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DEVELOPMENT OF HERBAL TABLETS CONTAINING TRILLIUM GOVANIANUM EXTRACT WITH POTENT ANTI-HYPERTENSIVE EFFECTS

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ABSTRACT

The goal of the current study was to create and assess herbal tablets using rhizome extract from *Trillium govanianum* for possible antihypertensive effects. The Soxhlet extraction method was used to create the methanolic extract, which was then integrated into tablets using the wet granulation technique. For pre-compression and post-compression parameters, five formulations (F1–F5) were created and assessed. Formulation F3 was chosen as the optimal formulation based on the evaluation. The improved pills were then examined for antihypertensive potential using the angiotensin-converting enzyme (ACE) inhibitory assay and for in vitro antioxidant activity using DPPH and nitric oxide radical scavenging assays. The improved formulation showed concentration-dependent antioxidant and ACE inhibitory effects in addition to acceptable physicochemical characteristics. These results suggest that herbal pills containing *Trillium govanianum* have a promising antihypertensive potential and may be used as a natural treatment for hypertension. To determine their safety and therapeutic efficacy, more in vivo research is needed.

KEYWORDS: *Trillium govanianum*, herbal tablet, hypertension, ACE inhibitory activity, antioxidant activity, wet granulation.

INTRODUCTION

Plants are rich in a variety of compounds. Many are secondary metabolites and include aromatic substances, most of which are phenols or their oxygen-substituted derivatives such as tannin[1] Aromatic plants, herbs, and their essential oils have been used in traditional medicine, food preparation, and preservation, religious observances and cosmetic purposes for thousands of years. today, the use of plant extracts in feed additives, as sources of medicinal compounds, continues to grow, aiming to address the modern consumer's demands for natural, safe, and high-quality products.[2] Several herbal drugs have yielded important modern therapeutic agents e.g., aspirin, taxol and the Vinca alkaloids. Herbal medicines also play a significant and increasingly important role in global healthcare, where they are finding new and expanding markets as health foods and preventative medicines.[3] Nowadays it has been estimated that more than 50% of available drugs have originated in some way from plants.[4] In India around 20,000 medicinal plant species have been recorded recently but more than 500 traditional communities use about 800 plant species for curing different diseases. Currently 80% of the world population depends on plant-derived medicine for the first line of primary health care for human alleviation because it has no side effects.[5] WHO report 80% of the world population relies on the drug from natural origin. A large no. of medicinal plants is used in the treatment of hypertension.[6] Hypertension is defined as a persistence increase in blood pressure above the normal range of 120/80 mmHg. The prevalence of hypertension increases with advancing age. The blood pressure (BP) of ≥140/90 mmHg is a criterion by which the risk of hypertension-related cardiovascular disease is high enough and needs immediate medical attention. Hypertension is a major risk factor for coronary artery disease and its complications, heart failure, stroke, and renal insufficiency.[7] The association between kidney disease and hypertension has been complex, as hypertension can cause kidney disease, and

conversely kidney disease can be complicated by the development of hypertension. Primary renal diseases cause hypertension, and malignant hypertension has been associated with the development of renal dysfunction. Nephrosclerosis and hypertensive kidney disease have been used to identify renal dysfunction associated with essential hypertension.[8] It has been demonstrated that several factors may contribute to hypertension including excess dietary salt or alcohol intake, stress, age, genetics and family history, obesity, physical inactivity, as well as high saturated fat diet.[9] A large body of epidemiologic data suggests that systolic blood pressure (SBP) is far more important than diastolic blood pressure as a determinant of cardiovascular risk, except in younger age groups. Epidemiologically, systolic hypertension is the most common form of hypertension.[10] Hypertension increases the risks of end-organ injury, maternal/fetal vulnerability, and total mortality. Blood pressure, even the so-called resting blood pressure, is inherently variable depending on innumerable factors. Many patients with hypertension remain undiagnosed for years; many others are wrongly diagnosed and unnecessarily treated for decades. Many people receiving tablets for hypertension are not adequately treated due to poor compliance, side effects of medicines, or inappropriate choice of medicines by the physician.[11] The Treatment of hypertension include Angiotensin converting enzyme inhibitors, Angiotensin II receptor antagonists, Alpha blockers, Beta blockers, Calcium channel blockers, Diuretics, Direct rennin inhibitors, Vasodilators have some side effects of like Dry cough, Dizziness, Depression, Palpitations, Slow heartbeat, Constipation, Loss of taste, Headache, Gout, Kidney damage (rare). There is a great deal of scientific evidence to suggest that the use of carefully chosen herbal remedies and dietary supplements can help to lower blood pressure, as well as to improve the overall functioning of heart, arteries, and entire cardiovascular system.[12] *Trillium govanianum* belongs to the genus *Trillium* (family: Melanthiaceae *alt.* Trilliaceae) is an indigenous medicinal plant of Pakistan, India found at an altitudinal range of 2500–3800 m.[13] In traditional medicines, rhizomes of this plant species are used for treating wounds, dysentery, skin boils, infections, menstrual disorders and hypertension.[14-16] The genus *Trillium* consists of 31 species, widely distributed from the western Himalayas to Japan, China, Kamchatka (Russia) and North America.[17] And is an important source of bioactive compounds of different classes like steroids, glycosides, terpenoids, sterols, saponins, sapogenins and flavonoids.[18-20] So it was very interesting to select this plant which can help in the treatment of hypertension along with its major complication of the disease. The main objective of this present study was to investigate the rhizome of *Trillium govanianum* as a potent anti hypertensive drug. During the course of present investigation its pharmacological studies and then formulation of the extract as a tablet dosage form and in vitro evaluation of the tablets were studied.

Fig. 1: *Trillium govanianum*.

Fig. 2: Rhizomes of *Trillium govanianum*.

MATERIALS AND METHODS

- **Collection and authentication of plant**
  The rhizomes of the plant *Trillium govanianum* were collected from **Skiran top, Banjar (H.P),** in the month of May, 2025. The plant was then authenticated by the Dr. Ved Prakash Assistant Professor Botany Govt. College Bassa, Gohar, Mandi (H.P). Magnesium stearate, Talc, Sodium Starch glycolate is procured by Loba chemise Pvt. Ltd. Laboratory in Mumbai, Maharashtra. Lactose, Microcrystalline cellulose, PVP K_{30} is procured by Qualikems fine chem. Pvt. Ltd. Kapra, Hyderabad

- **Extraction process**
  Plant material is extracted and the active components of the plant are identified as part of the initial phytochemical screening of the plant.

Methods of Extraction
Hot Continuous Extraction (Soxhlet)

Materials used
i. Soxhlet apparatus
ii. Methanol
iii. Distilled water

iv. Shade dried coarse powder of rhizomes of *Trillium govaninaum*

Fig. 3: Hot continuous extraction (Soxhlet).

Extraction procedure

The shade dried coarsely powdered rhizomes of *Trillium govaninaum* (100gms) was extracted with methanol and water (70:30) at temperature of 60-70 °C until it become transparent. After completion extraction, the solvent was removed by re distillation assembly. Brown colored residue was obtained. The residue was then stored in a desicator.

Fig. 4: Re distillation assembly

Fig. 5: *Trillium govanianum* extract.

- **Pre Formulation Studies**

The waft belonging of the mixed powder in an vital parameter to be measured since it impacts the uniformity of dose. It become assessed through the subsequent parameters.[21-22]

a. **Angle of Repose:** he fixed funnel method was used to calculate the angle of repose. The granules were permitted to pass through a funnel that was set on a level surface at a specific height. The angle of repose was computed using the following formula after the height (h) and radius (r) of the powder heap were measured:

$\theta=\tan^{-1}(h/r)$ Where: h = height of pile, r = radius of pile

b. **Bulk Density:** A precisely measured amount of granules was added to the measuring cylinder, and the initial volume was recorded.

Bulk Density= Mass of powder/ Bulk volume

c. **Tapped Density:** The granule-filled measuring cylinder was mechanically tapped until a consistent volume was achieved, at which point the final tapped volume was noted.

Tapped Density= Mass of powder/ Tapped volume

d. **Carr's Compressibility Index:** Granules were precisely weighed and then put into a dry, clean measuring cylinder. Bulk volume was defined as the initial volume that the granules occupied. After that, the cylinder was mechanically tapped a certain number of times to achieve a consistent volume; the

resulting volume was recorded as the tapped volume. Carr's compressibility index was computed using bulk density and tapped density.
Carr's Index= Tapped Density−Bulk Density/tapped Density *100

e. **Hausner's Ratio:** Granule bulk and tapped densities were calculated using the measuring cylinder method. By dividing the tapped density by the bulk density, Hausner's ratio was calculated.

Hausner's Ratio=Tapped Density/ Bulk Density

- **Formulation of Tablets**
The plant extract was mixed with the excipients and compressed into tablets. The detail of composition was given table no.2
- **Evaluation of post compression tablets**

General appearance
The general appearances of the tablet from every formulation batch become observed. The general appearance parameters like shape, color, presence or absence of odor and flavor had been evaluated.

Weight Variation Test
A digital balance was used to weigh each of the twenty tablets that were chosen at random; the average weight was computed and contrasted with the weights of individual tablets.

Thickness Test
A Vernier caliper was used to measure the tablets' thickness. The average thickness was determined using tablets that were chosen at random.

Hardness Test
A Monsanto hardness tester was used to measure the tablets' hardness. The average hardness of randomly chosen tablets was measured in kg/cm².

Friability Test
The Roche friabilator was used to conduct the friability test. The friabilator was used to rotate pre-weighed tablets at 25 rpm for four minutes. After the test was finished, the tablets were dedusted and reweighed.

Disintegration Test
USP disintegration equipment was used to conduct the disintegration test. The time it took for the tablets to completely disintegrate was noted after they were put in a basket rack assembly with distilled water kept at 37 ± 2°C.

IN VITRO PARAMETERS

- **ACE inhibitor assay**

Principle: Angiotensin I is changed into angiotensin II by the Angiotensin Converting Enzyme. ACE inhibition lowers blood pressure by reducing the production of angiotensin II. Hippuryl-histidyl-leucine (HHL) substrate hydrolysis was measured to assess the inhibitory activity.

Procedure: Distilled water or an appropriate solvent was used to prepare various strengths of the plant extract. After combining 50 µL of sample solution with 50 µL of ACE enzyme solution, the mixture was incubated for 10 minutes at 37 °C. Following incubation, 150 µL of HHL substrate made in sodium borate buffer was added to the reaction mixture, and it was then incubated for a further 30 minutes at 37 °C. 250 µL of 1N hydrochloric acid was added to stop the reaction. After that, 1.5 ml of ethyl acetate was added and properly combined. The top organic layer of the mixture was separated by centrifugation. The residue was dissolved in distilled water after the solvent was evaporated. A UV-visible spectrophotometer was used to detect the absorbance at 228 nm. The standard medication was captopril.

Calculation: The percentage inhibition of ACE was calculated using the following formula:
%ACE Inhibition=$A_c-A_s/A_c\times100$
Where,
A_c= Absorbance of control A_s= Absorbance of sample

- **DPPH Radical Scavenging Assay**

Principle: DPPH is a deep violet-colored, stable free radical. The herbal extract's antioxidants give DPPH radicals hydrogen atoms or electrons, turning them into a stable yellow molecule. The sample's ability to scavenge radicals is indicated by the decrease in absorbance.

Procedure: DPPH was produced in methanol at a concentration of 0.1 mM. Methanol was used to make the herbal extract in various quantities. One milliliter of the sample solution and one milliliter of the DPPH solution were combined, and the mixture was allowed to sit at room temperature for half an hour in the dark. A UV-visible spectrophotometer was used to detect the absorbance at 517 nm following incubation. Ascorbic acid was employed as the standard antioxidant, while methanol with DPPH solution was utilized as the control.

Calculation: The percentage radical scavenging activity was calculated using the following formula:
%Radical Scavenging Activity=$A_c-A_s/A_c\times100$
Where,

- A_c= Absorbance of control
- A_s= Absorbance of sample

- **Nitric Oxide Scavenging Assay**

Principle: Nitrite ions are created when nitric oxide produced from sodium nitroprusside combines with oxygen. A pink chromophore that can be detected by spectrophotometer is created when these nitrite ions combine with the Griess reagent. The herbal extract's antioxidants reduce absorption by competing with oxygen and preventing the production of nitrite ions. Both blood pressure management and vascular function depend heavily on nitric oxide. Thus, the antihypertensive potential of herbal preparations may be enhanced by nitric oxide scavenging activities.

Procedure: 0.5 ml of various herbal extract strengths were combined with around 2 ml of sodium nitroprusside solution made in phosphate buffer saline. For 150 minutes, the reaction mixture was incubated at 25 °C. Following incubation, 1 ml of Griess reagent was combined with 0.5 ml of the reaction mixture. For the color to develop, the mixture was left to stand for ten minutes. A UV-visible spectrophotometer was used to detect the absorbance at 546 nm. The standard was ascorbic acid.

Calculation: The percentage nitric oxide scavenging activity was calculated using the following formula**:**
%Nitric Oxide Scavenging Activity= $Ac-A_s/A_c \times 100$
Where,

- A_c = Absorbance of control
- A_s = Absorbance of sample

RESULTS

Table 1: Preliminary phytochemical analysis.

Sr. No.	Test	Results
1.	Saponin	+
2.	Terpenoids	+
3.	Flavanoids	_
4.	Tannin	_
5.	Poly Phenol	_
6.	Diosgenin	+
7.	Glycosides	+

Table 2: **Composition of Herbal Tablet.**

Sr. No.	Chemicals	F1	F2	F3	F4	F5
1.	Extract	200 mg	200 mg	200 mg	200 mg	2oo mg
2.	MCC	170 mg	160 mg	150 mg	140 mg	130 mg
3.	Lactose monohydrate	70 mg	75 mg	80 mg	90 mg	100 mg
4.	PVP K30	6 mg	8 mg	10 mg	12 mg	14 mg
5.	Sodium starch glycolate	15 mg	20 mg	25 mg	30 mg	20 mg
6.	Colloidal silicon dioxide	5 mg	5 mg	5 mg	5 mg	5 mg
7.	Magnesium stearate	4 mg	5 mg	5 mg	5 mg	5 mg
8.	Talc	30 mg	27 mg	25 mg	18 mg	26 mg
9.	Total weight	500mg	500mg	500mg	500mg	500mg

Table 3: Pre formulation studies of herbal fried extract.

Sr. No	Parameters	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
1.	Angle of repose (°)	28.8	27.9	30.4	29.8	28.5
2.	Bulk density (g/mL)	0.46	0.44	0.49	0.48	0.45
3.	Tapped density (g/mL)	0.53	0.52	0.59	0.56	0.55
4.	Hausner's ratio	1.15	1.18	1.20	1.17	1.22
5.	Carr's index (%)	13.21	15.38	16.95	14.29	18.18

Fig. 6: Prepared Herbal Tablets (500 mg).

Table 4: Evaluation of Herbal Tablet.

Sr. No.	Parameters	Observations
1.	Appearance	Round ,uncoated tablet
2.	Color	Light brown to grayish brown
3.	Odor	Characteristic odor
4.	Taste	Bitter
5.	Shape	Round

Table 5: Evaluation flow properties of herbal tablet various batch.

Sr. No.	Parameters	F1	F2	F3	F4	F5
1.	Weight variation (mg)	499.8	500.2	500.5	499.9	500.3
2.	Hardness (kg/cm²)	6.3	4.1	7.5	7.1	4.9
3.	Thickness (mm)	4.20	4.17	4.24	4.11	4.27
4.	Diameter (mm)	9.00	9.01	9.00	9.00	9.00
5.	Friability (%)	0.43	0.51	0.39	0.41	0.54
6.	Disintegration time (minutes)	9.12	7.10	14.41	13.11	8.39

- **UV-Visible Spectral Analysis**

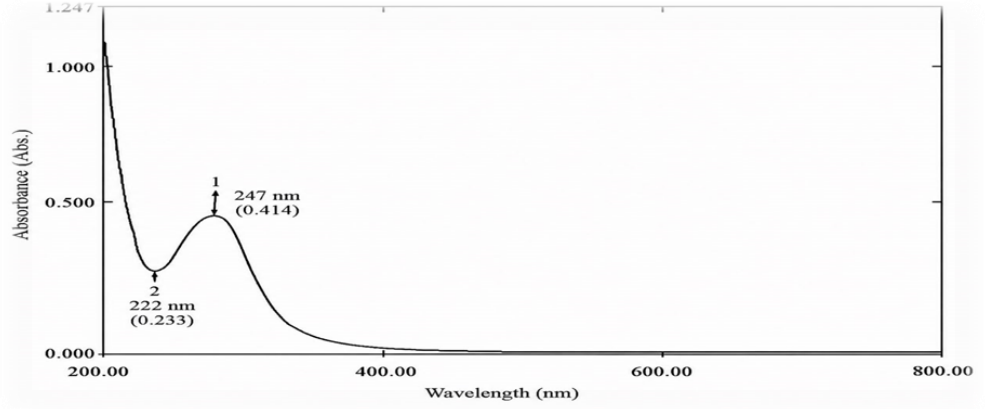

Fig. 7: UV-Visible absorption spectrums of the tablet extract containing *T. govanianum*.

The tablet extract's UV-visible spectrum showed two absorption peaks at 222 and 247 nm, with 247 nm showing the highest absorbance (λmax) (Absorbance = 0.414). The ultraviolet absorption shows that the tablet formulation contains UV-absorbing ingredients. There was no discernible absorption in the visible range (400–800 nm), suggesting that the formulation did not contain any brightly colored ingredients.

- **HPLC Fingerprint Chromatogram**

The tablet extract containing *Trillium govanianum* showed a distinctive chromatographic profile with several well-resolved peaks in the HPLC fingerprint chromatogram recorded at 247 nm. Throughout the chromatographic run, a significant peak was seen at a retention time of roughly 2.53 minutes, followed by a number of smaller peaks at various retention periods. Multiple peaks show that different components in the tablet formulation were successfully separated under the chosen chromatographic conditions. The tablet formulation's distinctive chemical profile is provided by the HPLC fingerprint chromatogram, which can be used as a reference for quality assurance, batch-to-batch consistency, and qualitative evaluation**.**

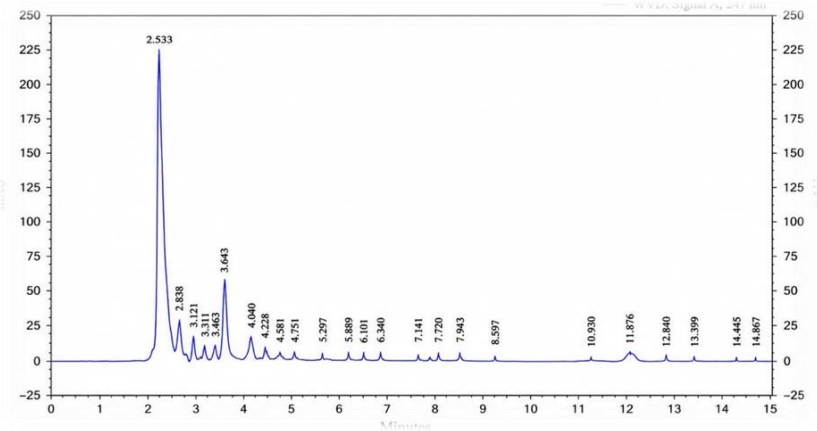

Fig. 8: HPLC fingerprint chromatogram of the tablet extract containing *Trillium govanianum* recorded at 247 nm.

- **In vitro Dissolution Study**

Table 6: In vitro dissolution profile of the herbal tablet containing *Trillium govanianum*.

Time (min.)	F1	F2	F3	F4	F5
5	24.2	25.1	26.7	24.4	23.8
10	31.8	33.1	34.5	32.9	31.5
15	41.4	43.3	45.3	43.6	40.7
20	54.7	57.2	59.6	58.1	55.7
25	67.3	69.7	72.3	70.5	68.3
30	79.5	81.6	84.2	82.3	80.3
35	88.4	90.4	92.5	91.2	89.3
40	94.3	95.7	97.0	96.5	94.9
45	96.7	98.3	99.3	98.7	96.8

All five formulations (F1–F5) underwent an in vitro dissolving study using phosphate buffer (pH 6.8). In all formulations, the cumulative percentage medication release increased gradually with time. F3 showed the most effective dissolving profile among the formulations, with the maximum drug release (99.3 ± 0.5%) at 45 minutes. While formulations F1 (96.7 ± 0.8%) and F5 (96.8 ± 0.8%) demonstrated somewhat lower but adequate drug release, formulations F2 (98.3 ± 0.7%) and F4 (98.7 ± 0.6%) also shown excellent solubility. Overall, all formulations showed adequate dissolving properties for the manufactured herbal tablets, releasing over 95% of the medication in 45 minutes.

Dissolution Profile Graph Data

In- Vitro Release Profile of Formulation F1-F5

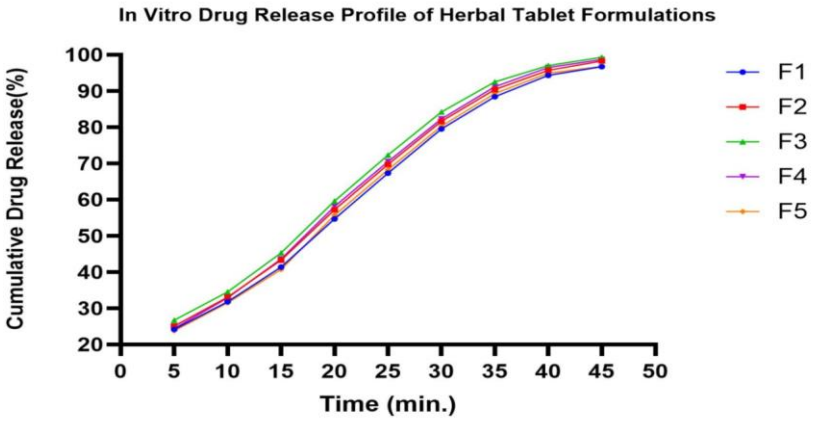

Fig. 6.9: In –Vitro Drug Release Profile of *Trillium govanianum* Herbal Tablet Formulations (F1-F5).

Table 7: Calibration data of tablet extract at 247nm.

Sr. No.	Concentration (µg/mL)	Absorbance (247nm)
1	2	0.093
2	4	0.100
3	6	0.116
4	8	0.146
5	10	0.194
6	12	0.220
7	14	0.245
8	16	0.274
9	18	0.298

Linear Regression
Regression equation
$y=0.014x+ 0.047$, $R^2=0.982$
Where: y= Absorbance, x= Concentration (µg/mL)

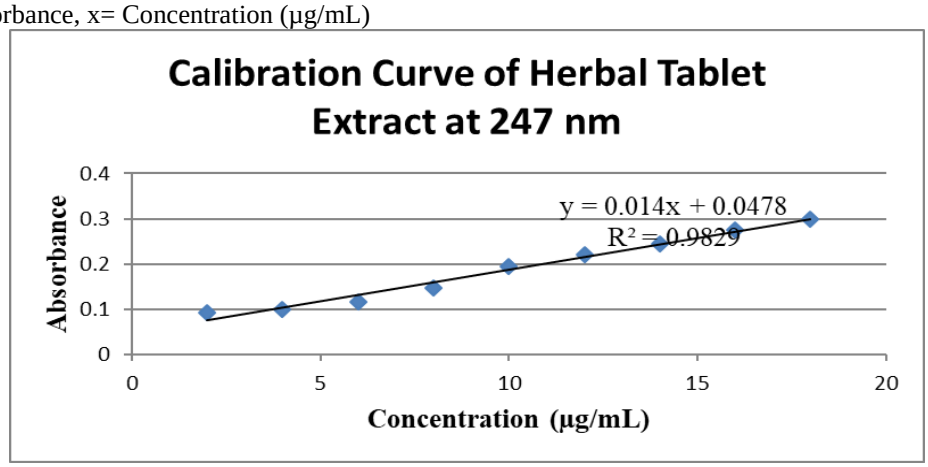

Fig. 10: Calibration Curve of Herbal Tablet Extract at 247 nm.

Using reference solutions in the concentration range of 2–18 µg/mL, a calibration curve of the herbal tablet extract was created at the maximum absorption wavelength (247 nm). There is a linear relationship between concentration and absorbance since the absorbance rose proportionately with increasing concentration.

The regression equation that was found was:
$y = 0.014x + 0.047$
Over the chosen concentration range, the coefficient of determination ($R^2 = 0.982$) shows satisfactory linearity. The UV spectrophotometric approach is dependable and appropriate for quantitative measurement of the herbal tablet extract during dissolving investigations, as indicated by the high R2 value. Dissolution Profile Graph Data

ACE- Inhibitory Assay
At various concentrations (0–100 µg/mL), the prepared *Trillium govanianum* herbal tablets ACE inhibitory efficacy was assessed. Angiotensin-converting enzyme (ACE) inhibition was concentration-dependent for the herbal extract and the conventional medication, captopril. The % inhibition increased in tandem with the concentration, suggesting increased ACE inhibitory action. At doses of 20, 40, 60, 80, and 100 µg/mL, the prepared herbal tablet demonstrated ACE inhibition values of 21.2%, 34.4%, 45.1%, 61.9%, and 73.3%, respectively. With inhibition values of 49.6%, 64.3%, 81.2%, 90.7%, and 98.4% at the same concentrations, the conventional medication captopril showed greater inhibitory activity.

Table 8: ACE- Inhibitory Activity of Formulated *Trillium govaninaum* Herbal Tablet.

Concentration (µg/mL)	Herbal Tablet(% Inhibition)	Captopril (% Inhibition)
20	21.2	49.6
40	34.4	64.3
60	45.1	81.2
80	61.9	90.7
100	73.3	98.4

Dose Response Curve

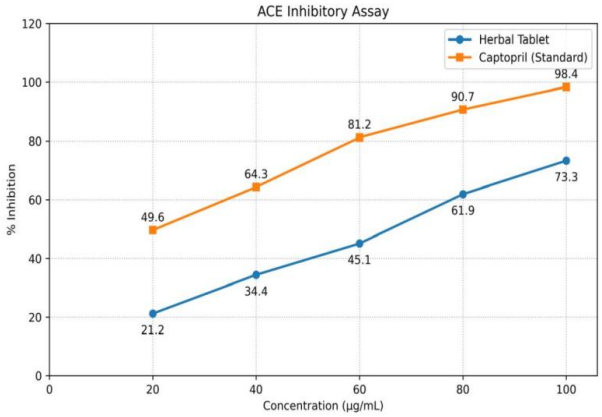

Fig. 11: ACE Inhibitory Activity of the Herbal Tablet and Captopril.

Table 9: IC_{50} Values of the Herbal Tablet and Captopril.

Sample	IC_{50}(µg/mL)
Herbal Tablets	63.6 µg/mL
Captopril	20.3 µg/mL

IC_{50} Determination

Over the studied range of 20-100 µg/mL, both the herbal tablet of *Trillium govanianum* and Captopril showed a concentration-dependent rise in the percentage inhibition of the ACE Inhibitory. Captopril's IC_{50} value was 20.3 µg/mL, whereas the herbal tablets was 63.6 µg/mL. The herbal tablets IC_{50} value was higher than captoprils, suggesting that a larger extract concentration was needed to produce 50% DPPH radical scavenging in comparison to the standard.

DPPH Radical Scavenging Assay

The formed samples antioxidant activity rose in a concentration-dependent fashion, with percentage inhibition rising from 27.4% at 20 µg/mL to 88.2% at 100 µg/mL. By contrast, the antioxidant activity of conventional ascorbic acid was higher, with percentage inhibition ranging from 51.2% at 20 µg/mL to 96.4% at 100 µg/mL. These results show that while the designed samples antioxidant activity is not as strong as that of ordinary ascorbic acid, it is nevertheless noticeable.

Table 10: DPPH Radical Scavenging Activity of Formulated *Trillium govaninaum* Herbal Tablets.

Concentration (µg/mL)	Herbal Tablet(% Inhibition)	Ascorbic Acid (% Inhibition)
20	27.4	51.2
40	46.3	70.6
60	62.8	84.5
80	75.9	91.8
100	88.2	96.4

Dose Response Curve

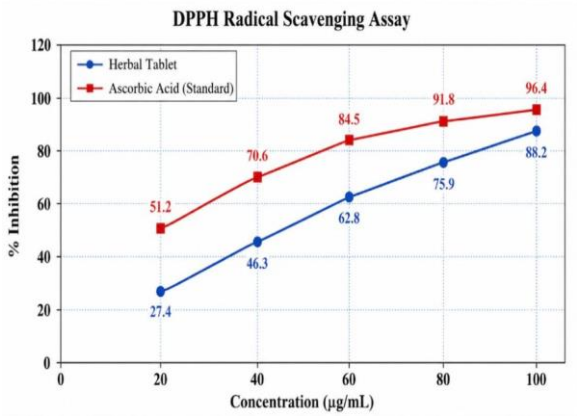

Fig. 12: DPPH Radical Scavenging Activity of the Herbal Tablet and Ascorbic Acid.

Table 11: IC_{50} Values of the Herbal Tablet and Ascorbic Acid.

Sample	IC_{50}(µg/mL)
Herbal Tablets	44.5 µg/mL
Ascorbic Acid	19.0 µg/mL

IC_{50} Determination

The DPPH radical scavenging assays concentration–response curves were used to estimate the IC_{50} values. The conventional ascorbic acid had an estimated IC_{50} of 19.0 µg/mL, while the compounded *Trillium govanianum* herbal tablet had an estimated IC_{50} of 44.5 µg/mL. Ascorbic acid's higher antioxidant effectiveness as compared to the prepared herbal tablet is indicated by its lower IC_{50} value.

Nitric Oxide Scavenging Assay

The prepared *Trillium govanianum* herbal tablet exhibited concentration-dependent increases in nitric oxide radical scavenging activity, with percentage inhibition rising from 24.2% at 20 µg/mL to 81.5% at 100 µg/mL. By contrast, the nitric oxide scavenging activity of the conventional ascorbic acid increased from 47.2% at 20 µg/mL to 94.3% at 100 µg/mL. These findings show that, while having a lower antioxidant potential than regular ascorbic acid, the prepared herbal pill has strong nitric oxide radical scavenging activity.

Table 12: Nitric Oxide Scavenging Activity of Formulated *Trillium govaninaum* Herbal Tablets.

Concentration (µg/mL)	Herbal Tablet(% Inhibition)	Ascorbic Acid (% Inhibition)
20	24.2	47.2
40	43.5	64.6
60	60.1	79.1
80	72.2	87.8
100	81.5	94.3

Dose Response Curve

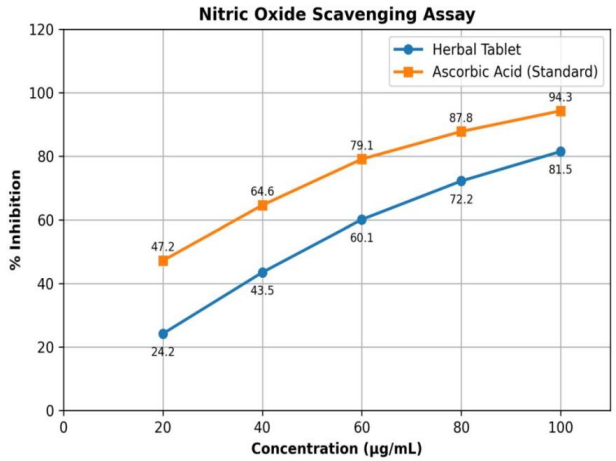

Fig. 13: Nitric Oxide Scavenging Activity of the Herbal Tablet and Ascorbic Acid.

Table 13: IC_{50} Values of the Herbal Tablet and Ascorbic Acid.

Sample	IC_{50}(µg/mL)
Herbal Tablets	48.0 µg/mL
Ascorbic Acid	23.0 µg/mL

IC_{50} Determination

The concentration–response curves of the nitric oxide radical scavenging experiment were used to estimate the IC_{50} values. The conventional ascorbic acid had an estimated IC_{50} of 23.0 µg/mL, while the compounded *Trillium govanianum* herbal tablet had an estimated IC_{50} of 48.0 µg/mL. Ascorbic acid has a higher nitric oxide potency than the manufactured herbal pill, as seen by its lower IC_{50} value.

CONCLUSION

The goal of the current study was to create and assess a herbal tablet formulation with extract from *Trillium govanianum* for possible antihypertensive effects. The wet granulation process was used to generate five formulations (F1–F5), and their pre-compression and post-compression properties were assessed. The acceptable pharmaceutical quality parameters, which include flow characteristics, weight variation, hardness,

friability, thickness, and disintegration time, were all met by all formulations.F3 was chosen as the best formulation out of the five due to its good physicochemical characteristics. The optimized formulation was suitable for additional in vitro testing since it demonstrated adequate hardness, low friability, a sufficient disintegration time, and good overall tablet quality**.** The optimized formulation (F3) demonstrated significant biological activity. It exhibited 88.2% DPPH radical scavenging activity and 81.5% Nitric oxide scavenging activity, indicating strong antioxidant potential. Furthermore, the formulation showed 73.3% ACE inhibitory activity, suggesting promising antihypertensive potential through inhibition of the angiotensin-converting enzyme. The in vitro dissolution study demonstrated satisfactory drug release, indicating that the formulated tablet is capable of releasing the active constituents effectively under the test conditions. Overall, the results of this investigation show that the created *Trillium govanianum* herbal tablet has promising antioxidant and ACE inhibitory properties in addition to desired medicinal qualities. The optimized formulation's potential as a candidate for additional research as a herbal antihypertensive formulation is supported by these findings. However, before clinical application, more stability testing, in vivo pharmacological research, and clinical trials are needed to confirm its safety, effectiveness, and therapeutic relevance.

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