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REVIEW ON ANTI-VIRAL AND ANTI-BACTERIAL ACTIVITY STUDY ON EXTRACTS OF BERRIES OF *SOLANUM TORVUM*

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ABSTRACT

Solanum torvum commonly known as turkey berry is found in tropical Africa, Asia, South America. Methanolic and ethanolic extracts of berries of Solanum torvum SW. were evaluated in vitro for antiviral and antibacterial activity by disc diffusion method comparing zone of inhibition with that of standard such as acyclovir and amikacin, respectively. The extracts of berries of solanum torvum contains number of potentially and pharmacologically active phytoconstituents including flavonoids, phenols, tannins, saponins, steroids, alkaloids. A new steroidal glycoside named torvoside(H) also found to exhibit antiviral activity (HSV-1). The minimum concentration that inhibits bacterial activity using ethanolic extracts was 9.6 to 19.2µg/ml . Results revealed that fruit extracts showed significant activity due to presence of phytoconstituents. Thus, solanum torvum has antimicrobial activity can be used clinically to find novel antibacterial and antiviral compounds..

Keywords: Solanum torvum, anti-bacterial, phytoconstituents.

INTRODUCTION

The plant kingdom includes a high number of species producing a diversity of bioactive molecules with different chemical scaffolds. Over the centuries, the use of medicinal and aromatic plant has become an important part of daily life despite the progress in modern medical and pharmaceutical industries. Likewise, the solanum torvum which is the largest genus in solanaceae family which consists of more than 2000 speices. Many of them are distributed in tropical and subtropical areas and only a small amount in temperature regions throughout world. Solanum torvum orginates from central and south America. It is now pantropical weed in west and central Asia, it is locally a kitchen garden crop. The fruit of this plant edible. Solanum torvum is also used in traditional medicine when used wisely, its fruit and leaves can be used to control a range of microbial activities. Different parts of the plants used as sedative, diuretic and digestive agent. It is also used to treat fever, tooth decay, wounds, cold and cough, cracked foot, reduce body heat and microbial diseases. Leaves used as haemostatic. Extract of fruits and leaves are useful in case of liver and spleen enlargement. The glycoalkaloid solasidine that is formed in its leaves and fruits is used in India in the manufacture of steroidal sex hormones for oral contraceptives. The repened fruit of solanum torvum contain steroidal glycosides, hydrocarbons and steroids, antioxidant proteins used as traditional medicine. Phytochemical studies have shown that berries of solanum torvum contains alkaloids, glycosides, saponins, flavonoids, tannins that have adequate pharmacologically properties. Several reports confirmed that the plant has many pharmacological properties such as analgent and anti inflammatory, anti microbial, anti ulcerogenic activity, anti hypertensive, antioxidant activity. Due to the notable medicinal value of solanum torvum, it was considered of profits to carryout a phytochemical and antimicrobial investigation on this species.[1-4]

MATERIALS AND METHODS:

COLLECTION OF PLANT:

The berries of solanum torvum were collected from the herbal garden, Chennai and authenticated by professor Dr. Jayaraman taxonomical department of botany, Tambaram, chengalpattu, Tamil nadu, India. After authentication the fruit/berries were collected, washed with running tap water, shade dried and then pulverized into core powder by a mechanical grinder and passed through no.40 sieve meshes.

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Chemicals:

- Solvents and all the reagents used are analytical grade, such as
- Folin ciocalteu
- 20% Sodium carbonate
- Gallic acid
- Methanol
- Ethanol
- Aluminium chloride
- Potassium acetate
- Quercetin
- Chemical and reagents.

Figure 1: S. torvum fruits

Microorganism:

- Escherichia coli, Vibrio cholera, Staphylococcus aureus, Streptococcus,
- Bacilli subtilis, Klebsiella typhimurium, Pseudomonas sp.., Proteus vulgarigus.
- HSV -1

Preparation of extract:

Shade dried fruits of s. torvum were grinded finely with a blender and used for the preparation of methanolic and ethanolic extracts. Ethanolic and methanolic extracts were prepared by maceration process and concentrated using rotary evaporator. The extracts were dried under fume cupboard [5-9].

Phytochemical screening:

The ethanolic and methanolic extracts of S.torvum berries were screened for the presence of phytochemical constituents, flavonoids, phenols, reducing sugar, saponins, alkaloids and anthraquinones using standard method.

Determination of total phenols:

Method:

Total phenolic content in the s. torvum fruit extract was determined using the Folin-Ciocalteu method as described by Singleton et al(1999) with slight modification. Briefly, different concentrations of ethanolic fruit extract of s. torvum ranging from 125 to 500µg/ml was prepared and 1.5 ml Folin- Ciocalteau reagent was added to the extracts and incubated at room temperature for 5 minutes followed by the addition of 4ml of 20% sodium carbonate (Na_2CO_3) solution. The contents were made up to 10ml with distilled water and incubated at room temperature for 30 min and absorbance was recorded at 738 nm. Gallic acid was used as the standard. The content of phenol in ethanolic extract of s. torvum fruit was expressed in terms of Gallic acid equivalent [10-16].

Determination of total flavonoids:

Method:

The flavonoid content was determined by aluminium chloride colorimetric method. The method of Cerkovic et al(2008) was used with slight modifications. Varying concentration of S. torvum fruits ethanolic extract ranging from 250-2000µg/ml was prepared and was added with 5ml ethanol, 0.2ml aluminium chloride, 0.2ml potassium acetate solution and 5.6 ml distilled water and the contents were mixed well. The absorbance was measured at 415nm. Quercetin was used to plot the standard calibration curve. Extract was analysed in triplicate and the results were expressed as milligrams of quercetin equivalent per gram dried weight (mg QE/g DW).

Antibacterial activity:

Ethanolic and methanolic extracts of sun dried fruit of s. torvum were found to have effective antimicrobial activity against human and animal clinical isolates. Biochemical analysis of extracts of s. torvum indicate the presence of flavonoids, alkaloids, saponins, tannins and glycosides. The various extracts of s. torvum used against gram +ve bacteria (bacillus subtilis, staphylococcus aureus) and gram –ve bacteria (E. coli, klebsiella sp.., pseudomonas aeroginosa, salmonella typhi, proteus sp..,) isolated from the clinical special of human and animals to evaluate antibacterial activity by the disc diffusion method. The antibacterial activity measured as the zone of inhibition of methanolic and ethanolic extracts of s. torvum and negative control antibiotics. The maximum zone of inhibition of methanolic extracts of s. torvum was 19mm at 100µlt concentration and minimum 10mm at 10µlt concentration. The standard measure of s. torvum was highly active compared to methanolic extract where zone of inhibition was 30mm at 100µlt concentration found on reference. In vitro screening of s. torvum has given encouraging results, indicating this have active constituents act against antibacterial activity.

Determination of antibacterial activity of solanum torvum:

Disc diffusion method:

The nutrient agar media was prepared by dissolving 0.3 beef extract, 0.3 yeast extract, 0.5peptone,

0.5 NaCl and 1.5% agar in 1L of distilled water. The wells of 5mm diameter were made using sterile cork borer in each petriplates the various extracts of sundaikai fruit coat were added, a blank well loaded without test compound was regarded as control. For each treatment 10 replicates were maintained. The plates were incubated at 37^0c for 24 hrs and the resulting zone of inhibition was measured by comparing control the standard antibiotic.

Determination of minimum inhibitory concentration (MIC):

The minimum inhibitory concentration of different extracts of sundakai fruit coat were determined by serial dilution in the nutrient agar with concentrations ranging 5, 10, 20, 25, 50, 75 and 100µg ml¯[1]. The inoculam was prepared from fresh overnight broth culture in nutrient broth. Plates were incubated for 24h at 37^0c. The MIC was recorded as lowest extract concentration demonstration no visible growth in the broth.

Anti-viral activity:

Herpes simplex virus (HSV) is responsible for human infections in the orofacial region(HSV-1) and the genital region (HSV-2) (Travis,2002). Type 1 (HSV-1) of Herpes simplex virus was tested against ethanolic and methanolic fruit extracts of S. torvum. HSV-1 was maintained in the Vero cell line (kidney fibroblast of an African green monkey), which was cultured in Eagle's minimum essential medium (MEM) with addition of heat inactivated fetal bovine serum(FBS)(10%) and antibiotics. The test samples were placed into wells of a microtiter plate at final concentration ranging from 20 to 50mg/ml. The viral HSV 1(30 PFU) was mixed into the 96 well plate, followed by plating of Vero cells(1105 cells/ml); the final volume was 200ml . After incubation at 37^0c for 72 h, under 5% CO_2 atmosphere, cells were fixed and stained, and optical density measured at 510 nm. Under these screening conditions, the reference compound, Acyclovir, typically exhibited an IC50 of 2-5 mg/ml for HSV. Torvanol A, torvoside H, and solasonine also inhibited the expression of herpes simplex virus-1 (HSV-1), and the activity may relate to the entering of glycosides into the viral capsules [17-25].

CONCLUSION

The outcomes of the study, point out that extracts of berries of solanum torvum comprise of diversity of phytochemical compounds revealed that the methanolic and ethanolic extract of berries of solanum torvum are highly active against bacteria (Escherichia coli, Vibrio cholera, Staphylococcus aureus, Streptococcus, Bacilli subtilis, Klebsiella typhimurium, Pseudomonas sp.., Proteus vulgarigus) and virus (HSV-1).

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