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STUDY OF ANTIDIABETIC AND ANTIMICROBIAL ACTIVITY OF VARIOUS MEDICINAL PLANTS

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ABSTRACT

Diabetes Mellitus is one of the major problems faced by most people after the age of 35. It is characterized by elevated blood glucose level. On the other side, medicinal plants are now used to cure many diseases around the world as they have no side effects and later onset of other symptoms. Some food crops also have medicinal values and are used in many treatments. Our study deals with testing of Antidiabetic activity and antimicrobial activity of some commonly available plants such as Acalypha indica, Citrus limon, Myristica fragrans, Manilkara zapota, Ziziphus jujube, Trichosanthes cucumerina and Ixora coccinea.

KEYWORDS: Acalypha indica, Citrus limon, Myristica fragrans, Manilkara zapota, ziziphus jujube, Trichosanthes cucumerina, Ixora coccinea, Antidiabetic, Antimicrobial.

1. INTRODUCTION

Medicinal plants are considered as rich resources of ingredients which can be used in drug development and synthesis. Medicinal plants are now believed as one of the source of treatment for many incurable diseases around the world. Among them many plants show activities against the diseases which are still remain untreated by medicines. Acalypha indica are useful in the treatment of pneumonia, asthma, rheumatism and many skin diseases. The dried leaves are used to treat bedsores and wounds. The juice of Acalypha indica can be mixed with oil to treat various skin disorders.[1] Nutmeg is used to treat diarrhea, nausea, kidney diseases, sleeping trouble, cancer, etc. Nutmeg oils are used as fragrance in soaps and cosmetics. Citrus fruits are consumed worldwide in many form, in that lemon peel said to contain polyphenols, Vitamins, minerals, dietary fibers, essential oils and carotenoids.[2] Jungle geranium is traditionally used as hepatoprotective, Chemoprotective, anti-microbial,

anti-oxidant, anti-nociceptive, anti–mitotic and anti-inflammatory activities.[3] The jujube fruit found to contain antiallergic, analgesics, antihyperglycemic activities.[4] The ethanolic extract of jujube seeds and leaves are tested for Antidiabetic activities in rats.[5] Snake gourd is a better medicine for curing bilicious fever, indigestion, boils, sores, dermatitis, ulcers and inflammations. The plant extract was tested for Antidiabetic activity in rats.[6]

2. AIM AND OBJECTIVE

Our study deals with the Antidiabetic and antimicrobial activity of Acalypha indica, Lemon, Nutmeg, Jungle geranium, Snake gourd, Jujube and the leaves of Sapota.

- To study the Antidiabetic property of the extracts
- To study the antimicrobial property of these extracts against microbes cultured from serial dilution
- To analyze the phytochemical activity of these plants.

3. MATERIALS AND METHODS USED

3.1 Plant Material

Citrus limon, Acalypha indica, Myristica fragrans, Manilkara zapota, Ziziphus jujube, Trichosanthes cucumerina and Ixora coccinea plant species were selected for the studies of Antidiabetic and Antimicrobial. Jujube and Snake gourd samples were collected freshly from the market and the other samples were collected freshly from our college campus. These samples were rinsed in fresh water and allowed to dry clean for further processing.

3.2Extraction

Preparation of Ethanolic Extract of Nutmeg

Dried nutmeg seeds were washed with tap water to remove dust and dirts and are then dried and powdered. The powdered sample was mixed with ethanol in the ratio 1:10. It is then filtered by Wattman's filter paper. The filtrate is collected and stored for later use.

Preparation of Ethanolic Extract of Plant samples

Freshly harvested samples (other than nutmeg) were washed with tap water and are air dried. It is then crushed with absolute ethanol in the ratio 1:10 and is filtered using Wattman filter paper. The filtrate is collected and stored in room temperature for later use.

3.3Antibacterial Activity

Anti-biotic disc diffusion method was performed for measuring the anti-microbial activity. Nutrient agar plates were used for microbial growth. Wattman's No.1 filter paper was cut into round pieces. They were soaked in the plant extracts and is placed over the medium. The plates were then incubated.

3.4Antidiabetic activity

Inhibition of α-amylase enzyme

Five concentrations of plant extracts, as 0.2mg/ml, 0.4mg/ml, 0.6mg/ml, 0.8mg/ml, 1mg/ml, were prepared by dissolving in double distilled water.The enzyme solution was prepared by mixing 40mg amylase in 40ml of distilled water. The plant extract was made up to 2ml by adding 0.02 Sodium Phosphate buffer (pH 6.9 with 0.006M Sodium chloride). A total of 2ml extract (with buffer) and 1ml amylase were mixed in a test tube and was then incubated for 10 minutes at 25^{o}C. After pre-incubation 1ml of Starch was added and then incubated for 10 minutes at 25^{o}C. 2ml of 3, 5 Di-nitro salicylic acid(DNS) is added to each test tube to stop the reaction. These test tubes were incubated in water bath for 5 minutes and cooled at room temperature. The absorbance was measured at 540nm.

4. RESULTS AND DISCUSSION

4.1 Anti-diabetic property

Table 4.1.a) Absorbance Table

Plant samples	OD value for the ethanolic extracts of various concentrations				
	0.2mg/ml	0.4mg/ml	0.6mg/ml	0.8mg/ml	1mg/ml
Acalypha indica	0.1014	0.1310	0.1707	0.2475	0.2684
Jujube	0.1082	0.1643	0.2831	0.3832	0.4669
Jungle geranium	0.2271	0.4396	0.6798	0.8557	0.9934
Lemon peel	0.1142	0.1763	0.3827	0.5865	0.6630
Nutmeg	0.2642	0.4569	0.7040	0.8624	0.9993
Sapota leaves	0.8444	0.8780	0.8943	0.9107	0.9523
Snake gourd	0.0993	0.1596	0.2127	0.2351	0.2933

The Absorbance of control is noted as 2.3

While comparing optical density of all the plant extracts, their higher concentration 1mg/ml showed better results. Among all the 7 samples Acalypha indica showed a better result, followed by Snake gourd and Jujube. Hence it reveals that these three samples have good anti-diabetic property.

Calculation of % of inhibition

$$\%\text{relative enzyme activity}=\frac{Enzyme\ activity\ of\ test}{Enzyme\ activity\ of\ control}*100$$

% of alpha amylase inhibition activity=100- %relative enzyme activity

4.1. b) % inhibition

Sample	%inhibition
Acalypha indica	88%
Jujube	80%
Jungle geranium	56%
Lemon peel	71%
Nutmeg	56%
Sapota leaves	58.6%
Snake gourd	87%

Graphical Analysis

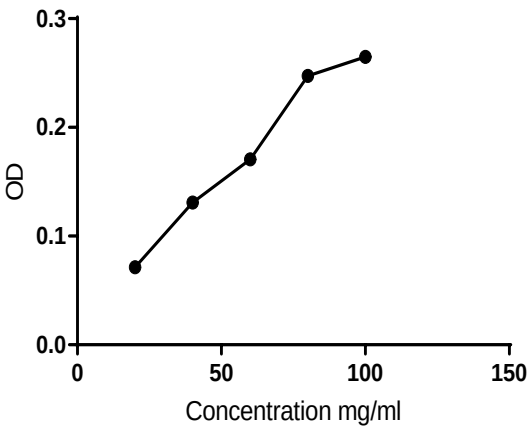

Fig. 4.1.(a) Antidiabetic activity for *Acalypha indica*

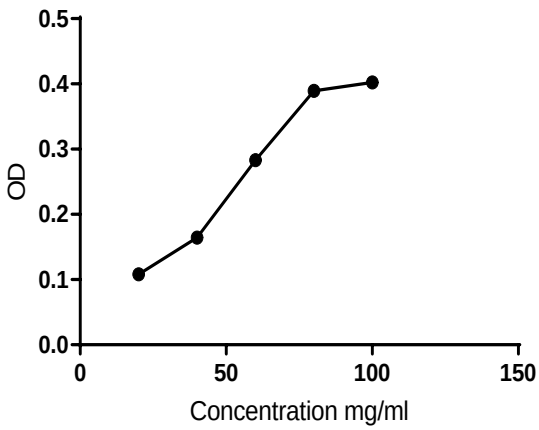

Fig. 4.1.(b) Antidiabetic activity for *Ziziphus jujube*

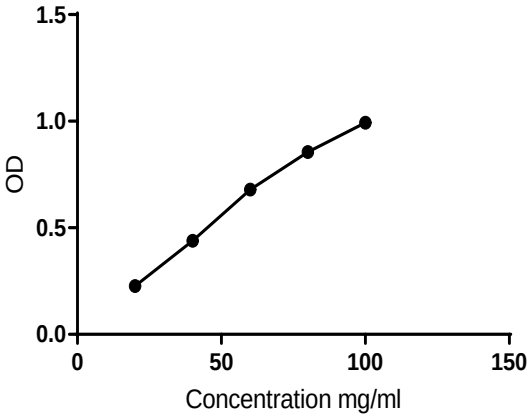

Fig. 4.1.(c) Antidiabetic activity of*Ixoracoccinea*

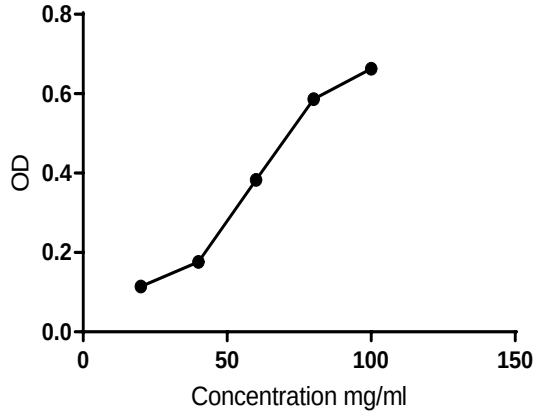

Fig. 4.1.(d) Antidiabetic activity of peel of *Citrus limon*

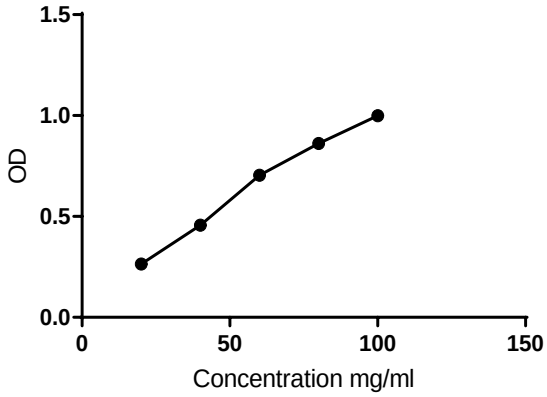

Fig. 4.1.(e) Antidiabetic activity of*Myristicafragrans*

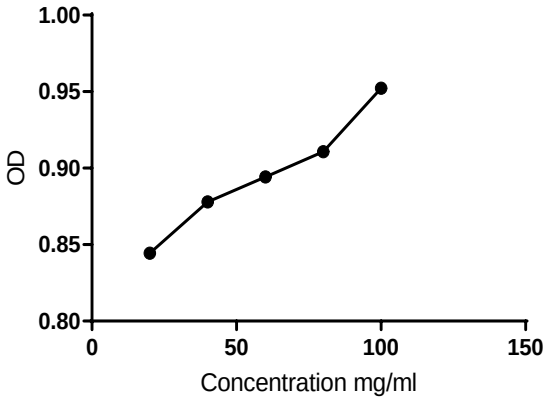

Fig. 4.1.(f) Antidiabetic activity of*Manilkarazapota*

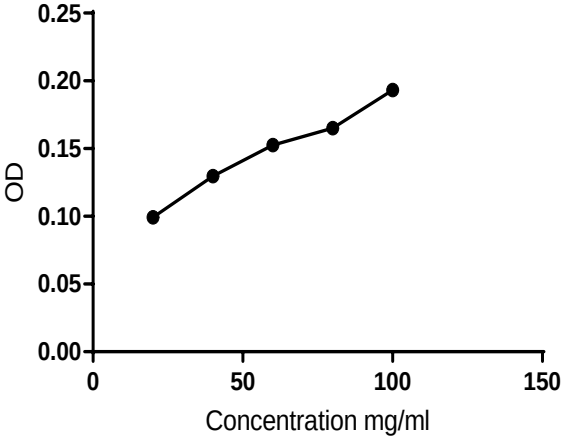

Fig. 4.1.(g) Antidiabetic activity of *Trichosanthescucumerina*

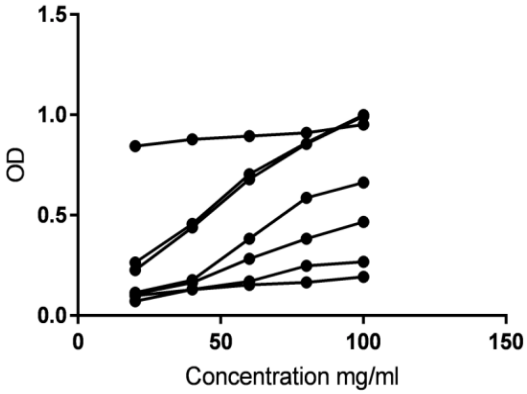

Fig.4.1.(h) Comparison of Antidiabetic activity of various samples

4.2. Anti-microbial activity

Antimicrobial activity of each extracts was performed by disc diffusion method. The organisms present in the soil were used by culturing it from serial dilution. The ethanolic extract of Acalypha indica, Nutmeg, Jungle geranium and lemon peel showed a very good zones of inhibition for the chosen microorganisms. But the ethanolic extract of snake gourd and Sapota leaves showed no zone of inhibition. The overall result obtained from the antimicrobial activity was well and good.

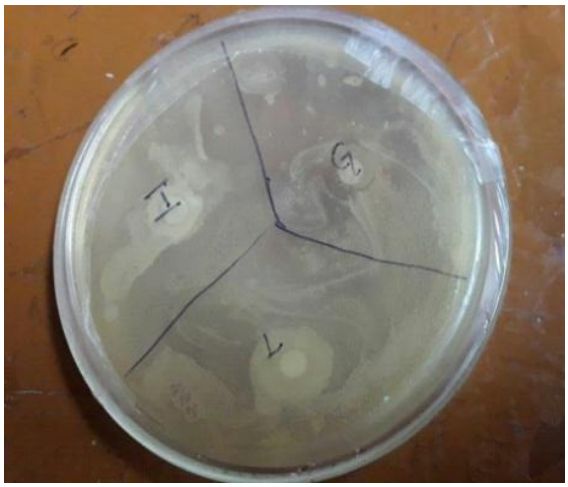

Fig. 4.2.1

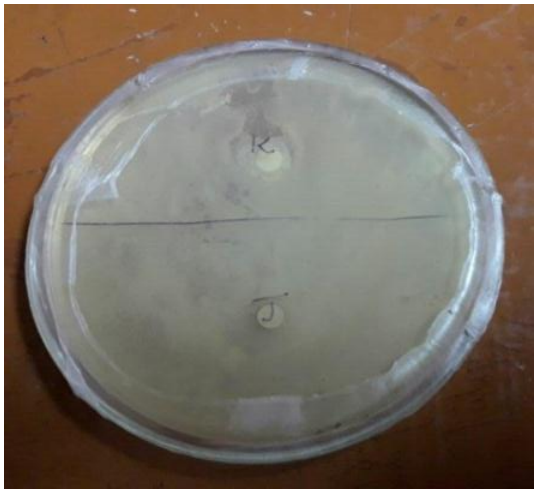

Fig. 4.2.2

Zone of inhibition formed by various plant samples.

5. CONCLUSION

Comparative study of *Acalypha indica, Citrus limon, Myristica fragrans, ziziphus jujube, Trichosanthes cucumerina, Manilkara zapota* and *Ixora coccinea* was focused in this study. Antidiabetic and antimicrobial activities were checked for the samples and the results were interpreted. Among these seven samples, Nutmeg and acalypha indica showed better results. Many of these plants have anticancer activities and few of them can be used to treat hypertension. These plants can be consumed directly. The above plant sources are available everywhere and are cheap even. It is affordable by all classes of people.

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