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REVIEW: SYNERGISM IN SOME MEDICINALLY IMPORTANT PLANT SPECIES

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Abstract

The synergic effect of biological evaluation in plants is associated with the protocol where the multiple plant originated compound and the plant extract combined with their individual or independent effects. In India, Plant-based medicines are used traditionally by tribals and local people. The diverse use of vegetation and plants has been rooted even in ayurveda and ancient sacred text across the Indian subcontinent. Medicinal plants find very significant place to its therapeutic value and source of wide spectrum of secondary metabolites. The perspective relative to this aspect is associated with extensive exploration towards the stimulation of the chemotherapeutic compounds and the natural resources. By understanding synergistic effect of plant extract we get to explore how multiple phytochemicals within medicinal plants interact to enhance or modulate their therapeutic efficacy.

Keywords: Synergic effect, phytochemicals, ethnomedicinal plants, secondary metabolites.

Introduction:

The terrestrial plants species have been reported to use for the making various medicines since ancient civilizations (Benarba and Belhouala, 2024). The natural medicinal substances have been extracted from the various medicinal plants to cure human diseases as these substances show healing and preventive effects. These medicinal plants contain various phytochemicals showing therapeutic effects against various diseases such as cancer. (Chandra

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et al., 2023; Iyer *et al.*, 2023). The various phytochemicals compounds found to be present in edible plant species are important sources of antioxidants improving the therapeutic indices and decrease the toxicity of drugs through synergistic mechanism. It has been reported that the molecules from medicinal species and condiments in combination can augment the suppressive capacity of malignant cells as an anticancer drugs by mitigating the unintended toxicity to vital tissues. (Benarba *et al.*, 2019; Khadidja Belhouala *et al.*, 2024). The field of medicinal plant research has been aimed over the discussion of the interplay reaction and role between various plant extracts and their synergistic effects in the recent years. The various phytochemicals in the combinations can lead to enhanced bioavailability and reduces the side effects and offers more reliable approach towards the treatments in order to optimize the therapeutic potential of plants. It is necessary to understand the interactions between compounds which are present within the medicinal plants (Daniel, 2024). The useful and detail information relative to the interaction could be derived through the use of various techniques such as high-throughput screening, advanced chromatographic methods etc. The data thus generated through various sources, subject to the integration towards the study and interpret, how different phytochemical compounds present within plant interact with each other and affect biological systems to cure various diseases. (Daniel, 2024).

The use of various techniques and sophisticated instruments such as mass spectrometry, Nuclear Magnetic Resonance (NMR) etc., the complexity of plant interactions can be deduced and can be derived useful and detail profile of phytochemicals present within the plant species and their synergistic effects. (Fung *et al.*, 2012). The mechanism of multiple phytochemicals interaction within plants can generate useful and beneficial information about the therapeutic benefits that single compound alone cannot provide. This novel approach aligns with traditional herbal wisdom and also gives the way for modern scientific advancements and offers a richer, better perspective on plant medicines. (Bakare-odunola, 2010). The two types of metabolites primary and secondary metabolites are synthesized in plant. Of which, the primary metabolites are essential for growth and development of plants, whereas the secondary metabolites produced in the plants required in less amounts to plants. Plants producing some phytochemical compounds which are bioactive in nature are referred to as secondary metabolites. There are various types of secondary metabolites such as phenolic compounds, terpenes, flavonoids etc. which have various medicinal properties. The study of the plant extract in combination with different antibiotics have been studied in the many parts of the world. The synergistic antimicrobial effect of *Camellia sinensis* and *Juglans regia* with nalidixic acid has been reported against the bacteria (Farooqui *et*

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al.,2015). The synergistic effect between the aqueous and ethanolic extracts of the flower buds and fruits has been reported in Capparis spinosa (Ennacerie *et al.*, 2017). According to the quote by Buckminster fuller (1968), he said that "Universe is synergetic, Life is synergetic. Synergy means the interaction or cooperation of two or more substances or agents produce a combined effect which is greater than the individual effect of substance (Tennakoon P.L.K. *et al.*, 2007).

The synergistic effect of plant derivative and the synthetic drug has been reported as more effective therapeutic in the treatment of *S. Typhi* and other bacteria. The combined treatment might be an enhancer for the immune system towards better action against the external and internal pathogens (Chauhan *et al.*, 2023). Now-a-days, many diseases have complicated mechanism and that cannot be treated by single drug therapy so it can be treated more effectively by the combination of different drugs that can target different aspects. In western countries, they use various multidrug therapies for treatment of various complicated disorders such as cancer, hypertension, metabolic and inflammatory diseases, acquired immune deficiency syndrome (AIDS), and infections (Huma Ali *et al*., 2024). It has been reported that the extracts of *Bryonia Evernia Telephium* showed significant cytotoxic effect on cancer cells and the extract significantly inhibited the growth of cancer cells and thus mixture exhibited significant anti-angiogenic activity (Khadidja Belhouala *et al*.,2024).

Jae-young Jeong reported that, the extract of medicinal plants like *Caesalpinia sappan* L. (CS), *Glycyrrhiza uralensis* fisch (GU), *Sanguisorba officinalis* L. (SO) and *Uncaria gambir* Roxb. (UG) shows the inhibitory effect on growth of another common pathogen is methicillin-resistant *Staphylococcus aureus* (MRSA). It has been reported that the *Sanguisorba officinalis* L. (SO) and *Uncaria gambir* Roxb. (UG) extract showed best synergism. (Jae-Young Jeong, 2023).

The phytochemicals derived from the wild ethnomedicinal plant species from the Botha Forest and subject to the quantitative and qualitative analysis and assessment using the standard estimation protocol. Thus, the phytochemicals obtained from the wild ethnomedicinally important plant species of the interest subject to the study of quantitative and qualitative deduction of synergistic effect accompanying with various artificial drugs applied against diseases and ailments in human being.

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