

Research Article

Formulation and *In-Vitro* Radical Scavenging Evaluation of Herbal Tablet of *Sesbania grandiflora*

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ABSTRACT

The study deals with formulation and evaluation of *in-vitro* radical scavenging activity of tablets prepared from aqueous extract of *Sesbania grandiflora*. The extract was treated with various excipients for the formulation of tablet *viz.*, carbopol, ethylcellulose, MCC and PEG-4000 by direct compression method, the formulations were also evaluated for their quality control parameters like; weight variation, friability, hardness and *In-vitro* dissolution test etc. The formulation was found to be satisfactory on the basis of results of evaluation parameters. Further formulation was evaluated for antioxidant activity using radical scavenging model *viz.* DPPH assay. Results of antioxidant evaluation confirm significance of formulation as potent anti-oxidant agent since marked inhibition of radicals was found to be by formulation.

Keywords: Antioxidant, *Sesbania grandiflora*, Herbal Formulation, Tablets.

INTRODUCTION

Herbs had been used by all cultures throughout history. It was an integral part of the development of modern civilization. Many drugs commonly used today are of herbal origin. Many of the prescription drugs having at least one active ingredient derived from plant material. Some are made from plant extracts; others are synthesized to mimic a natural plant compound. Herbal therapy is becoming increasingly popular among patients and physicians many herbal preparations are used for various ailments. Herbal treatments that have been used for centuries are now being studied scientifically^{1,2}.

Antioxidants naturally occurring in plants may be employed topically or systemically for minimizing the harmful effects and in preventing and treating pathological and physiopathological conditions related to oxidative stress^{3,4}.

S. grandiflora (originally from India and Malasia) is cultivated in the tropics as an ornamental plant as well as for temporary wind-breaks. The stem yields an astringent red gum. The bark, leaves, flowers and roots are

also used medically herbs distributed in the tropical regions of the globe. The plant is rich in polyphenols contents and traditionally known to have antioxidative properties [5]. The evaluation of antioxidant activities of plants having phenolics content is necessary; to view this fact, the aim of the present work was to perform evaluation of *in-vitro* radical scavenging activity of tablets prepared from aqueous extract of *Sesbania grandiflora*.

MATERIALS AND METHODS

Ethylcellulose, Carbopol, Microcrystalline Cellulose, etc. are procured from local drug-chemical market and other chemicals used were of analytical grade.

Preparation of Extracts

The shade dried coarsely powdered plants of *Sesbania grandiflora* was extracted with petroleum ether until the extraction was completed. After completion of extraction, the solvent was removed. The residue was then stored in dessicator.

Aqueous Extract

The marc left after Petroleum ether extraction of tuberous roots of *Sesbania grandiflora* was dried and extracted with water (little addition of chloroform to affect extraction process) by cold maceration process in a narrow mouth bottle for 3 days. After completion of the extraction, it was filtered and the solvent was removed. Residue was stored in desiccator.

Determination of total phenolics⁶

Extract was mixed with Folin-Ciocalteu reagent (0.2 N). After incubation period aqueous sodium carbonate solution was added. The colour was developed after few hours. The gallic acid was used as standard for the establishment of the curve of reference and absorbance was measured spectrophotometrically at 760nm.

Formulation of Tablets

The plant extract was mixed with the excipients and compressed into tablets. The tablets were prepared by direct compression method as shown in Table 1.

Table 1: Compositions of Tablet Formulation

Ingredients	Quantity Per Tablet (Mg)			
	T1	T2	T3	T4
Plant extract	100	100	100	100
Microcrystalline cellulose	20	20	20	20
Ethyl cellulose	10	20	30	40
Peg 4000	3	3	3	3
Methyl paraben	0.1 %			

Evaluation of tablets

Tablets were evaluated for the following parameters.

Weight variation test

Twenty tablets were selected at random and their average weight was determined using an electronic balance. The tablets were weighed individually and compared with average weight.

Hardness

Hardness of tablets was determined individually with the Monsanto hardness tester.

Friability

Friability of pre-weighed ten tablets was determined by using Roche friabilitor at 25rpm for 4 min. The tablets were de-dusted and reweighed.

$$\% \text{Friability} = \left(\frac{\text{Loss in weight}}{\text{Initial weight}} \right) \times 100$$

Table 2: Results of evaluation Parameters of Tablet Formulations

Parameters	Formulation			
	T1	T2	T3	T4
Weight Variation (%)	2.32	1.95	2.19	1.79
Hardness (kg/cm ²)	4.0	4.1	4.0	4.2
Friability (%)	0.76	0.85	0.77	0.67

In-vitro dissolution test

The release of polyphenol from tablets was determined using USP dissolution test apparatus. Dissolution was examined in 900ml of distilled water with tablets placed in each of 6 dissolution vessels. The temperature was maintained at $37 \pm 0.2^\circ\text{C}$. Samples each of 10 ml were withdrawn at fixed time interval, filtered through wattman filter paper and replaced with an equal amount of fresh dissolution medium. Equal volumes of the filtered specimens withdrawn were combined and used as the pooled sample, as test solution. Test solution was analyzed for polyphenol content by Folin Ciocalteu assay. The amount of total polyphenols dissolved was calculated from the calibration curve of gallic acid. The results are given in Figure 1.

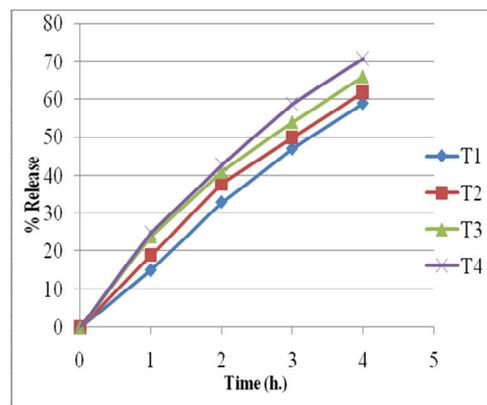


Fig. 1: Results of Drug Release Study

Antioxidant activity by the reduction of the DPPH⁷

In vitro antioxidant activity of the extracts was determined by performing scavenging capacity of extract to trap radicals, for this purpose radical generating reagent DPPH was used and inhibition of DPPH induced radicals by polyphenols (extract) was measured as antioxidant capacity of drug. Presence of a reducing substance (an antioxidant), gives reduced form of the DPPH with loss of the color violet (with a yellow color residual blade of the grouping picryl). For this purpose the solution of 2 mg of DPPH was dissolved in methanol. The sample was dissolved in methanol by the technique of limiting dilution. In an Ependorf tube, sample solution and

solution of DPPH in methanol was added. Quercetin was used as reference standard. The test solution was consisted of methanol and DPPH solution. The control was having only methanol instead of sample. The absorbance was read after incubation period of 15 min. in dark at 517 nm.

RESULTS AND DISCUSSION

In present work the tablets of extract of *Sesbania grandiflora* was prepared and evaluated for quality control parameters⁸.

First Phytoconstituents were extracted by using different solvents of increasing polarity like petroleum ether and water. The total phenolics of the extract was determined using Folin-Ciocalteu reagent method and it was found to be 9.5 mg Gallic acid/g dry extract. After determination of total phenolics tablets from dry extract were prepared and evaluated for various quality control parameters as given in **Table 2**. The tablets were compressed at the specified weight. The maximum weight variation of the tablets falls within the acceptable weight variation range. The results of hardness and friability were also found within the acceptable limit. Dissolution study is an important parameter of tablet. Results of dissolution parameters reveals optimum release of drug with in time period as shown in **Figure 1** it was concluded that the release of active from tablet formulation is not to slow and not to fast but follow controlled released pattern of drug release formulation **T4** was found to have better release profile then others.

The antioxidant activity of extract was measured in terms of capacity of extracts to reduce the DPPH. The reduction of the DPPH by the extracts makes decrease colouring initial violet. Results were reported in terms of % reduction (**Figure 2**.)

$$\% \text{ Reduction} = \frac{[(\text{Absorbance of controls}) - (\text{Absorbance of antioxidant})]}{(\text{Absorbance of controls})} \times 100$$

Sesbania grandiflora extract showed good anti oxidant activity compared to the Quercetin. The antioxidant activity of extracts can be attributed to the presence of polyphenolic compounds^{9,10}.

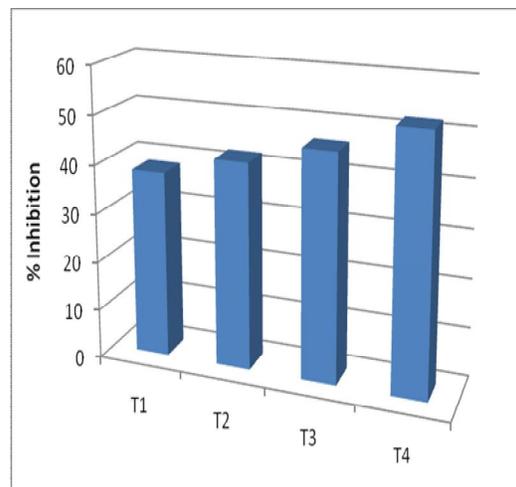


Fig. 2: Results of Antioxidant Study (% Inhibition vs. Formulation)

CONCLUSION

Present study deals with formulation and evaluation of the tablets made from aqueous extract of *Sesbania grandiflora*. The best formulation in terms of the dissolution profile was assigned **T4**. Results indicate that the extracts of *Sesbania grandiflora* contain polyphenols and showed excellent anti-oxidant activities. These results suggest the acceptability of extract as tablet formulation and utilization of same as potent antioxidant agent. Further broad study and *in-vivo* analysis could establish this plant as commercial sources of antioxidant agents.

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