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Title of the Thesis: Phytochemical Investigation and Antimicrobial Activity of Different Plant Extracts.

Abstract

White willow which is also known as the salicin willow has been used for its health benefits for thousands of years. Eight flavonoids were isolated from the leaves of *Salix alba*. Apigenin, 7-*O*-(4-*p*-coumarylglucoside), terniflorin, quercetin 3-*O*-glucoside, quercetin 3-*O*-rutinoside, isorhamnetin 3-*O*-glucoside, isorhamnetin 3-*O*-rutinoside and quercetin 7, ′3-dimethylether 3-*O*-glucoside. Salicin, a glycoside isolated from *S. alba* attracted the researchers in the 19th century and it provided us with most potent weapon, Acetyl-salicylic acid for killing pain.

Salix viminalis L. bark were advised to chew to reduce fever and inflammation. The fresh bark of all these members of this genus contains Salicin, which probably decomposes into salicylic acid (closely related to aspirin) in human body. Five flavonoids were reported from the leaves of this plant namely, isorhamnetin 3-*O*- (6-acetylglucoside), isoquercitrin, apigenin 7- *O*-glucoside and isohamnetin 3-*O*-glucoside.

Candida is a genus of yeasts and is the most common cause of fungal infections worldwide and cause of invasive candidiasis, the fourth leading cause of nosocomial bloodstream infections. It colonizes mucosal surfaces of the oral & vaginal cavities and the digestive tract and is also able to cause a variety of infections. Although many antifungal agents are available but they all are inherent toxic and present serious side effects. Research on plant derived molecules has accelerated in recent years due to their low inherent toxicity and side effects.

The vast majority of the bacteria in the body are rendered harmless by the protective effects of the immune system and some are beneficial. However, several species of bacteria are pathogenic and cause infectious diseases including cholera, syphilis, anthrax, leprosy and bubonic plague. Many antibacterial agnets are used in day today life but they have serious side effects.

In this study we have explored the effect of methanolic, chloroform and petroleum ether leaf extracts of *Salix alba* and *Salix viminalis* to understand the effect of test compounds on growth and pathogenicity of *Candida* and *Bacteria*. Till no reports have been published that show the effect of methanolic, chloroform and petroleum ether leaf extracts of *S. alba* and *S. viminalis* leaves on growth and important pathogenicity markers of different fungal and bacterial species. Objectives of the research proposal were: 1). Phytochemical investigations, 2). GC-MS analysis, 3). Determination of MIC, 4). Growth curve study, 5). Disc diffusion assay, 6.) Scanning electron microscopy, 7). Transmission electron microscopy.

We examined the antifungal and antibacterial effect of methanolic, chloroform and petroleum ether leaf extracts of *S. alba* and *S. viminalis* on growth and virulence factors of various bacterial and fungal isolates. All the plant extracts were found to be effective against all tested bacterial and *Candida* strains. Initial screening for antifungal and antibacterial activity of *S. alba* extracts and *S. viminalis* extracts was carried out by evaluating MIC against five clinical sensitive isolates of *Candida* species and four bacterial species (two gram positive & two gram negative). MIC results obtained in this study showed that the test extracts exhibited varying degrees of antifungal activity. Generally, all the fungal and bacterial isolates investigated were found sensitive to the test extract. The use of total mean MICs obtained gave a good indication of the overall antimicrobial effectiveness of each plant extract.