

Original Article

THE ASSESSMENT OF THE *DOUEPIA TORTUOSA* AND *HORSETAIL (EQUISETUM ARVENSE)* COMPARATIVE AND COMBINE ANTIOXIDANT POTENTIAL

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ABSTRACT:

Superoxide anions, hydrogen peroxide, and hydroxyl radicals are all members of the family of reactive oxygen species (ROS) known as free radicals. They can react with proteins, lipids, and DNA to cause cancer and other chronic diseases. The antioxidant capacity of *Douepia tortuosa*, (*D. tortuosa*) is substantial. This study evaluated scavenging capacity of 23%, 65% and 78% at different concentrations of *D. tortuosa*, including 100µg/ml, 500µg/ml, and 1000µg/ml respectively. The common horsetail (*Equisetum arvense*) is a silica-rich rhizomatous annual herbaceous plant with a number of biological traits, such as antioxidants, diuretics that act as immunological barrier, and antimicrobial, antibacterial, and anti-inflammatory properties which is reportedly protect the heart and the nervous system. This study showed that horsetail (*Equisetum arvense*) has antioxidant capacities of 26%, 42%, and 47%. Furthermore, the combine plants extract antioxidant potential which was found to be 41%, 61% and 80%. Further in vivo and in vitro studies are needed to elucidate the biochemical composition of combine plant extract and explore their therapeutic potential.

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INTRODUCTION

Only 5–10% of cancers are caused by genetic defects, while 90%–95% are caused by environmental and lifestyle factors. Even though there has been an enormous amount of research and significant advancements in the past few decades, cancer remains leading cause of death globally (1-3). It has been reported that during the year 2023, the United States of America reported 609,820 cancer deaths and 1,958,310 new cancer cases (4). According to estimates, China reportedly had 2,574,200 cancer-related deaths and 4,824,700 new cancer cases in the year 2022 (5). Oxidative stress is the connection between the production and formation of reactive oxygen species (ROS). Reactive oxygen species are the main cause for various diseases, including endometriosis, diabetes mellitus, cancer, and atherosclerosis (2, 6). Herbs are the most popular complementary and alternative medicine therapy (7). The common horsetail (*Equisetum arvense*) is a silica-rich rhizomatous annual herbaceous plant that grows in Pakistan's northern and northwest regions. Horsetails (*Equisetum arvense*) contains up to 22% to 25% of their dry weight in silica, which has led to its widespread use in medicine (8, 9). Silica raises the ability of plants to deal with stressful situations and adverse conditions, but it is not an essential element, neither an essential nutrient. several biological characteristics, include diuretics that are immunological barriers, antimicrobial, antibacterial, anti-inflammatory, neurological and heart securing, and antioxidant that are being identified in this plant (10). Horsetail provides a range of bioactive molecules, includes flavonoids, saponins, silicates, and polysaccharides (11). The horsetail powder has high antibacterial, anti-inflammatory, protective properties, anti-hypertensive, and antioxidant effects, according to current research in pharmacology. From medical examinations, special needs have a wound-healing ability and may be utilized to manage cracked hair disease and chronic pain in the muscles (12). Although it is native to Pakistan, the plant species *Douepia tortuosa* (*D. tortuosa*) is not classified as endangered. It's a member of the Brassicacea family. This perennial plant species is found in Pakistan's Punjab and Khyber Pakhtunkhwa provinces. The woody root of this glabrous, glaucous perennial plant grows to a height of 30 to 75 cm (13). The

physiological significance of *D. tortuosa* was not yet examined. The primary goal of this study was to find out the medicinal properties of *D. tortuosa* in individual form and within complex form.

METHODS:

The 2, 2 diphenyl-1 picrylhydrazyl (DPPH) was purchased from sigma Islamabad Pakistan Branch. Methanol and Aluminium foil were provided by Department of Zoology University of Sciences and Technology, Bannu, Khyber-Pakhtunkhwa, Pakistan. The methanolic extract of plants for activities were prepared in the Laboratory of Zoology Department UST, Bannu Kp Pakistan.

Plant material and preparation of crude extract:

During the month of November 2024, the sample of plants were collected from the District at Bannu, Khyber-Pakhtunkhwa, Pakistan. With the help of a mortar and pestle shed dried leaves of *D. tortuosa* and horsetail plants were ground into fine powder. The powder was submerged into 70% methanol. After 24hrs agitation, the solution was filtered out with the help of Whatman no 3 filter paper and then placed at room temperature for preparing the glue-like plant extract. The prepared plant extract was kept at room temperature for future experimental uses.

Antioxidant Assay:

The antioxidant activity was assessed by using DPPH free radicals, which was performed by following the protocols previously published (6). Briefly the samples for the antioxidants assay were prepared by using the concentrations including 100µg/ml, 500µg/ml and 1000µg/ml. Then 900µg/ml of DPPH solution was mixed with 100µl extracts solution. The extracts' scavenging ability was assessed using a spectrophotometer with a 517 nm UV wavelength.

RESULTS:

Douepia tortuosa (D. tortuosa) Antioxidant potential

The antioxidant assay to compare the scavenging activity of *D. tortuosa* methanolic extract was assessed at various concentrations to an ascorbic acid (used as control). The scavenging capacity using various concentration including 100µg/ml, 500µg/ml and 1000µg/ml were 23%, 65% and 78% respectively at maximum concentration of *D. tortuosa* (Figure 1).

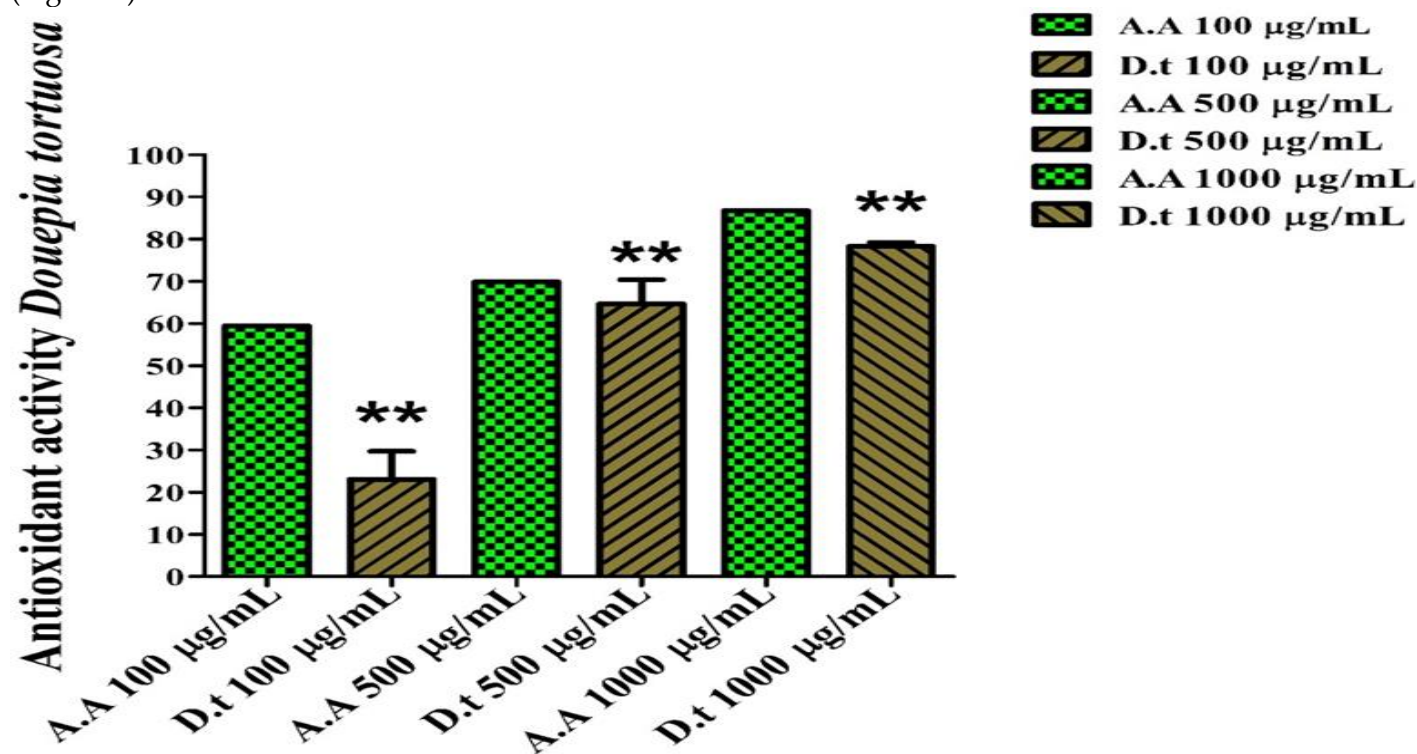


Figure .1 Represents the *D. tortuosa* antioxidant potential

Horsetail (Equisetum arvense) Antioxidant Potential

Next, we examined the antioxidant potential of horsetail (*Equisetum arvense*) using different 100µg/ml, 500µg/ml and 1000µg/ml concentrations. The antioxidant ability of horsetail (*Equisetum arvense*) were 26%, 42% and 47% respectively compared with the control ascorbic acid of 34%, 55%, 62% as shown in Figure 2.

D. tortuosa and horsetail (Equisetum arvense) combine antioxidant potential

Furthermore, we examined the antioxidant potential of combined plants extract. We noticed that combined plants extract of *D. tortuosa* and horsetail (*Equisetum arvense*) at different concentrations 100 µg/ml, 500 µg/ml, and 1000 µg/ml showed a high significant value of antioxidant potential which are 41%, 61% and 80% respectively. Our results suggested that combine plant extract showed high significant antioxidant potential than individual.

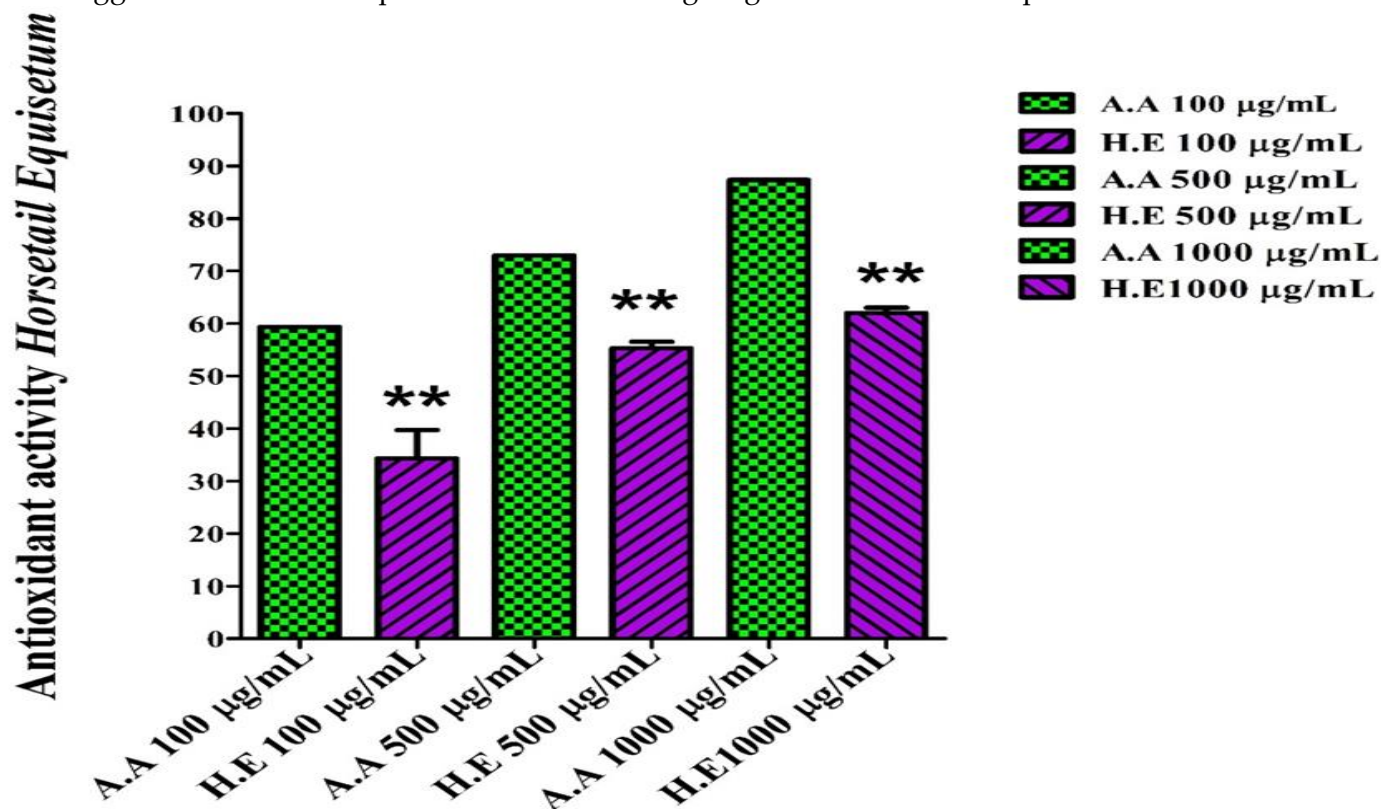


Figure. 2 Represents the horsetail (*Equisetum arvense*) antioxidant potential

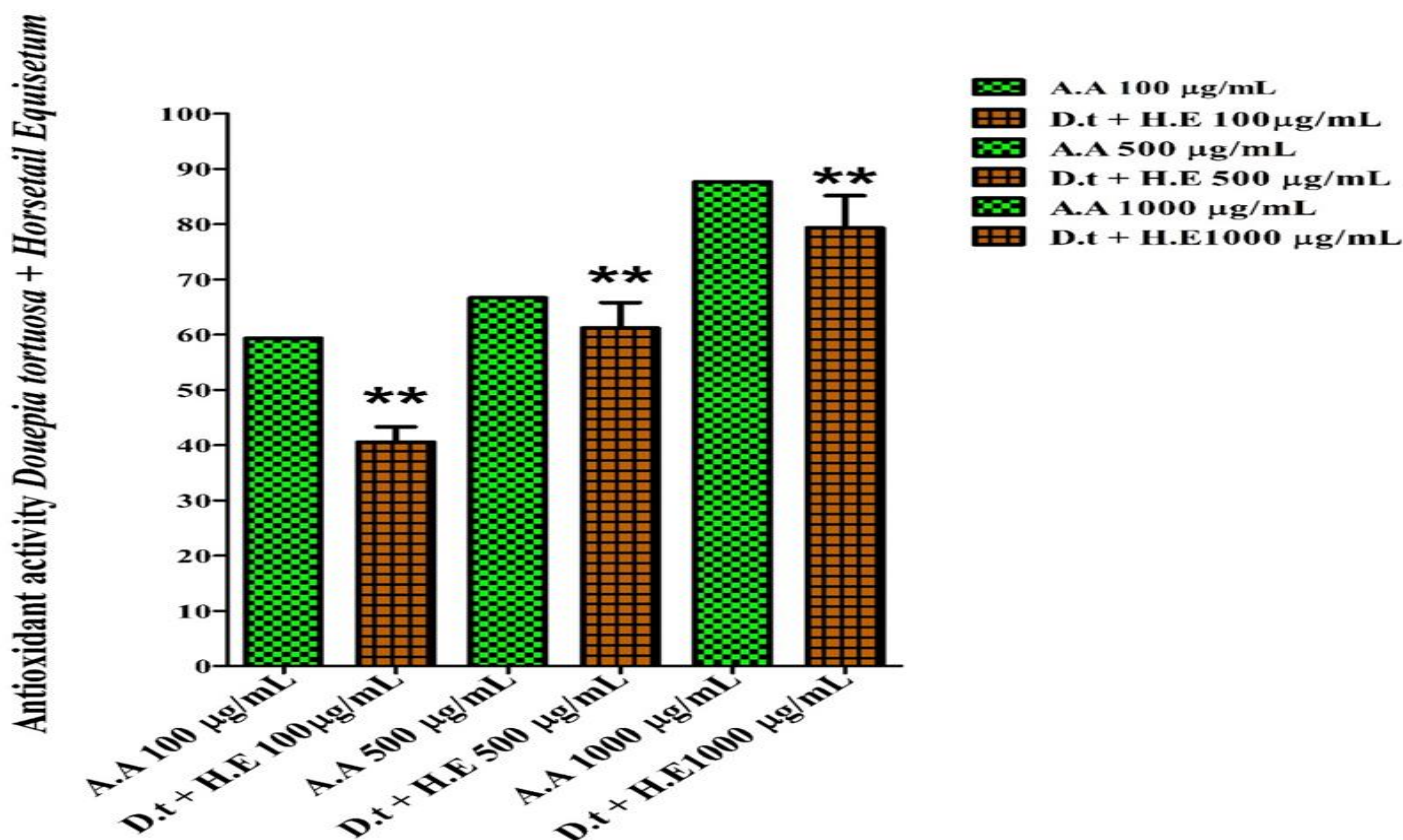


Figure. 3 Represents the *D. tortuosa* and horsetail (*Equisetum arvense*) combine antioxidant potential

DISCUSSION

Oxidative stress is major underlying cause of a number of diseases in human subjects including cancer, which is regarded as the second-leading cause of death worldwide, after heart disease and stroke (14). Redox processes occur when the cell uses oxygen to generate energy (15). During the redox process, a variety of free radicals are produced. Free radicals are a class of reactive oxygen species that includes superoxide anions, hydrogen peroxide, and hydroxyl radicals. Cancer and other chronic disorders can result from their reactions with proteins, lipids, and DNA (16). Natural compounds found in herbs can eliminate harmful radicals and could have anti-oxidant properties, which not only prevent these diseases but can also have therapeutic potential (17). The therapeutic potential of *D. tortuosa* is not well understood. Herein we focused its antioxidant potential on various concentrations. We found that *D. tortuosa* showed 23%, 65% and 78% antioxidant potential on various concentrations, these findings are consistent with previously published reports, showing similar potential at different concentrations (13). Our results suggest that *D. tortuosa* has the capacity to modulate the production of free radicals produced during Redox reactions, which cause various kinds of chronic diseases, including cancer. The anti-inflammatory, antibacterial, antifungal, vasorelaxant, neuroprotective, cardioprotective, and anti-proliferative pharmacological activities of *Equisetum arvense* L. or tea have been documented in a variety of research experiments (11, 18). We found that the horsetail (*Equisetum arvense*) showed 34%, 55%, 62% antioxidant activity on various concentration. Our results described that the horsetail (*Equisetum arvense*) has an antioxidant potential to regulate free radicals which cause various types of chronic disorders. Based on different concentrations, we observed that the horsetail (*Equisetum arvense*) exhibited 34%, 55%, and 62% antioxidant activity. Our findings showed that horsetail (*Equisetum arvense*) possesses antioxidant properties that can regulate free radicals, which are responsible for a number of chronic disorders. Next, we examined the combined antioxidant potential of both plants extracts on various concentrations. We found that mixture of both plants extract showed a significant antioxidant potential 41%, 61% and 80% Our results suggested that a combination of *D. tortuosa* and horsetail (*Equisetum arvense*) has a significant antioxidant potential than individuals. The modulation of free radicals by *D. tortuosa* and horsetail (*Equisetum arvense*) needs more research study.

There is literature available suggesting anti-oxidant potential of the molecules can be used as a therapeutic option, however, there is limitation of the study that these extracts were not tested on cell lines neither on animal models. However robust methodology was used to explore scavenging ability of *D. totuosa* and horsetail (*Equisetum arvense*) is taken as strength of the study.

CONCLUSION

The study showed remarkable anti- oxidant ability of the extract of *D. tortuosa* and horsetail (*Equisetum arvense*), however combined extracts has further enhanced potential. Further cell line and animal model studies are recommended to explore therapeutic potential of these extracts.

Acknowledgment:

The research study was carried out by in the research Laboratory Department of Zoology University of Science and Technology, Bannu, Khyber-Pakhtunkhwa, Pakistan.

Conflict of Interest

Authors declare no conflict of interest.

Ethical consideration

The study was approved by the local Ethical Review Committee.

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