Research Article

Evaluation of In-Vitro Antidiabetic Activity of Different Extracts of *Capparis decidua* Edgew (KER) Root and Stem

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ABSTRACT

In the present study, investigated in vitro antidiabetic activity of different solvent extracts (Aqueous, Acetone, Methanol, Hexane and Chloroform) of stem and root part of Capparis decidua. The acetone, methanol, hexane and chloroform extracts of Capparis decidua root was highly inhibited the Alpha-amylase activity 72.01%,65.79%,76.56% and 72.32% respectively differentiate to stem extracts. The methanol and chloroform extracts of Capparis decidua stem was highly inhibited the Alpha-glucosidase enzyme activity 91.17% and 95.83% respectively differentiate to root extracts. Thus, considering its relative antidiabetic strength, these all extracts are functionally therapeutic agents for treating and control of diabetes.

Keywords: *Capparis decidua*, Antidiabetic activity, Different extracts of Root, Stem, Diabetes.

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INTRODUCTION

Diabetes mellitus is a customary and extremely widespread disease affecting the citizens of both developed and developing countries. It is evaluate that 25% of world residents is affected by this disease[1]. Diabetes mellitus is caused by the abnormality of carbohydrate metabolism which is connected to low blood insulin level or insensitivity of target organs to insulin[2,3]. Two enzymes that play a key role in diabetes are Alpha-amylase and Alpha-glucosidase. Alpha-amylase is a prominent enzyme found in the pancreatic juice and saliva which breaks down large insoluble starch molecules into absorbable molecules. On the other hand, mammalian Alpha-glucosidase in the mucosal brush border of the small intestine catalyzes the end step of digestion of starch and disaccharides that are abundant in human die[4,5,6]. *Capparis decidua* (Forsk.) Edgew (Syn. *Capparis aphylla* Roth.) belonging to the family *Capparidaceae*. It is traditionally acclaimed for its vast medicinal and inconsistency importance[7]. Stem powder used for treatment of Asthma, cough, rheumatism, analgesic, diaphoretic, and alexeterie, hypoglycemic and antidiabetic agents in lowering oxidative stress in diabetes. Root powder used for treatment of Diuretic, paralysis, enlarge, spleen and tubercular gland in rheumatism, expectorant, analgesic reduction of triglycerides, lipids, phospholipid in plasma[8,9,10]. The objective of the current study of the evaluation of in vitro antidiabetic activity of different extracts of *Capparis decidua* Edgew (KER) root and stem.

MATERIALS AND METHODS

Plant Material

Plant material Stem and Root of *Capparis decidua* (Forsk.) Edgew was obtain from desert area in Gujarat, India.

Processing of plant material

The Stem and Root were washed in running tap water several times for remove the dust particle and then dried under shade 2-3 weeks. The dried material was taken and ground using electric blender mixture to obtain a fine powder. The powder sample were stored in a clean glass bottle until needed for analysis.

Preparation of extracts

The dried and ground powder 10 gm were successively extracted in 100 ml with different solvents like Aqueous, Acetone, Methanol, Hexane and Chloroform for 24 hrs stand at room temperature. Extracted sample was filtered with whatman No.1 filter paper. The filtrate extract was stored in refrigerator at 4^0C. The filtrate was used for the antidiabetic activity.

α-Amylase Inhibitory Activity

The α-amylase inhibitory activity of *C. decidua* was determined by a slightly modified method[11]. Reaction mixture contained 20 µL of α-amylase (0.05 U/µL), 20 µL of sample and 250 µL of 2% starch solution in 0.1 M sodium phosphate buffer (pH 6.9). The reaction was carried out at 37°C for 10 min and terminated by the addition of 200 µL of DNS reagent (1% 3,5-dinitrosalicylic acid and 12% sodium potassium tartrate in 0.4 M NaOH). The reaction mixture was heated for 15 min at 100 °C and then diluted

with 5 mL of distilled water. The α-amylase activity was determined by measuring absorbance at 540 nm. Acarbose was used as positive control. The percentage inhibitory effect of compounds was calculated by the formula:

$$\% \text{ Inhibition} = \frac{(\text{control absorption} - \text{sample absorption})}{(\text{control absorption})} \times 100$$

α-Glucosidase Inhibitory Assay

Antidiabetic activity was measured by alpha-glucosidase inhibitor assay [12].

1 mL of 3 mM p-nitrophenyl α-D-glucopyranoside (pNPG) in 0.2 M sodium phosphate buffer (pH 6.8) was added as a substrate to the mixture of 50 µL of α-glucosidase (0.15 unit/mL), and 50 µL of sample to start the reaction. The reaction was conducted at 37 °C for 15 min and stopped by the addition of 750 µL of 0.1 M Na2CO3. The α-glucosidase activity was assessed by measuring the release of p-nitrophenol from pNPG at 405 nm. Acarbose was used as positive control. The percentage inhibitory effect of compounds was calculated by the formula:

$$\% \text{ Inhibition} = \frac{(\text{control absorption} - \text{sample absorption})}{(\text{control absorption})} \times 100$$

Statistical analysis

Statistical analysis of the data was carried out using single factor one-way analysis of variance (ANOVA). (M.S Office, Excel) to determine the acceptability of the "Evaluation of In-vito Antidiabetic Activity of Different Extracts of *Capparis decidua* Edgew (KER) Roots and Stem". The significant level of **P≤0.01,*P≤0.05 and P≥0.05 and F value were consider.

RESULTS AND DISCUSSION

The carbohydrate metabolic disorder may causes various health problem including diabetes. Diabetes mellitus is mainly due to the lack of insulin secretion or action. The intestinal digestive enzyme Alpha-amylase plays an important role in the carbohydrate digestion.

The results of in-vitro antidiabetic activity are evaluated against Alpha-amylase and Alpha glucosidase and standard drug acarbose. Acarbose is commercially available enzyme inhibitor for Type-II diabetes. In the present study Aqueous, Acetone, Methanol, Hexane and Chloroform extracts of *Capparis decidua* stem and root are shown in Table and Fig 1 and 2.

Alpha – amylase activity was highest in root extracts of Acetone, Methanol, Hexane and Chloroform (72.01%,65.79%,76.56% and 72.8%) respectively where as in stem extracts. Aqueous was higher 82.12%. There was highly significant difference (P≤0.01). Acarbose used as a control it's inhibition was 78.84% for Alpha – amylase.

Table 1: Alpha –amylase inhibition% by different solvent extracts of stem and root of *Capparis decidua*

Different Parts of *Capparis decidua*	Plant extracts Alpha amylase Inhibition (%)					
	Aqueous	Acetone	Methanol	Hexane	Chloroform	Acarobose
Stem	82.12 ± 0.25	63.37 ±0.34	55.38 ±0.58	59.19 ±0.46	69.96 ±0.34	78.84 ±8.73
Root	74.51± 0.22	72.01 ±0.55	65.79 ±0.46	76.56 ±1.08	72.38 ±0.77	
F- value	1545.14	535.53	593.05	653.12	24.75	
P- value	*HS	*HS	*HS	*HS	*HS	

Mean value of three observation ± SD Value sharing a common super script within a column are significantly different. S = Significant different * P ≤ 0.05. HS = Highly Significant different ** P ≤ 0.01. NS = Non Significant different ≥ 0.05.

Table 2: Alpha –glucosidase inhibition% by different solvent extracts of stem and root of *Capparis decidua*

Different Parts of *Capparis decidua*	Plant extracts Alpha- glucosidase Inhibition (%)					
	Aqueous	Acetone	Methanol	Hexane	Chloroform	Acarobse
Stem	77.22±0.03	84.44±0.03	91.17±0.03	62.60±0.02	95.83±0.02	73.10±1.15
Root	76.45±0.05	87.33±0.03	73.67±0.02	67.38±0.50	79.22±0.03	
F-value	509.76	19762.57	841110.8	269.41	568516	
P-value	*HS	*HS	*HS	*HS	*HS	

Mean value of three observation ± SD Value sharing a common super script within a column/row are significantly different. S = Significant different * P ≤ 0.05. HS = Highly Significant different ** P ≤ 0.01. NS = Non Significant different ≥ 0.05.

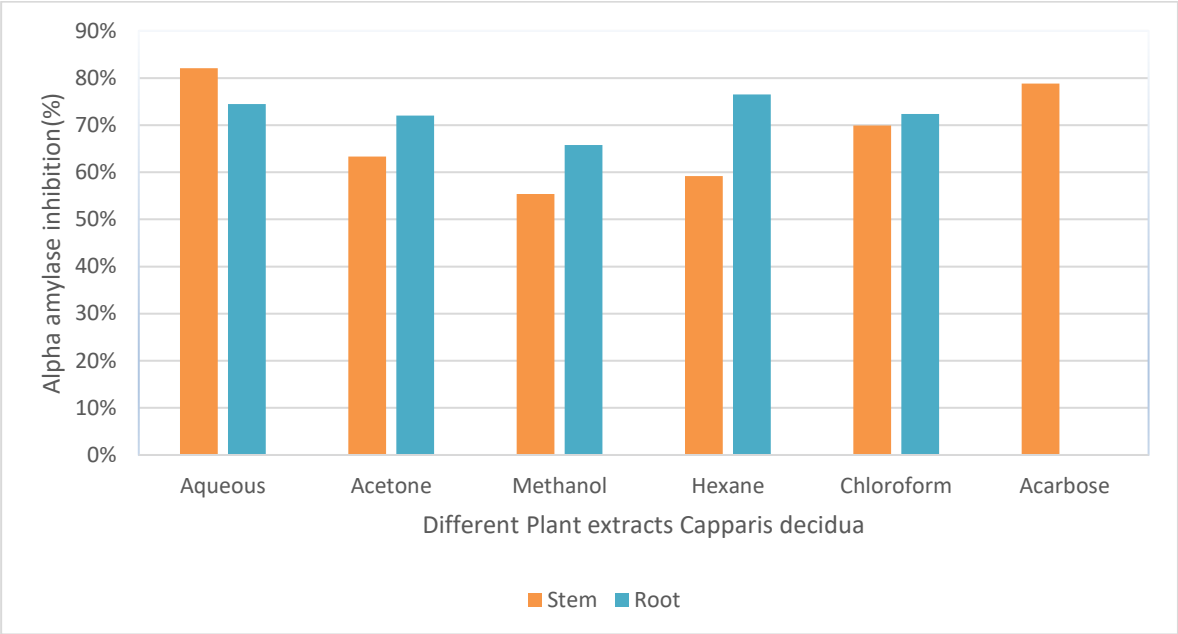

Figure 1: Alpha –amylase inhibition% by different solvent extracts of stem and root of *Capparis decidua*

Alpha–glucosidase activity highest in stem extracts of Aqueous, Methanol and Chloroform (76.45%, 73.67% and 79.22%) respectively there was highly significant difference (P≤0.01) where as in root extracts of Acetone and Hexane was (8.33% and 67.38%) respectively. There was also highly significant difference (P≤0.01). Acarbose inhibition was 73.10% for Alpha-glucosidase.

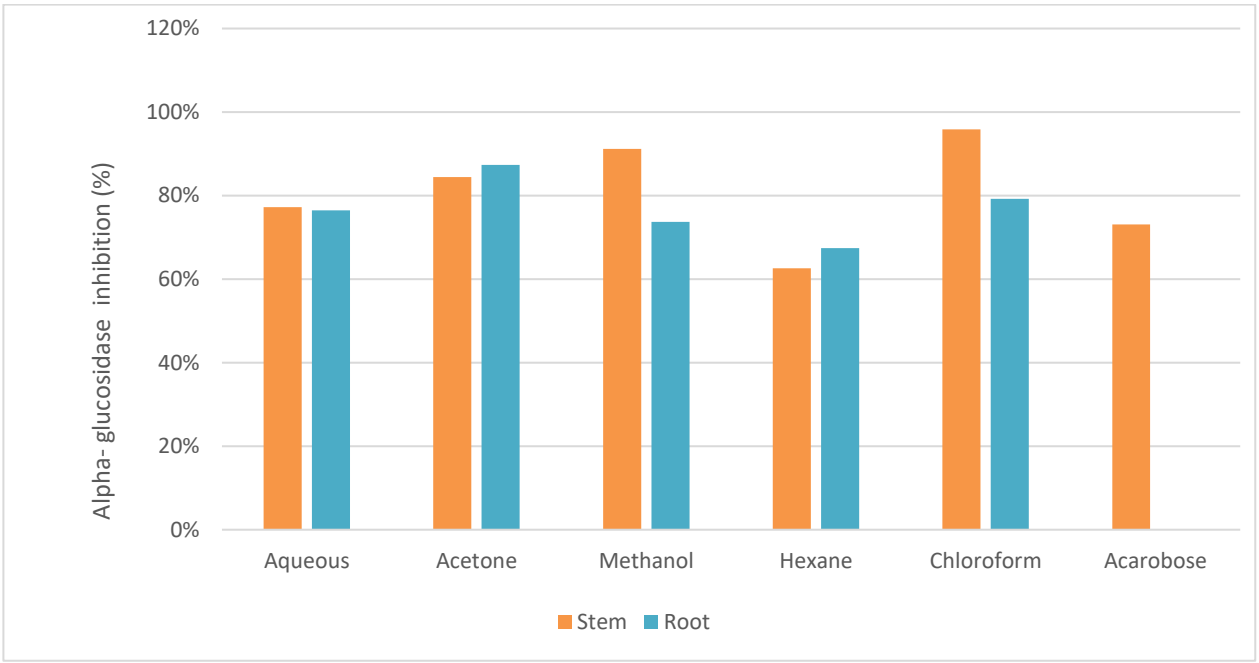

Figure 2: Alpha –glucosidase inhibition% by different solvent extracts of stem and root of *Capparis decidua*

CONCLUSION

Herbal remedies are widely used for the treatment of Type-II diabetes mellitus. The present work finding that extracts of root and stem of *Capparis decidua* inhibits both Alpha-amylase and Alpha- glucosidase enzyme in vitro antidiabetic activity. Aqueous extracts of stem and hexane extracts of root was found higher Alpha-amylase activity. Moreover chloroform extracts of *Capparis decidua* stem was found higher Alpha-glucosidase activity. This study provides scientific evidence of their anti-diabetic effects. They can be further analysed to develop anti-diabetic drugs free from harmful side effects.

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