves are one of the useful plants that contain Gallic Acid and it could be optimum extracted by using aqueous.

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# CHAPTER ONE

## BACKGROUND

### 1.1 Introduction

Neem (*Azadirachta indica*) tree has attracted worldwide prominence owing to its wide range of medicinal properties. Neem leaf and its constituents have been demonstrated to exhibit immunomodulatory, anti-inflammatory, antihyperglycaemic, antiulcer, antimalarial, antifungal, antibacterial, antioxidant, *antimutagenic* and *anticarcinogenic* properties (Subapriya, R and Nagini, S, 2005). Neem is a tree in the mahogany family *Meliaceae*. It is one of two species in the genus *Azadirachta*, and is native to India and Burma, growing in tropical and semi-tropical regions. It is a fast growing tree that can reach a height of 15-20 m, rarely to 35-40 m. It is evergreen but under severe drought it may shed most or nearly all of its leaves. The branches are wide spread. For thousands of years the beneficial properties of Neem (*Azadirachta indica* A. Juss) have been recognized in the Indian tradition. Each part of the neem tree has some medicinal property. The taxonomical classification of neem is, Rutales (Order), Rutinae (Suborder), *Meliaceae* (Family), Melioideae (Subfamily), Melieae (Tribe), *Azadirachta* (Genus), and *indica* (Species) (Alok Maithaniet et al 2011). The maceration was employed for preparing the leaf extract, in which the solvents diffuse into the solid plant material and solubilize their compounds. The as-prepared leaf extracts are safe and effective for long term use, since they possess antibacterial molecules as well as antioxidants. The following medicinal leaves crude extracts were used in this study. Firstly, the extract that was collected from the leaf of *Azadirachta indica* (neem) has flavonoids, dihydrochalcones, arabinogalactans, isoprenoids, polyphenolics, coumarin, and tannins, which are the important constituents for its antibacterial activities (S. Siddiqui, S. Faizi, and B. S. Siddiqui 1992). Therefore, in this study, the phytochemical constituents, antioxidant property, and high-performance liquid chromatography analysis of methanol and acetone–water extracts of *A. indica* leaf were investigated to assess the potential protective benefits of this plant against degenerative reactions induced by free radicals (Saha et al 2008).

## 1.2 Literature Review

### 1.2.1 Neem leaves (*Azadirachta Indica*)

Neem (*Azadirachta indica*, Meliaceae) is being used as an antimicrobial agent in traditional systems of medicines since ancient times (Nair, V. v, Asija, R., & Gupta, A. 2019). Neem also possesses notable insecticidal and pesticide activities (Thirukumaran *et al.*, 2021). *Azadirachta indica* we all commonly known as neem. It is native of India and naturally present in tropical and subtropical areas in different countries. *Azadirachta indica* has great medicinal value and distributed wide spread in the world. The Chemical constituents including alkaloids, flavonoids, triterpenoids, phenolic compounds, Carotenoids, steroids and ketones contain many biologically active compound that can be extracted from neem (Verkerk, 1993). Siamese neem tree (*Azadirachta indica* A. Juss var. *siamensis* Valetton), which belongs to the Meliaceae family, has been found in Southeast Asian countries such as Laos, Myanmar, Cambodia and also Thailand (Sombatsiri *et al.*, 1995). In Thailand, the young leaves and young flowers of this plant are commonly consumed as a vegetable for bitter tonic. The flowers were also traditionally used as an element tonic for the treatment of fever and nasal polyposis (Clayton *et al.*, 1996).

### 1.2.2 Extraction

Maceration using dried material (usually leaves) is the extraction method preferred by the majority of authors (Tavares *et al.*, al 2021). The option for ethanol and/or water extracts is more environmentally friendly and resorts to easily accessible solvents (Tavares *et al.*, 2021). Solvent methanol and aqueous were used for extraction of crudes by means of maceration ( Ibrahim, and Kebede 2020). HPLC profiling of methanolic extract of *A. indica* and *M. azaderach* revealed eleven and ten fractions of compounds were visualized in the form of peak. (Malar *et al.*, 2020)