

## Antibacterial Study and Effect of Ethanolic Extracts of *Syzygium cumini* Seeds Powder on Glucoamylase *in vitro*

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### Abstract

Antibacterial activity against *E. coli*, *B. subtilis*, *P. aeruginosa* and *S. aureus* and inhibitory effect on glucoamylase of ethanolic extracts isolated at different temperatures from seeds of *Syzygium cumini* was investigated *in vitro*. All four strains were observed with moderate to good antibacterial activity. The ethanolic extract isolated at 20°C showed maximum inhibition (50%) of glucoamylase activity. Thus we report the ethanolic extract of *Syzygium cumini* seeds is antibacterial and also potent inhibitor of glucoamylase. Hence may be hypoglycemic function in diabetes type-2.

**Key words:** *Syzygium cumini*, Glucoamylase, Antibacterial, Glucoamylase inhibitor, Hypoglycemic Diabetes type-2

### INTRODUCTION

In traditional medicinal systems of India, different parts of the plant have been claimed to have medicinal properties. The large number of herbal products including several metals and minerals has been reported for the care of diabetes mellitus in ancient literature<sup>1</sup>. The plant drugs are considered to be less toxic and free from side effects than synthetic drugs<sup>2</sup>. The *Syzygium cumini* (jamun) is a large evergreen tree, grown widely in the indagangetic plains and also in the Cauvery delta of Tamilnadu<sup>3</sup>. The jamun belongs to the family Myrtaceae and is botanically identified as *Syzygium cumini* Linn<sup>4</sup>. *Syzygium cumini* (Jamun) seeds have hypoglycaemic<sup>5,6,7</sup>, anti-inflammatory<sup>8</sup>, antipyretic<sup>9</sup>, psychopharmacological<sup>10</sup>, hypolipidaemic<sup>11</sup>, and antioxidant<sup>12,13, 14</sup> activities. It is reported that the jamun seed extracts given to animals with 5 g/Kg body weight was more effective than glibenclamide<sup>6</sup>, an anti-diabetic or hypoglycemic drug mostly given orally in case of diabetes type-2. It is also reported that glibenclamide may inhibit glucoamylase *in vivo*. Thus it controls the degradation of glycogen and maintains glucose level in the blood. Reports are available that a decoction of the dry leaves of the *Syzygium cumini* gives hypoglycemic effect<sup>15</sup>. The oral administration of alcoholic seed extract of jamun has a hypoglycaemic effect which also reduces

glycosuria<sup>3</sup>. No report is available on the effect of ethanolic extracts of *Syzygium cumini* (Jamun) seed on glucoamylase and antibacterial activity. Therefore, in the present work we have studied the effect of ethanolic extracts of *Syzygium cumini* (Jamun) seed isolated at different temperatures on glucoamylase and antibacterial activity *in vitro*.

### MATERIAL AND METHODS

#### Plant material

*Syzygium cumini* (Jamun) seeds were collected fresh from local market, and washed with distilled water and dried in presence of sunlight. The plant was identified and authenticated at the Blatter Herbarium ST. Xavier's College, Mumbai-400 001, India, with specimen no. 1848 of G. L. Shah. The dried seeds were ground in electrical mill and the powdered seeds were kept separately in plastic containers in dark until used.

#### Preparation of ethanolic Jamun seed extracts (JSEts) at different temperatures

A suspension of 10 g of seed powder in 100mL of ethanol was stirred manually for half an hour at 4°C temperature. The suspension was centrifuged for 5 minutes at about 6000 rpm. The centrifugate was evaporated to dryness at 80°C in an oven. Similarly the ethanolic extracts were prepared at 10, 15, 20, 25, 30, 35, 40, 45 and 50°C.

### Antibacterial study

The ethanolic extracts obtained at different temperatures were tested against four microorganisms by agar cup method<sup>16</sup>. All bioassays were carried out in triplicate and average values were taken.

### Glucoamylase activity

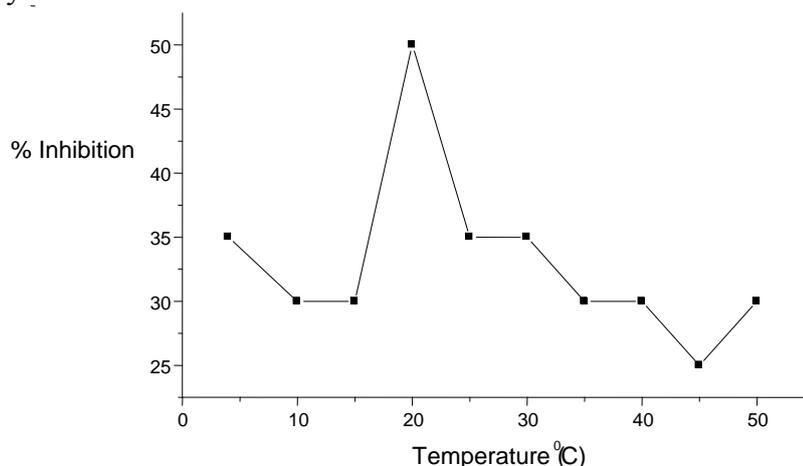
1 mL of the reaction mixture containing 0.5 mL of starch solution (5 mg/mL prepared in 100 mM acetate buffer pH 4.5) and a suitable amount of enzyme (0.1 mL, 2  $\mu$ g) were incubated at 37°C for 30 minutes. The reaction was terminated by keeping the test tubes in boiling water bath for 1-2 minutes, cooled under running tap water and the liberated glucose was estimated by DNS method<sup>17</sup>. A unit activity is defined as the mg of glucose liberated per mg of protein per minute.

### RESULTS AND DISCUSSION

The oral administration of aqueous and alcoholic extracts of *Syzygium cumini* (jamun) seed resulted in a significant reduction in blood glucose level<sup>18,19</sup>. There is no report available on the effects of ethanolic extracts of *Syzygium cumini* (Jamun) seed isolated at different temperatures on glucoamylase and its antibacterial functions. In the present work we have studied the effect of ethanolic extracts of *Syzygium cumini* (Jamun) seed isolated at different temperatures on glucoamylase in vitro. The percentage yield of ethanolic extracts of *Syzygium cumini* seeds obtained with ethanol between +4 to 50°C was only 6-7%.

The effect of ethanolic extracts of *Syzygium cumini* seeds isolated at different temperatures is given in Fig. 1.

**Fig.1:** Effects of ethanolic extracts of *Syzygium cumini* seeds isolated at varying temperatures on glucoamylase in vitro



**Table 1:** Antibacterial activity of ethanolic extracts of *Syzygium cumini* seeds powder

Temperature (°C)	Inhibition (Excluding control, 8mm)			
	<i>E-coli</i>	<i>P-aeruginosa</i>	<i>S-aureus</i>	<i>B-subtilis</i>
4	9	3	8	6
10	5	3	6	8
15	6	4	6	9
20	5	5	5	7
25	4	3	7	5
30	6	3	7	4
35	6	3	6	6
40	4	3	6	6
45	9	4	5	7
50	6	4	6	6

It is found that all ethanolic extracts of *Syzygium cumini* seeds inhibits the glucoamylase activity in vitro. The extract of *Syzygium cumini* seeds isolated at 20°C shows maximum inhibition of glucoamylase (50%). The possible mechanism by which extracts of *Syzygium cumini* seeds bring about its hypoglycemic action may be by affecting the activity of glucoamylase or by increasing the glycogen biosynthesis. Thus, the significant inhibition of glucoamylase suggests that the active hypoglycaemic compound present in ethanolic extracts of jamun seeds does not necessarily require the presence of functioning of  $\beta$ -cells for its favorable action seen in type-I. It means the ethanol extracts of *Syzygium cumini* seeds may act in a variety of diabetic conditions with or without functioning of pancreatic  $\beta$ -cells. An antibacterial effect of ethanolic extracts of *Syzygium cumini* seeds is given in Table 1. The ethanolic extracts obtained at varying temperatures showed maximum inhibition for *E.coli* and minimum for *P. aeruginosa*.

## CONCLUSION

The maximum yield of ethanolic extracts isolated at different temperatures is only 6-7%. All extracts are moderate to good antibacterial against all four tested microorganisms. The ethanolic extract of *Syzygium cumini* seed isolated at 20 °C is potent inhibitor of glucoamylase and hence may be hypoglycemic function in diabetes type-2.

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