Invitro antioxidant and antidiabetic properties of corchorus olitorius leaves and seed ethanol extract

ABSTRACT

Background: Medicinal herbs have been widely used in therapeutic applications for various diseases in today's world. These herbs are used by village folk medicine, but without scientific evidence. Corchorus olitorius, also known as jute mallow is a herb that possesses many curing effects like pain, fever and many other diseases like cystitis and tumour etc.

Objective: The objective of the study was to elucidate the effects of corchorus olitorius as antioxidant and antidiabetic.

Materials and method: In Vitro Evaluation of antidiabetic and antioxidant properties were conducted using various tests. Alpha - amylase inhibitory activity and alpha glucosidase inhibitory activity for antidiabetic activity and DPPH free radical scavenging assay for antioxidant property was performed. The results were compared with standard metformin and aspirin respectively.

Results: Results showed a dose dependent increase in alpha amylase inhibitory activity with concentration ranging from 100-500 micro/ml.
Results showed a dose dependent increase in alpha glucosidase inhibitory activity with concentration ranging from 100-500 micro/ml.
Results showed a dose dependent increase in DPPH free radical scavenging activity with concentration ranging from 100-500 micro/ml.

Conclusion: The results showed an innovative finding that ethanolic seed extract of corchorus olitorius has great potential as antidiabetic and antioxidant property which can be used as novel innovative natural medication in the medical field rather than using any artificial synthetic drug which causes many other side-effects like allopathic drugs.

Keywords: Antidiabetic, Anti Inflammatory, Antioxidant, innovative, medicine

Running title: Evaluation of antioxidant and antidiabetic property of Corchorus olitorius leaves and seed ethanol extract.

Introduction

Medicinal herbs are extensively used in medical science because of their wide spectrum uses. 70% of Indian population uses medicinal herbs for general ailment. Mostly used as traditional medicines in India.(1) Corchorus olitorius is also known as jute mallow or nalta jute and possesses many curing effects.(2). Traditionally its leaves are used in the treatment of pain, fever and many other diseases like cystitis and tumours.(3). Cold infusion restores strength and appetite.(4,5). Oil of Corchorus olitorius has estrogenic effects. Seeds contain many cardiac phytochemicals and hydrogen cyanides like corchoroside A and corechoroside B.(6)

Jute is also rich in ascorbic acid and is consumed by many in the form of vegetables in taiwan. The high content of carotenoids and alpha tocopherol makes Corchorus olitorius a rich source of many properties which can be used for treatments.(7). Jute also contains high levels of all essential amino acids except methionine. Phenolics in Jute are much richer than any other vegetables. (2,8). Free radicals are very reactive substances which are produced in the body after processes like metabolism or exposure to x-rays.(9) These are like superoxide, hydroxyl radical, singlet oxygen, and these move in the body and cause destruction of the body cells.(10) The enzymes which are produced in the body like antioxidant enzymes, these scavenge or destroy the free radicals which are harmful for our body.(11,12)
The limitations of the study was that only few methods were used to check the activity with specific concentrations.
This study will scientifically prove the usage of Corchorus olitorius as folklore medicine without any scientific approach but because of the tradition they used.

Materials and methods.

Assessment of in vitro antidiabetic activity

α-amylase inhibitory activity

α-amylase inhibitory activity of extract of Corchorus olitorius and fractions was done according to the standard method with some minor modification (Ademiluyiand Oboh, 2013). In plate with 96 wells, reaction mixture of phosphate buffer around 50 µl(100 mM, pH = 6.8), 10 µl α–amylase (2 U/ml), and 20 µl of different concentrations of plant extract (0.1 to 0.5mg/ml) and was pre incubated at 37°C for about 20 mins. After that, the 20 µl of 1% soluble starch (100 mM phosphate buffer pH 6.8) was mixed as a substrate and was incubated at 37°C for half an hour; 100 µl of the 100 µl of the DNS color reagent was then added and

boiled for 10 min. The absorbance of the resulting mixture was observed and measured at 540 nm with the help of Multiplate Reader (Robonik). Acarbose at different concentrations (0.1–0.5 mg/ml) was taken as a standard. Without test (extract and fractions) substance was found out in parallel as control and every experiment was performed in triplicates. The results were formulated in the form of percentage inhibition, which was calculated using the formula

Inhibitory activity (%) = (1 − As/Ac) ×100here,

As is that the absorbance within the presence of test substance and Ac is that the absorbance of control

α-glucosidase inhibitory activity

α-glucosidase inhibitory activity of extract and fractions was performed according to the standard method with minor modification (Shai et al., 2011). In a plate with 96 wells, reaction mixture containing 50 µl phosphate buffer (100 mM, pH = 6. 8), 10 µl alpha-glucosidase (1 U/ml), and 20 µl of varying concentrations of plant extract (0.1 to 0.5mg/ml) was pre- incubated at 37°C for 15 min. Then, 20 µl P-NPG (5 mM) was mixed as a substrate and incubated for about 37°C for 20 min. The reaction was brought to an end by adding 50 µl Na2co3 (0.1 M). The absorbance of the released p-nitrophenol was measured at 405 nm employing a Multiplate Reader. Acarbose at various concentrations (0.1–0.5 mg/ml) was included as a typical . Each experiment was performed in the form of triplicates. The results were expressed as in the form of percentage inhibition, which was calculated with the formula,

Inhibitory activity (%) = (1 − As/Ac) ×100

Where,

As is that the absorbance within the presence of test substance and Ac is that the absorbance of control.

Assessment of antioxidant properties

DPPH radical assay The DPPH free radical scavenging assay was performed by LiyanaPathirana and Shahidi method [Kikuzaki and Nakatan, 1993]. 200 µL of 0.1 mM DPPH prepared in methanol was added to 100 µL of the plant compounds with an increase in concentration (0.1 to 0.5mg/ml). The resulting mixture was incubated at temperature within the dark for a quarter-hour . Absorbance was observed at 517 nm. BHT was taken as a positive control. The experiment was administered in triplicates and percentage inhibition of the DPPH radical scavenging activity was calculated.

% Inhibition=((A0 -A1)/A0)*100

Where A0is the absorbance of the control and A1 is the absorbance of the sample.

Statistical analysis

The data were analysed statistically using one way analysis of variance (ONE-WAY ANOVA). Duncan Multiple range test was used to analyze the statistical significance between groups. The levels of significance were considered at the levels of $p<0.05$.

Results

Results of alpha amylase inhibitory activity of Corchorus olitorius leaf extract showed a dose dependent increase in alpha amylase inhibitory activity with concentration ranging from 100-500 micro/ml.

Results of alpha amylase inhibitory activity of Corchorus olitorius seed extract showed a dose dependent increase inhibition with concentration ranging from 100-500 micro/ml.

Results of alpha glucosidase inhibitory activity of Corchorus olitorius leaf extract showed a dose-dependent increase in inhibition with concentration ranging from 100-500 micro/ml**.**

Results of alpha glucosidase inhibitory activity of Corchorus olitorius seed extract showed a dose-dependent increase in inhibition with concentration ranging from 100-500 micro/ml**.**

Results of DPPH free radical scavenging activity of Corchorus olitorius showed a dose-dependent increase in inhibition with concentration ranging from 100-500 micro/ml.

Results of DPPH free radical scavenging activity of Corchorus olitorius seed extract showed a dose-dependent increase in inhibition with concentration ranging from 100-500 micro/ml.

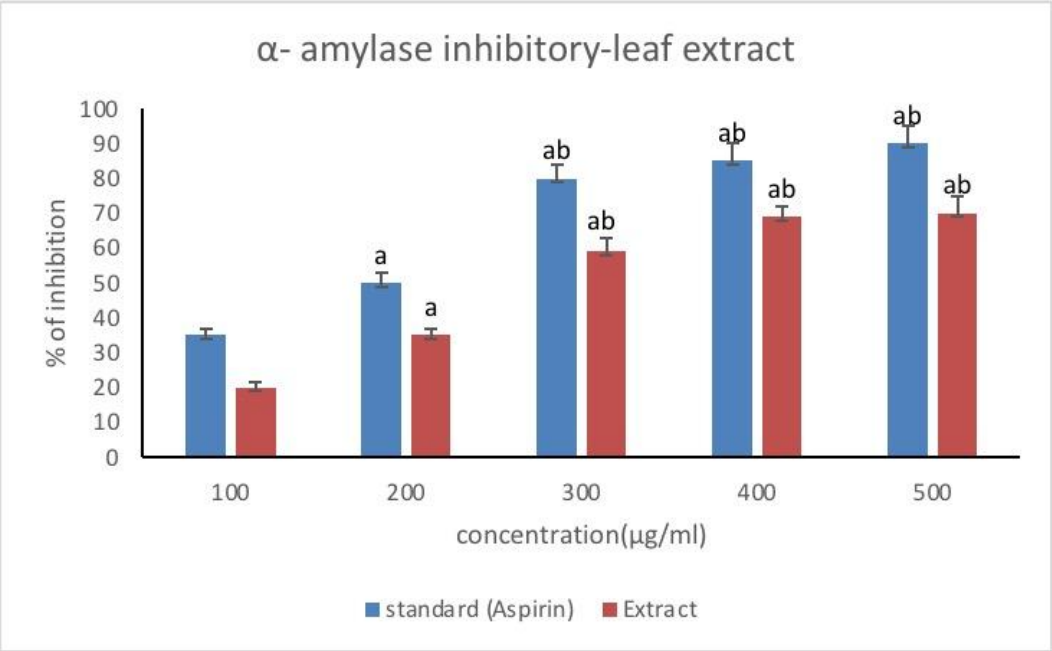

Figure 1: Figure 1 represents alpha amylase inhibitory activity of leaf extract. Each bar represents the mean ± SD of 6 observations. Significance at the levels of $P < 0.05$.a-compared with 100 µg; b-compared with 200 µg; c-compared with 300 µg. Blue colour denotes standard drug and red colour denotes the extract.

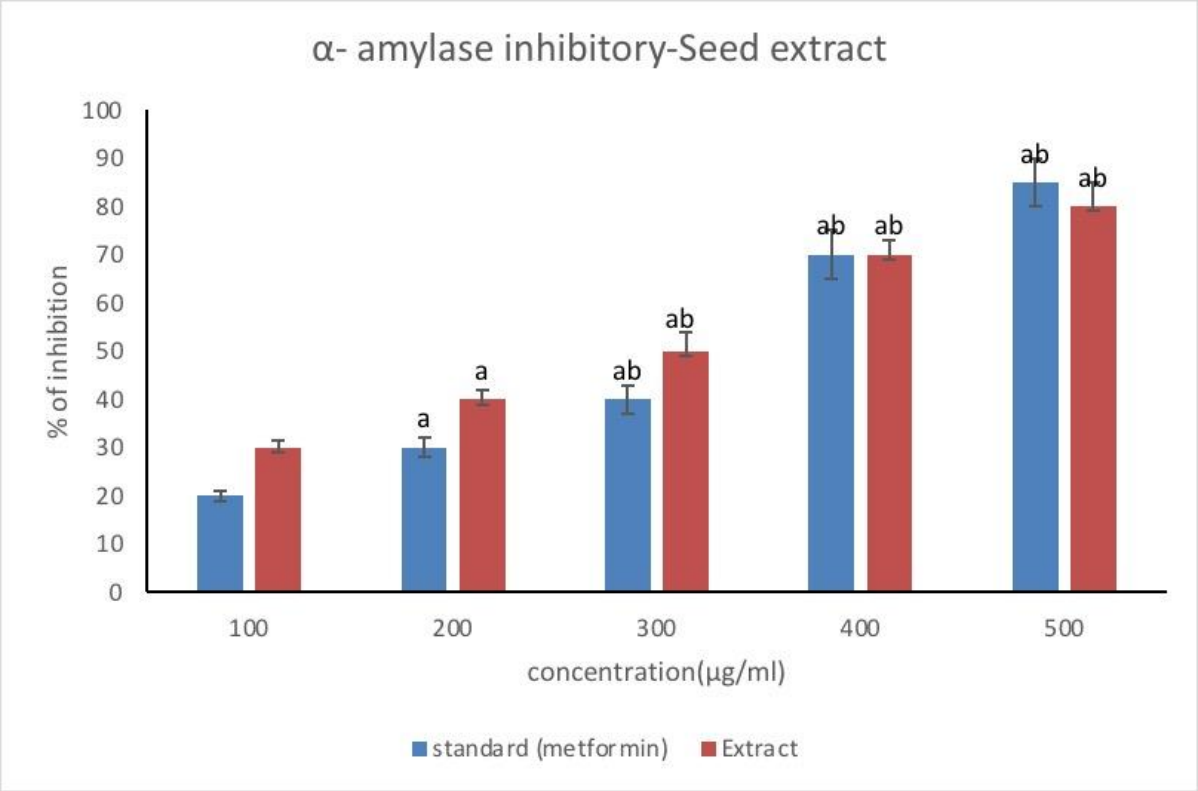

Figure 2: Figure 2 represents alpha amylase inhibitory assay of seed extract. Each bar represents the mean ± SD of 6 observations. Significance at the levels of $P < 0.05$.a-compared with 100 µg; b-compared with 200 µg; c-compared with 300 µg. Blue colour denotes standard drug and red colour denotes the extract.

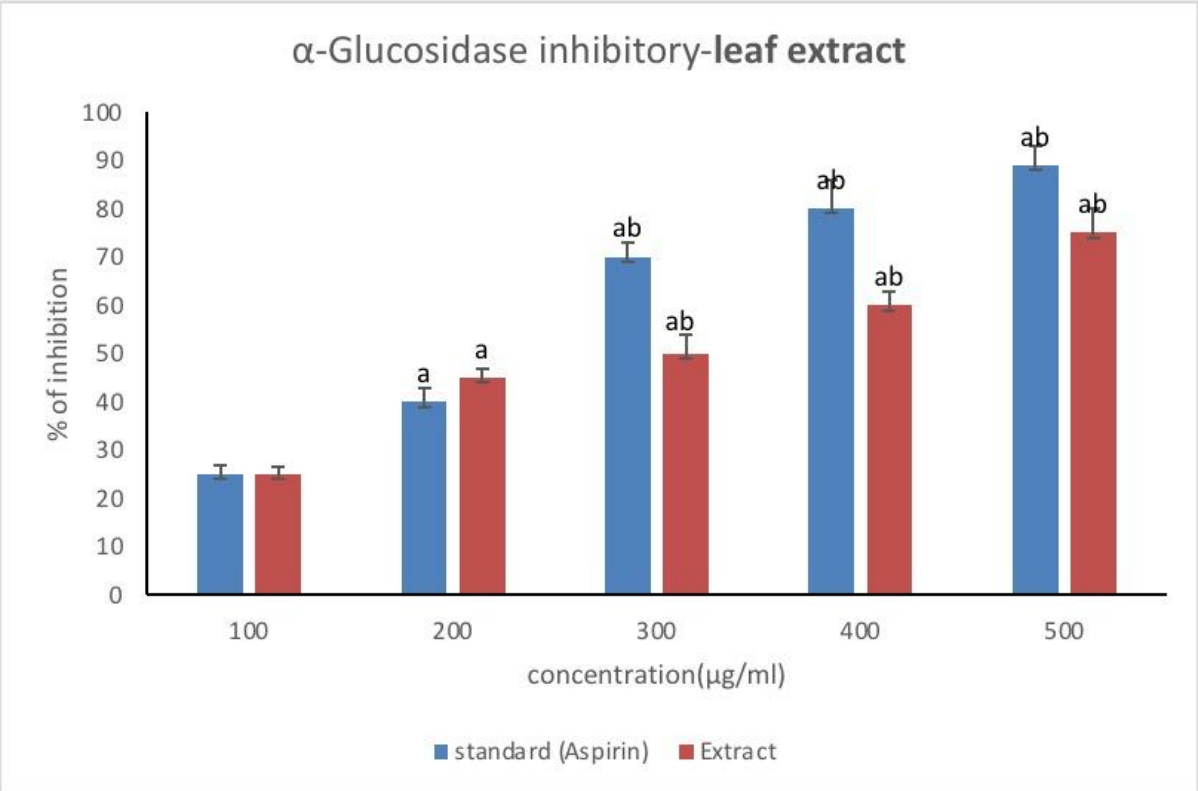

Figure3: Figure 3 alpha Glucosidase inhibitory assay of leaf extract. Each bar represents the mean ± SD of 6 observations. Significance at the levels of P < 0.05.a-compared with 100 µg; b-compared with 200 µg; c-compared with 300 µg. Blue colour denotes standard drug and red colour denotes the extract.

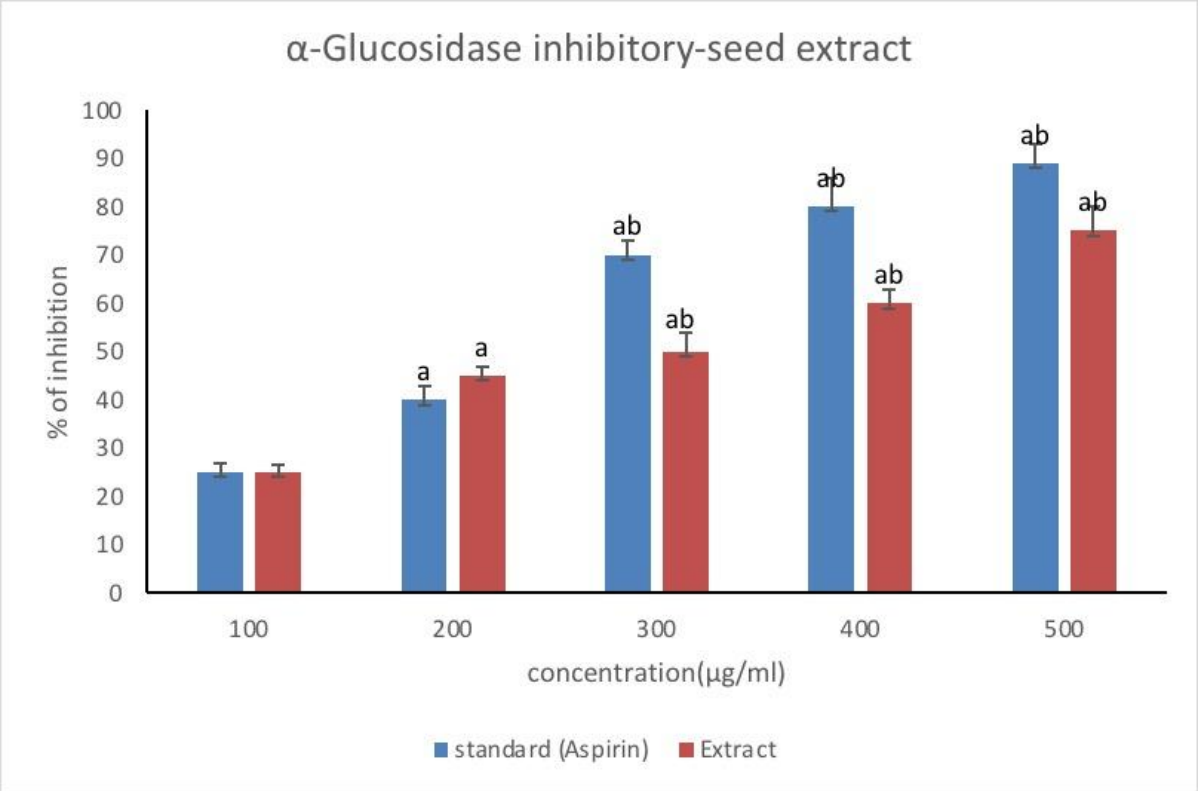

Figure 4: Figure 4 represents the alpha Glucosidase inhibitory assay of seed extract. Each bar represents the mean ± SD of 6 observations. Significance at the levels of P < 0.05.a-compared with 100 µg; b-compared with 200 µg; c-compared with 300 µg. Blue colour denotes standard drug and red colour denotes the extract.

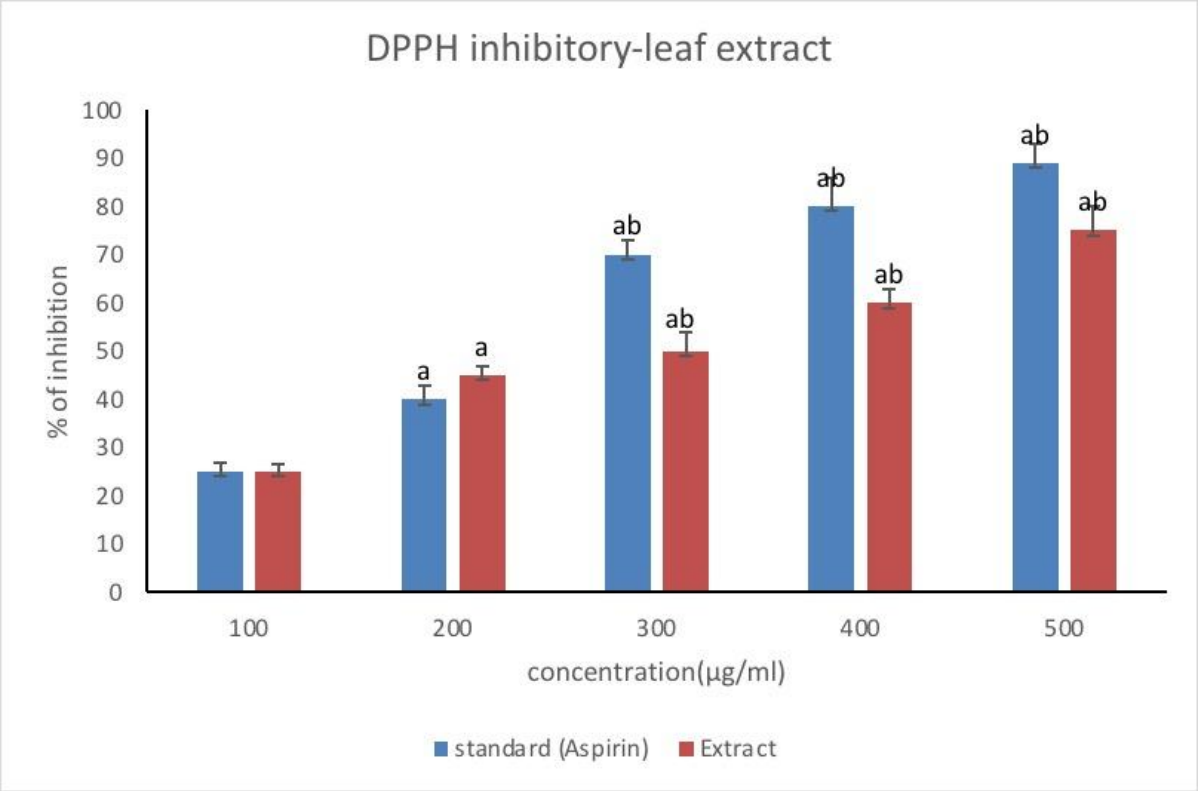

Figure 5: Figure 5 represents DPPH inhibitory assay of leaf extract. Each bar represents the mean ± SD of 6 observations. Significance at the levels of $P < 0.05$.a-compared with 100 µg; b-compared with 200 µg; c-compared with 300 µg. Blue colour denotes standard drug and red colour denotes the extract.

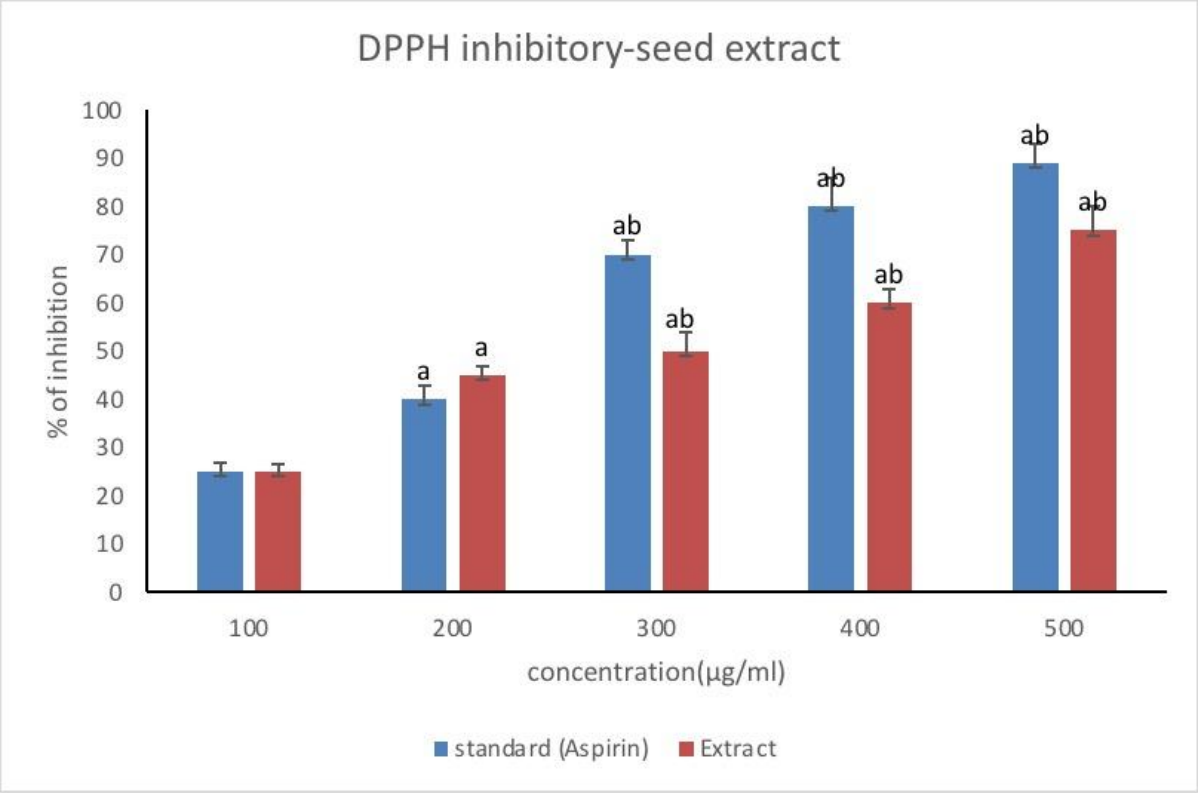

Figure 6: Figure represents 6 DPPH inhibitory assay of seed extract. Each bar represents the mean ± SD of 6 observations. Significance at the levels of P < 0.05.a-compared with 100 µg; b-compared with 200 µg; c-compared with 300 µg.Blue colour denotes standard drug and red colour denotes the extract.

Discussion

The present study was done to evaluate the anti-inflammatory, anti-diabetic and antioxidant properties of Corchorus olitorius. AECO(Aqueous Extract of Corchorus Olitorius) has a peripheral along with central analgesic effects and which comes out in a concentration independent manner.(13,14)

Phytochemical content of seed extract has alkaloids, saponins which shows hypoglycaemic effect, and other great potential treating effects(15). Some findings suggest the use of Corchorus olitorius as body cooling drink(4,16). DPPH free radical scavenging is performed against lipid oxidation effects of antioxidants on DPPH radical scavenging was assumed because of the hydrogen donating ability.(17,18) Corchorus olitorius leaf has higher phenolic content than many other vegetables like spinach, collard greens, green cabbage, and tomatoes.(19) The results also match with previous articles with DPPH free scavenging ability. (20)The working of the seed extract is related to the phytochemical content of the extract.(21,22) Of these alkaloids, flavonoids, saponins have shown to have hypoglycaemic effects.(23,24) C. olitorius is used as vegetables and in traditional medicine for the management of some diseases.(25,26)

The presence of coumarin compounds in C. olitorius leaves may be responsible for the inhibition activity.5-caffeoylquinic acid,(27,28) quercetin and the related glycosides found in

jute show good antioxidative capabilities and DPPH scavenging effects.(29,30) Flavonoids is attributed to its anti diabetic properties.(31,32) Thus further studies on identification on bio active compounds would add confirmation to the present findings.Certain limitations like small-scale testing and only few standard drugs are used for respective tests.

Conclusion

The results showed that ethanolic seed extract of Corchorus olitorius has great potential as antidiabetic and antioxidant properties which can be used as natural medication in the medical field rather than using allopathic , synthetic drugs with many other side-effects.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

NOTE:

The study highlights the efficacy of "traditional medicine" which is an ancient tradition, used in some parts of India. This ancient concept should be carefully evaluated in the light of modern medical science and can be utilized partially if found suitable.

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