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Short Communication

In vitro Antidiabetic Activity of Sulforaphane

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ABSTRACT

Background: Sulforaphane is mainly found in cruciferous vegetables. It is a glucosidal prodrug with many pharmacological activities like anti oxidant, anti ulcer, anti viral etc. The present work aims the screening of *in vitro* anti diabetic activity of Sulforaphane from broccoli extract. **Method:** The Hypoglycemic activity was performed with amylase inhibition assay by using chromogenic DNSA method. In this percentage inhibition of analyte was compared with that of control to conclude the proved anti diabetic activity. **Result:** Majority analyte concentration of 500µg exhibits significant inhibition of amylase enzyme which reflects potent anti diabetic effect. **Conclusion:** Despite of many adverse effects and short shelf life of present drugs here is a proved possibility of anti diabetic effect was found in Sulforaphane from broccoli extract.

Key words: Antidiabetic activity, Glucosidal prodrug, DNSA method.

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INTRODUCTION

Sulforaphane is a phytochemical which contains typical isothiocyanates group (NCS group) in cruciferous vegetables[1] such as broccoli sprouts. It exists in a bounded form as glucoraphanin a non- glycoside in which Sulforaphane glucosinolate[2] is a bounded sugar molecule. It is mainly available in combination with sinigrin[3] (metabolized into allyl isothiocyanate), glucotropaeolin (metabolized into benzyl isothiocyanate), gluconasturtiin (metabolized into phenethylisothiocyanate) and glucobrassicin[4] (metabolized into diindolylmethane). It has anti oxidant[5,6] and anti cancer property and also works as natural detoxifying[7] enzyme stimulator. It may reduce the risk of breast, bladder and prostate cancer.[8] The present work aims the screening of *in vitro* anti diabetic activity of Sulforaphane from broccoli extract.

MATERIALS AND METHODS

Materials

The study was carried out by using DNS solution which is prepared by dissolving 30g of potassium sodium tartarate in 2N NaOH and made up to 100 ml.

Method

The inhibition assay was performed using the chromogenic DNSA method.[9,10] The total assay mixture composed of 1400 µl of 0.05 M sodium phosphate buffer of pH 6.9, 50 µl of amylase and analyte at different concentrations as 100, 250 and 500 µg were incubated at 37^{0}C for 10 min. After pre- incubation, 500 µl of 1% (w/v) starch solution in the above buffer was added to each tube and incubated at 37^{0}C for 15 min. The reaction was terminated with 1.0ml DNSA reagent,[11,12] placed in boiling water bath for 5min, cooled to room temperature and the absorbance measured at 540 nm. The control amylase represented 100% enzyme activity and did not contain any sample of analysis. To eliminate the absorbance produced by analyte, appropriate analyte extract controls with the extract in the reaction mixture in which the enzyme was added after adding DNSA. The maltose liberated was determined by the help of standard maltose curve and activities were calculated according to the following formula.

The inhibitory property shown by the analyte was compared with that of control and expressed as percentage of inhibition.

Analysis of Acarbose as Standard Inhibitor

Acarbose was used as a standard inhibitor and it was assayed at above mentioned test sample concentrations. The assay method was similar to the above mentioned procedure, instead of analyte, acarbose was added. The results were compared to that of analyte.

RESULTS AND DISCUSSION

The results of percentage inhibition of amylase in the study were represented in Table 1 & Figure 1. In this method the percentage inhibition of amylase by the analyte were observed in dose dependent manner and decrease in the absorbance as 1.21 at 540 nm shows increased inhibition of amylase which is noted at 500 µg of analyte. The outcomes of present study suggest that the Sulforaphane exhibited significant inhibition of amylase enzyme which reflects the hypoglycemic activity of Sulforaphane in dose dependent manner. Here the analyte Sulforaphane has clearly displayed significant inhibition of 46% of enzyme at 500 µg concentration.

Hence a proper remedy for diabetes mellitus has to be found before the need reaches to its culmination. Through, many herbal products have been described for the treatment of diabetes mellitus, very few of them have been explored scientifically so far. The existing hypoglycemic drugs

Table 1: Percentage inhibition of analyte and amylase (control)

Sample	Absorbance @540 nm	% inhibition	Activity
Amylase (Control)	2.21	0.00	0.0504
100 µg Sample	1.96	11.65	0.0446
250 µg Sample	1.42	36.38	0.0321
500 µg Sample	1.21	46.00	0.0273

The graphical representation of amylase inhibition analysis of analyte with that of control was represented.

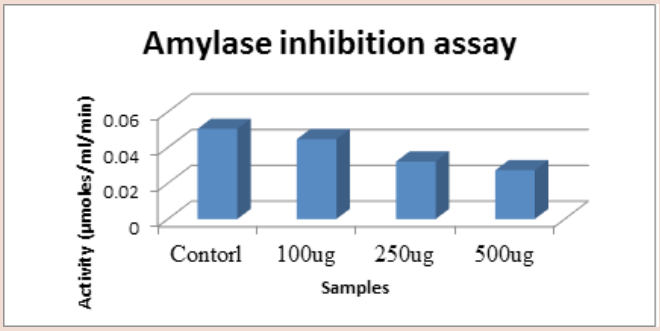

Figure 1: Amylase inhibition assay.

encounter many adverse effects and need on prolonged treatment including questionable efficacy in the treatment. This forces the area of research to find improved treatments which will counteract the adverse effects of the existing treatment. Finally here the study on Sulforaphane shows positive stance of having clear hypoglycemic activity. The study of such medicines might offer a natural key to unlock a diabetologist's pharmacy for the future.

CONCLUSION

Despite of many adverse effects and short shelf life of present drugs here is a proved possibility of antidiabetic effect was found in sulforaphane from broccoli extract.

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CONFLICT OF INTEREST

The authors declare they have no competing interests.

ABBREVIATION USED

DNSA: Dinitro Salicylic acid; **µg:** Micro gram; **µl:** Micro liter.

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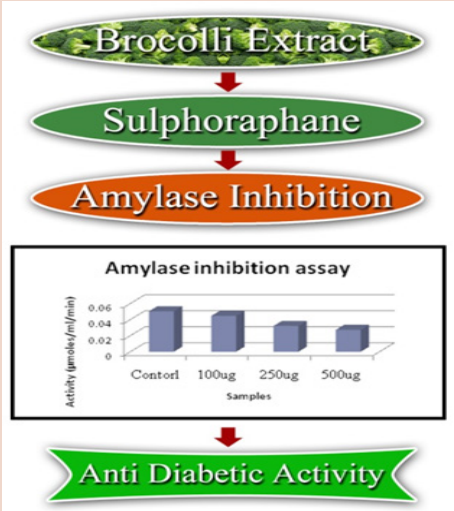
PICTORIAL ABSTRACT



SUMMARY

- Sulforaphane is an organosulfur compound which is mainly extracted from Broccoli having different pharmacological activities. In the present study the hypoglycemic activity was estimated with amylase inhibition assay by using DNSA method and it shows significant anti-diabetic activity.

ABOUT AUTHOR

Mr. Shaik Chand Basha is presently working as Assistant Professor in Dept. of Pharmaceutical Chemistry, Annamacharya College of Pharmacy, Rajampet. He has published 19 research papers in National and International journals. He had received Post Graduate Fellowship from AICTE during M. Pharmacy (PG) course for two years. His area of interest is Natural Product Chemistry.

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