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Antioxidant and Antidiabetic Activity of Ethanolic Extract of *Terminalia Chebula*

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ABSTRACT

Primary antioxidants directly scavenge free radicals, while secondary antioxidants indirectly prevent the development of free radicals through Fenton's reaction. Antioxidant activity is characterised as "a limitation of the oxidation of proteins, lipids, DNA, or other molecules that occurs by blocking the propagation stage in oxidative chain reactions."Phytochemical screening of both extracts indicated the presence of phenolic compounds, flavonoids, saponins, tannins, and steroids, which might contribute to the antidiabetic activity. The research is needed to find whether the ethanolic extract of *terminalia* chebula has antioxidant and antidiabetic activity. The research also fulfils the deficiency of work on comparing its antioxidant and antidiabetic activity of terminalia chebula to compare with its standards.The aim of the research is to find the antidiabetic and antioxidant activity of ethanolic extract of *terminalia* chebula. The methodology adopted in this study was DPPH assay. For antidiabetic activity a total of 5 concentrations of ethanolic extract of *terminalia* chebula was prepared and compared with the standard and for antioxidant activity a total of 5 concentrations was compared to the standard. From the results both shows when the concentration increases the percentage of inhibition also increases when compared to standard in antioxidant activity and antidiabetic activity when concentration increases the percentage of inhibition also increases when compared to standard.

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INTRODUCTION

Terminalia chebula, also known as black- or chebulic myrobalan, is a Terminalia species found in South Asia, ranging from India and Nepal east to southwest China, and south to Sri Lanka, Malaysia, and Vietnam. *Terminalia* chebula is a central component of the Ayurvedic treatment Triphala, which is used to treat kidney and liver problems.[(1)] The dried fruit is also used in Ayurveda as a purported antitussive, cardiotonic, homeostatic, diuretic, and laxative. The triterpenes arjunglucoside I, arjungenin, and the chebulosides I and II have all been isolated from haritaki glycosides.[(2)] Other phenolic compounds include ellagic acid, chebulinic acid, gallic acid, ethyl gallate, punicalagin, terflavin A, terchebin, luteolin, and tannic acid, as well as a coumarin conjugated with gallic acids called chebulin.[(3)] Chebulic acid is a type of phenolic acid found in ripe fruits. The bark can be used to extract luteic acid. The fruits of *Terminalia* chebula contain terflavin B, a form of tannin, as well as chebulinic acid.[(4)] Free radicals react with biological molecules and disrupt cell structure, resulting in diseases such as cancer, renal failure, and ageing, among others.[(5)] The anti-lipid peroxidation, anti-superoxide radical formation, and free radical scavenging activities of 6 extracts and 4 pure compounds of *Terminalia* chebula RETZ were investigated in the present study. Free radicals react with biological molecules and disrupt cell structure, resulting in diseases such as cancer, renal failure, and ageing, among others.[(6)] The anti-lipid peroxidation,

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anti-superoxide radical formation, and free radical scavenging activities of 6 extracts and 4 pure compounds of *Terminalia* chebula RETZ were investigated in the study. Electron spin resonance (ESR) spectrometry was used to assess the four pure compounds' ability to scavenge superoxide radicals.[7] The findings revealed that all of the T. chebula extracts and pure compounds examined had antioxidant activity of varying degrees of potency. Each pure compound's antioxidant activity was extracted from various pathways and was thought to be unique. The findings revealed that all of the extracts examined had antioxidant activity of varying degrees of potency.[8] The antioxidant activity of casuarina, chebulanin, and chebulinic acid isolated from *T. chebula* was also investigated in this research. The antioxidant activities of water, methanol, and 95 percent ethanol extracts of *T. chebula*'s air-dried fruit were reported by Chang and Lin. The antioxidant activities of water, methanol, and 95 percent ethanol extracts of T. chebula's air-dried fruit were reported by Chang and Lin. The antioxidant function of the polyphenolic-rich extract of T. chebula fruit, on the other hand, has never been tested.[9] The goal of this study was to see how successful the polyphenolic extract of T. chebula fruits against scavenging free radicals.[10]Our team has extensive knowledge and research experience that has translated into high quality publications.[11-30] A regular curve of ascorbic acid was used to measure ascorbic acid equivalents. The experiment was repeated three times, with the findings expressed in g equivalents of ascorbic acid per g/mL of extract.[31] The aim of the research is to find whether the ethanolic extract of *terminalia* chebula has antioxidant and antidiabetic activity. The research also fulfils the deficiency of work on antioxidant and antidiabetic activity of *terminalia* chebula.

MATERIALS AND METHODS

Ethanolic extract of *Terminalia chebula* was derived from its dried seeds. For antioxidant activity DPPH assay was used to test the antioxidant activity of plant extract. Diverse concentrations (10-50 µg/mL) of ethanolic extract of *terminalia* chebula interceded zinc oxide nanoparticle was mixed with 1 ml of 0.1 mM DPPH in methanol and 450 µL of 50 mM Tris HCl buffer (pH 7.4) and incubated for 30 minutes. Later, the reduction in the quantity of DPPH free radicals was assessed dependent on the absorbance at 517 nm. BHT was employed as control. Alpha amylase inhibition was determined by quantifying the amount of maltose liberated during the experiment. The method reported by Bhutkar and Bhise was with different concentrations of nanoparticles (10-50µL) were preincubated with 100µL of alpha amylase solution at room temperature for 30 mins.[32] 100µL solution of starch was further added to it and the mixture was incubated at room temperature for 10 minutes. 100µL of 96mM DNSA reagent was added to stop the reaction and the solution was heated in a water bath for 5 minutes. Control was maintained where the equal quantity of enzyme extract was replaced by sodium phosphate buffer maintained at a pH value of 6.9. Reading was measured at 540 nm. And the further calculations were made and the results were done.

RESULTS

See Figures 1 and 2.

DISCUSSION

The antidiabetic activity of ethanolic extract of *terminalia* chebula, At 10µL concentration the % of inhibition was 16% and the standard will be 47%, at 20µL concentration the % of inhibition was 55% and for standard 60%, at 30µL concentration the % of inhibition was 82% and for standard 71%, at 40µL concentration the % of inhibition was 83% and for standard 77%, at 50µL concentration the % of inhibition was 85% and for standard 83%. The antidiabetic activity of ethanolic extract of terminalia chebula was seen in higher concentration than in lower concentration. When concentration increases the percentage of inhibition also increases. The plant extracts and its mediated nanoparticles are showing good antioxidant activity.[12-16]

The antioxidant activity of ethanolic extract of *terminalia* chebula, At 10µL concentration the % of inhibition was 18% and for standard 76%, at 20µL concentration the % of inhibition was 45% and for standard 78%, at 30µL concentration the % of

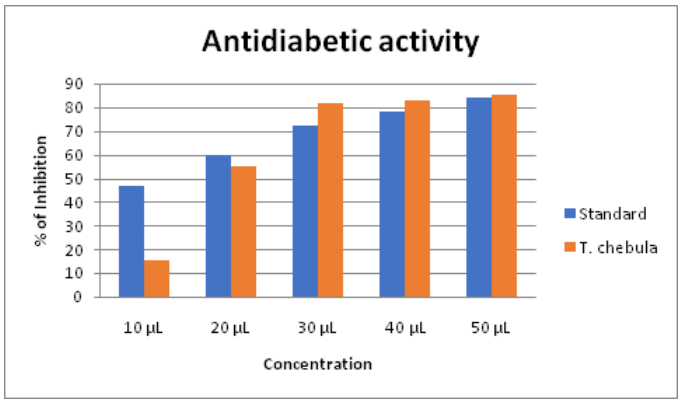

FIG. 1: The bar graph shows the antidiabetic activity of ethanolic extract of *terminalia* chebula. At 10µL concentration the % of inhibition was 16% and the standard will be 47%, at 20µL concentration the % of inhibition was 55% and for standard 60%, at 30µL concentration the % of inhibition was 82% and for standard 71%, at 40µL concentration the % of inhibition was 83% and for standard 77%, at 50µL concentration the % of inhibition was 85% and for standard 83%.

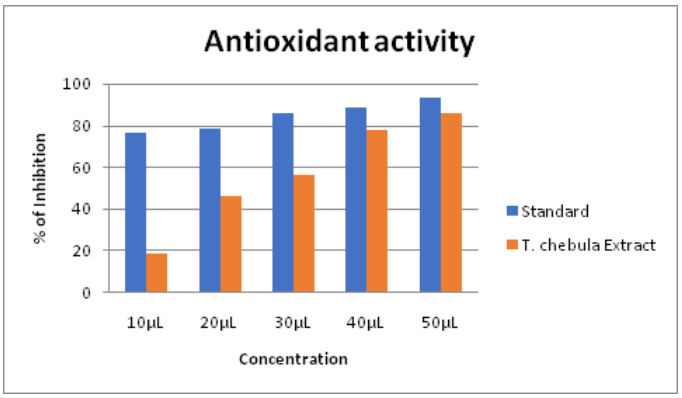

FIG. 2: The bar graph represents the antioxidant activity of ethanolic extract of terminalia chebula. At 10µL concentration the % of inhibition was 18% and for standard 76%, at 20µL concentration the % of inhibition was 45% and for standard 78%, at 30µL concentration the % of inhibition was 55% and for standard 85%, at 40µL concentration the % of inhibition was 78% and for standard 88%, at 50µL concentration the % of inhibition was 87% and for standard 92%.

inhibition was 55% and for standard 85%, at 40µL concentration the % of inhibition was 78% and for standard 88%, at 50µL concentration the % of inhibition was 87% and for standard 92%. Compared to the standard the ethanolic extract of terminalia chebula shows less activity but has good antioxidant properties at higher concentration. The increased concentration of plant extract or nanoparticles shows higher % of inhibition.[17-22]

CONCLUSION

Thus, from the above study the ethanolic extract of *terminalia* chebula has high antioxidant and antidiabetic activity when compared to standard at high concentration. Further studies have to be done to make better understanding on antidiabetic and antioxidant activity of ethanolic extract of *terminalia* chebula.

Declaration on Publication Ethics

The authors state that they adhere with COPE guidelines on publishing ethics as described elsewhere at https://publicationethics.org/. The authors also undertake that they are not associated with any other third party (governmental or non-governmental agencies) linking with any form of unethical issues connecting to this publication. The authors also declare that they are not withholding any information that is misleading to the publisher in regard to this article.

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