

CHAPTER I

INTRODUCTION

1.1. Research Background

Microbial diseases are among the primary cause of death worldwide [1], especially in low-income nations and young children [2]. These diseases which are mostly infectious [3], have afflicted humanity throughout history and have even changed history [1, 4]. The biblical plagues, the Middle Ages' Black Death, the 1918 "Spanish flu" pandemic and the 2019 "Covid 19" pandemic, are just a few instances [5]. The 1918 influenza pandemic killed more than half a million Americans and up to 50 million human beings globally, and it is thought to have contributed to the end of World War I. In addition, the incidence of invasive *Streptococcus pneumonia* illness and community-acquired pneumonia has grown during the last decade. Acquired immunodeficiency syndrome (AIDS) threatens to disrupt the social fabric in several African countries and is severely affecting the health-care system in the United States and other part of the world. Roughly 33 million persons worldwide are infected with the human immunodeficiency virus (HIV), with approximately 25 million affected since 1981 [6].

The *Clausena* genus is well known to include shrubs and trees. However, the character of the growth and the height of these shrubs and trees varies greatly. They are also characterized by having berry-like fruits with pinnate leaves. The gynophore supporting the ovary has been the most characterized morphological feature in this genus, separating them from other related genera [21]. Secondary metabolites such as alkaloids, flavonoids and terpenoids are abundant in *Clausena* plants [17,24,25,] but the principal phytochemical components in *Clausena* plants are the carbazole alkaloids and coumarins, with the alkaloids being known to exhibit high antibacterial, anticancer, antidiabetics, and antiparasitic activities [25,26]. The therapeutic use of medicinal plants has widely been regarded as the preferred means of treating infectious diseases for thousands of years [11,12], with over 80% of people in developing nations relying on medicinal plants directly for their medical needs [13,14,15]. With recent advancements in technology and lifestyle, more microbial ailments are continuously being discovered, resulting in a strong demand for research in natural products for plants that can be used as a source of single or multiple target drugs to cure these disorders.

1.2. Research Objectives

For generations, various parts of *Clausena* plants such as leaf, stem, bark, root, and essential oil rich in alkaloids, flavonoids, monoterpenes and triterpenoids have traditionally been utilized to treat ailments and also a source of drug for modern-day microbial diseases [16, 17]. Several reviews on *Clausena* species have been reported, including, A review of the traditional uses, phytochemical and pharmacological aspects of selected members of *Clausena* genus [36], Anticancer carbazole alkaloids and coumarins from *Clausena* plants [17], *Clausena excavata* Burm.f.(Rutaceae): A review of its traditional uses, pharmacological and phytochemical properties [143], and Essential Oils from *Clausena* Species in China: Santalene Sesquiterpenes Resource and Toxicity against *Liposcelis bostrychophila* [144]. However, the general and specific objectives of this study is to:

1.2.1 General Purpose

provide a comprehensive information on the occurrence, traditional potency, as well as the description and distribution of the *Clausena* species.

1.2.2 Specific Purpose

evaluate the current researches made on the antimicrobial activities of the extracts and secondary metabolite compounds of *Clausena* plants.

1.3. Scope and Significance of studies.

Various treatments have been developed to combat microbial diseases; however, microbial resistance to conventional antibiotics and single-target drugs continues to be a major cause for concern worldwide [7]. Antimicrobial resistance has been linked to several factors [8], among which are long-term use of these drugs, thereby giving the microorganism room to adapt and make the drugs less effective. Consequently, treatment of patients with an antibiotic-resistant infection comes at a high cost ranging from \$29,069 to \$39,069 on average, depending on the severity of the condition [9]. This emphasizes the significance of developing innovative drug approaches as a long-term solution to these antimicrobial drug resistance problems and therapeutic alternatives for diverse diseases caused by these pathogenic microbes [10]. The research aims to provide scientific knowledge regarding the extract and secondary metabolites found in the roots, stems, leaves,

rhizomes, twigs, seeds, fruits, and flowers of *Clausena* plants, as well as whether these substances have antimicrobial activity, so as to justify its traditional potency. Furthermore, this study is expected to serve as a source of scientific data and a reference for future research.