

Original Article

Ameliorative effects of *Saussurea lappa* against hypertension and anxiety in animal models

Adarsh Gaur¹, Avijit Mazumder¹, Saumya Das¹, Shalini Raghuvanshi¹, Antra Sinha¹

¹Department of Pharmacology, Noida Institute of Engineering and Technology (Pharmacy Institute), Greater Noida, Uttar Pradesh, India.

***Corresponding author:**

Saumya Das,
Department of Pharmacology,
Noida Institute of Engineering
and Technology (Pharmacy
Institute), Greater Noida, Uttar
Pradesh, India.

awasthi.sauya22@gmail.com

Received: 20 May 2025
Accepted: 21 August 2025
Epub Ahead of Print: 16 March 2026
Published:

DOI
10.25259/IJPP_290_2025

Quick Response Code:



Supplementary material
available at:
[https://dx.doi.org/10.25259/
IJPP_290_2025](https://dx.doi.org/10.25259/IJPP_290_2025)

ABSTRACT

Objectives: The aim of the following study was to perform a comparative analysis examining the impact of *Saussurea lappa* on both anxiety and hypertension activities.

Materials and Methods: The *S. lappa* plant sample was collected and filtered to obtain the plant root extract by means of a Soxhlet apparatus, and was concentrated out by the assistance of rotary evaporator. Further, phytochemical screening was conducted, which helped to choose the solvent for the extract. For validating and evaluating the parameters of anxiety, for experimental animals, 24 Swiss albino mice (20–40 g) of either sex were chosen, and the elevated plus maze apparatus was used. For validating and evaluating the parameters of hypertension, for experimental animals, 24 Wistar albino rats (150–200g) of either sex and a BIOPAC apparatus was used.

Results: The research resulted in histopathological, statistical and graphical data of anxiolytic and anti-hypertensive effects in the respective experimental specimen animals, that is, Swiss albino mice and Wistar albino rats.

Conclusion: This research concludes and highlights the anxiolytic and anti-hypertensive potential of *S. lappa* root extracts, attributed to their rich phytochemical composition. Key bioactive compounds, including phenolics and flavonoids, contribute to reducing anxiety and lowering blood pressure. These findings support *S. lappa* as a promising natural therapy for anxiety and hypertension, warranting further research to confirm its efficacy and mechanisms.

Keywords: Anxiolytic-action, Clinical research, Costunolide, Herbal potential, *Saussurea lappa*

INTRODUCTION

Depression, stress and anxiety are among the most prevalent psychiatric conditions globally, marked by complex biochemical, behavioural and psychological disturbances. Anxiety, a state characterised by heightened motor tension, sympathetic activation and unease, is typically treated with benzodiazepines, although these carry risks of dependency.^[1] First-line pharmacological treatments for generalised anxiety disorder include selective serotonin reuptake inhibitors and serotonin-norepinephrine reuptake inhibitors, with second-line options like pregabalin available for those not responding to initial therapies.

Herbal treatments, such as lavender, chamomile and jasmine, are gaining popularity due to minimal side effects and accessibility, contributing to complementary approaches to anxiety management.^[2,3] Lifestyle adjustments, such as regular exercise, sleep regulation and omega-3 supplementation, have shown modest efficacy in reducing anxiety symptoms. Recent research

This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, transform, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

©2026 Published by Scientific Scholar on behalf of Indian Journal of Physiology and Pharmacology

emphasises exploring botanical therapeutics for mood disorders, with several medicinal plants undergoing pharmacological evaluation to address anxiety and depressive symptoms.^[1,3]

Hypertension, a leading cardiovascular disorder and public health challenge, is particularly prevalent in developing countries and poses high risks for serious conditions such as heart disease, kidney failure and stroke. Typically defined body arterial pressure readings above the normal systolic (100–140 mmHg) and diastolic (60–120 mmHg) ranges, hypertension's primary causes include genetic and environmental factors, with high salt intake, sedentary lifestyle and obesity as significant contributors. Secondary hypertension may arise from underlying conditions such as endocrine disorders or lifestyle factors like heavy alcohol intake. Treatment initially focuses on lifestyle modifications, such as a low-sodium diet, weight management and the dietary approaches to stop hypertension (DASH) diet, all shown to reduce blood pressure significantly.^[4-6] If medication is required, options include angiotensin-converting enzyme inhibitors, calcium channel blockers and beta-blockers, although side effects may limit their use.^[5] Herbal remedies such as *Allium sativum* and *Sesamum indicum* offer alternative or complementary approaches, highlighting a growing interest in botanical interventions for hypertension management.^[5,7]

Saussurea lappa, commonly known as costus or kuth, is a perennial herb of the Asteraceae family, native to the high-altitude Himalayan regions of India, Nepal and Bhutan. This species, notable for its thick rhizomes and large leaves, is renowned in traditional medicine systems such as Ayurveda and Unani for treating ailments such as asthma, skin diseases and rheumatism. However, due to extensive exploitation for medicinal and commercial use, *S. lappa* has become critically endangered and is now listed in Appendix 1 of CITES. To protect this valuable species, the Government of India, through the Ministry of Commerce and National Medicinal Plants Board, has restricted its export and highlighted it as a high-priority species for conservation and research. These efforts align with national policy goals to meet the growing demand, estimated at 0.43 tons annually, for medicinal plants, including *S. lappa*, across various therapeutic applications.^[5,8]

MATERIALS AND METHODS

The *S. lappa* plant sample was collected from the village of Dharali, Uttarakhand, in the month of November 2023. The plant was authenticated as *S. lappa* (Asteraceae) by Dr. Priyanka Ingle (Senior Scientist-D), Botanic Garden of the Indian Republic, Botanical Survey of India, Noida, Uttar Pradesh. The Specimen No. is (BSI/BGIR/1/TECH./2024/83).

Preparation of extract

The fully dried roots were procured from the local market and ground into a coarse powder. This powder was then sequentially extracted with 70% ethanol using a Soxhlet apparatus for 3–4 days. The resulting extract was collected and concentrated using a rotary evaporator, operating at the boiling point of ethanol (68°C) and a rotational speed of 89 RPM, for 40–50 min.^[9]

Estimation of extracted plant material

The resultant plant extract was subsequently desiccated using a heated water bath, and the percentage yield for the plant was determined through the following equation, yielding a value of 14.72% w/w.^[9]

The equation utilised to compute the percentage yield is provided here as:

$$\text{Percentage yield} = \text{Theoretical yield/Practical Yield} \times 100$$

The percentage yield of *S. lappa* = weight of leaves extract (g)/weight of dried leaves powder (g) × 100

$$\% \text{ yield} = 3.24/22 \times 100.$$

The extract yield derived from *S. lappa* was determined to be 14.72% w/w.

Phytochemical screening

The coarsely powdered roots of *S. lappa* were extracted using various solvents such as chloroform, methanol, hexane, dichloromethane, ethanol and water for phytochemical examination. The objective of this process was to identify the most effective solvent for further extraction using a Soxhlet apparatus. The ideal solvent would be the one in which the maximum number of phytoconstituents could be detected. To achieve this, 0.5 g of the powder was soaked in 5 mL of each solvent (chloroform, methanol, hexane, dichloromethane, ethanol and water) for 24 h. The mixtures were then filtered and subjected to various phytochemical tests [Table 1].^[10-12]

Choice of solvent

Ethanol was chosen for extraction because it is a popular solvent for plant extraction as it can efficiently extract both polar and non-polar compounds, is safe, easy to handle and widely available. It dissolves various compounds needed for research, such as alkaloids, glycosides, tannins and terpenoids, which have potent biological activities.^[7,11]

Experimental animals

24 Swiss albino mice (20–40 g) of either sex were randomly chosen for the anti-anxiety and 24 Wistar albino rats (150–200 g) of either sex were randomly chosen for the

Table 1: The results of the phytochemical screening conducted on the leaf extract of *Saussurea lappa*.

Phytochemicals	Phytochemicals tests	Ethyl acetate	Chloroform	Methanol	Ethanol	n-Hexane	Distilled Water
Phenols	Ferric chloride test	+	+	+	++	-	+
Tannins	Ferric Chloride test	-	+	+	+	-	+
Sterols	Salkowski's test	-	-	+	-	-	-
Alkaloids	Dragendroff's test	+	-	+	++	+	-
Flavonoids	Alkaline reagent test	+	-	++	++	-	-
Saponins	Frothing test	-	+	+	+	-	+
Glycosides	Legal's test	+	+	+	++	+	-
Terpenoids	Salkowski's test	-	-	+	+	-	-

'++' shows tremendous presence, '+' shows good presence and '-' shows absence of phytochemicals

anti-hypertensive activity and assembled into 4 groups ($n = 6$). They were acclimatised and housed in an animal house with a 12 h:12 h light-dull cycle at $27 \pm 2^\circ\text{C}$ temperature and 45–55% relative humidity. Sustenance and water are very important. This study did not involve human participants; therefore, approval from the Institutional Review Board (IRB) was not required. Creatures were arbitrarily partitioned into four groups, for example control, standard, low section of test and high section of test. Gathering 1 was considered as control and treated with superior water.^[13,14] Gathering 2 treated as standard, gatherings 3 treated as test drug (*S. lappa*), which is low dose (200 mg/kg) and gatherings 4 treated as test drug (*S. lappa*), which is high dose (400 mg/kg).^[3]

RESULTS

Elevated plus maze model

The below context illustrates the average count of entries and the duration of time spent in both open and closed arms subsequent to drug administration. The findings demonstrated a notable increase in the number of entries and time spent in the open arms among the groups treated with the extract, comparable to those treated with traditional anxiolytic medications. The administration of *S. lappa* ethanolic extract (SLEE), at doses of 200 mg/kg and 400 mg/kg, significantly augmented the count of entries and the duration of time mice spent in the open arms.^[15] Conversely, mice treated with the standard medication diazepam exhibited a considerably higher ($P < 0.001$) total number of entries in the open arms and longer periods spent in the open arms, while allocating less time in the closed arms.^[16,17]

The mean duration of time spent in the open arms showed a significant increase in the groups receiving the extract, as compared to the control group treated with the vehicle [Table 2]. In the control group, the average duration was 128.5 ± 6.71 s, whereas in the groups treated with *S. lappa* at doses of 200 mg/kg and 400 mg/kg, the durations were 186.8 ± 29.2 s and 238.1 ± 16.3 s, respectively [Figure 1].

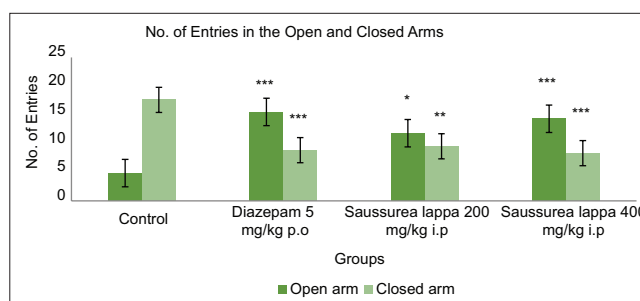


Figure 1: Impact of *Saussurea lappa* (200 and 400 mg/kg) as evaluated by the elevated plus maze model. The graphical representation demonstrated a noteworthy rise in the average duration of time spent in the open arms within the groups receiving the extract, in comparison to the control group treated with the vehicle. In the control group, the average duration was 128.5 ± 6.71 s, whereas in the groups treated with *S. lappa* at doses of 200 mg/kg and 400 mg/kg, the durations were 186.8 ± 29.2 s and 238.1 ± 16.3 s, respectively. Data are expressed as mean \pm SEM ($n = X$). * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$ compared with control.

Similarly, the average number of entries into the open arms was higher in the extract-treated groups compared to their respective control groups. In the control group, the average number of entries was 4.83 ± 2.31 , while in the groups treated with *S. lappa* at doses of 200 mg/kg and 400 mg/kg, the numbers were 11.8 ± 3.97 and 14.3 ± 3.50 , respectively [Figure 2].

Anti-hypertensive activity

Numbers below display the measurements of several parameters in rats subjected to different treatments: Control – high salt diet (HSD), atenolol (standard) and both doses of *S. lappa* root extract. The findings in Figure 3 indicate that salt-induced procedure significantly elevated mean arterial blood pressure (MABP), diastolic blood pressure (DBP) and systolic blood pressure (SBP) compared to the vehicle group. In contrast, the treatments with atenolol, SLEE 200 mg/kg and SLEE 400 mg/kg significantly

Table 2: Effect of *Saussurea lappa* root extract on mice in EPM.

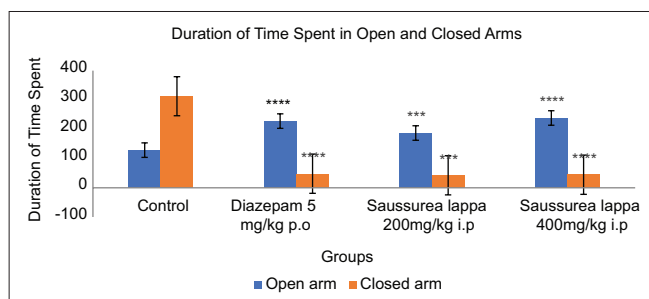
S. No.	Groups	Mean no. of entries		Mean time spent in (sec)	
		Open arm	Closed arm	Open arm	Closed arm
1.	Control	4.83±2.31	17.6±3.44	128.5±6.71	312.6±15.7
2.	Diazepam 5 mg/kg p.o	15.5±4.84***	8.83±2.31***	227.5±21.8****	47.8±5.63****
3.	<i>S. lappa</i> 200 mg/kg i.p	11.8±3.97*	9.5±4.27**	186.8±29.2***	42.8±7.08***
4.	<i>S. lappa</i> 400 mg/kg i.p	14.3±3.50***	8.33±3.38***	238.1±16.3****	44.6±4.71****

All values are presented as mean±SEM (Standard Error of the Mean). $n=6$, **** $P<0.0001$, *** $P<0.001$ and ** $P<0.01$, * $P<0.1$ compare to control (one-way analysis of variance followed by Dunnett test). EPM: Elevated plus maze

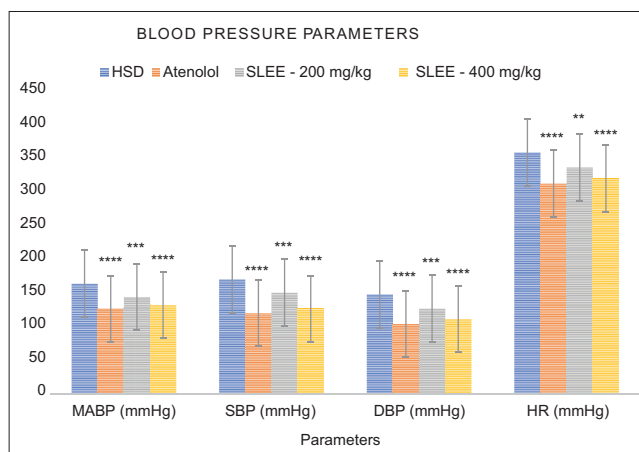
Table 3: Effects of different treatment groups on various blood pressure parameters and heart rate in rats.

Parameters	Group I HSD	Group II Atenolol	Group III SLEE - 200 mg/kg	Group IV SLEE - 400 mg/kg
MABP (mmHg)	164.33±4.84	127.16±8.32****	144.66±7.11***	132.66±8.16****
SBP (mmHg)	171.16±6.49	120.5±8.01****	151.16±6.94***	126.66±5.53****
DBP (mmHg)	148.5±9.85	104.33±5.88****	127.33±5.04***	111.5±6.02****
HR (mmHg)	360.16±12.89	313.66±8.38****	337.66±10.3**	321.16±12.73****

All values are presented as mean±standard error of the mean. $n=6$, **** $P<0.0001$, *** $P<0.001$, ** $P<0.01$ compare to control (one-way Analysis of Variance followed by Dunnett test). MABP: Mean arterial blood pressure, DBP: diastolic blood pressure, SBP: Systolic blood pressure, HR: Heart rate, HSD: High salt diet, SLEE: *Saussurea lappa* ethanolic extract

**Figure 2:** Impact of *Saussurea lappa* (200 and 400 mg/kg) as assessed by the elevated plus maze model. The graphical representation exhibited that the extract-treated groups demonstrated a greater average number of entries into the open arms compared to their respective control groups. In the control group, the average number of entries was 4.83 ± 2.31 , while in the groups treated with *S. lappa* at doses of 200 mg/kg and 400 mg/kg, the numbers were 11.8 ± 3.97 and 14.3 ± 3.50 , respectively. Data are expressed as mean \pm SEM ($n = X$). *** $P < 0.01$, **** $P < 0.001$ compared with control.

reduced MABP, DBP and SBP levels as compared to the salt group.^[15,18,19] In addition, the HSD group's heart rate (HR) was substantially higher than the control group. HR did not change significantly between the atenolol, both SLEE treatment groups and the high salt-induced group.^[20,21] These findings indicate that in rats with high salt induced hypertension, therapy with both atenolol and SLEE has been shown to lower blood pressure levels.^[11,22] The provided findings [Table 3] demonstrated that the SLEE 400 mg/kg

**Figure 3:** Impact of *Saussurea lappa* (200 and 400 mg/kg) as evaluated by the BIOPAC apparatus model. The graphical representation demonstrated a noteworthy decrease in blood pressure parameters (MAP, SBP, DBP) and heart rate (HR) in the groups receiving the extract, in comparison to the control group treated with the vehicle (HSD). Atenolol (10 mg/kg) served as the standard drug. Data are expressed as mean \pm SEM ($n = X$). ** $p < 0.01$, *** $p < 0.001$, **** $p < 0.0001$ compared with control.

dose was significantly more effective in treating hypertension than the 200 mg/kg dose and had an impact equivalent to the standard medicine atenolol. These data clearly showed that the root extract of *S. lappa* has considerable anti-hypertensive properties.^[23]

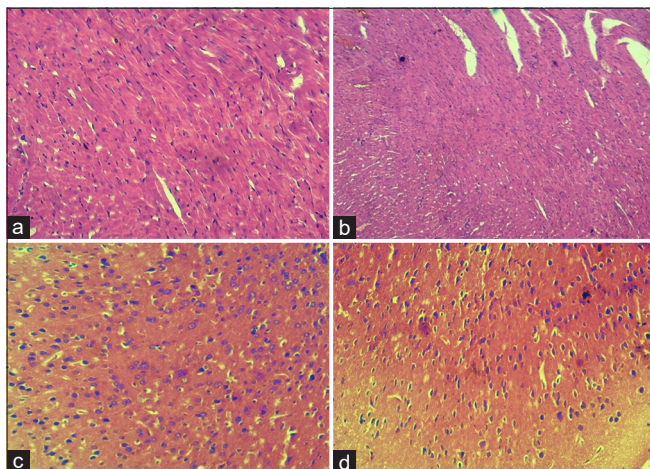


Figure 4: Histopathology of rat heart. This figure provides a clear visual representation of the observed differences among the groups. With (a) standard drug (Atenolol), (b) the one with high salt diet, (c-d) both the doses of *Saussurea lappa* extract. The groups subjected to the extract treatment display intermediate outcomes, positioned between the normal control and disease control groups. Histologically, most of the cardiac tissue appeared normal. Cardiac myocytes and endocardium appeared normal. Few congested vessels are seen in fructose induced group. Overall, no inflammation or any degenerative lesion were seen.

Histopathological examination of heart

The consumption of a diet high been associated with hypertension, metabolic disorders and cognitive decline.^[24,25] These dietary factors can lead to dysregulated lipid metabolism, insulin resistance and increased production of reactive oxygen species within the heart. In the context of hypertension, the elevated blood pressure exerts increased workload on the heart, leading to hypertrophy of cardiac myocytes. This pathological cardiac remodelling can result in structural changes [Figure 4] such as cardiomyocyte hypertrophy, interstitial fibrosis and alterations in the extracellular matrix.^[26] The chronic inflammatory state triggered by high fructose intake further exacerbates cardiac injury. Inflammation within the heart can be initiated by various factors, including oxidative stress, immune cell infiltration and the release of pro-inflammatory cytokines.^[27]

DISCUSSION

This research presents valuable evidence for the anxiolytic and anti-hypertensive potential of *S. lappa* root extracts, attributed to their rich phytochemical composition. The extracts demonstrated efficacy in reducing anxiety-related abnormalities, such as elevated adrenal cortisol levels, while also improving cardiovascular markers by lowering mean arterial, systolic and diastolic blood pressures. Key bioactive components identified in the extracts, including costunolide,

coumarin glycoside, chlorogenic acid, caffeic acid and hesperidin, are known for their biological effects. Notably, phenolic compounds such as catechin and chlorogenic acid are implicated in the anxiolytic properties, while flavonoid compounds, including coumarin glycoside, contribute to the anti-hypertensive effects. This suggests that *S. lappa*'s therapeutic action may be largely due to the presence of these specific bioactive phytoconstituents. The study's findings support the potential of *S. lappa* as an alternative therapy for managing anxiety and hypertension, though further research is needed to elucidate the mechanisms involved, determine optimal dosages and validate the consistency of these effects. In conclusion, *S. lappa* shows significant promise as a natural anxiolytic and anti-hypertensive agent.

CONCLUSION

This study highlights the promising potential of *Saussurea lappa* root extract as both an anxiolytic and anti-hypertensive agent. The extract showed clear, dose-dependent benefits, with higher doses performing on par with established drugs like diazepam and atenolol. Its rich phytochemical profile—particularly phenolics, flavonoids, alkaloids, and terpenoids—appears to play a key role in these therapeutic effects. Taken together, these results point to *Saussurea lappa* as a valuable natural option that could complement or even substitute conventional treatments for anxiety and hypertension. Still, more in-depth studies, including mechanistic insights, long-term safety testing, and clinical trials, are needed before its full potential can be translated into clinical practice.

Ethical approval: The research/study was approved by the Institutional Animal Ethics Committee (IAEC), Noida Institute of Engineering and Technology (Pharmacy Institute), protocol no. IAEC/NIET/2023/01/32, dated 13th December 2023.

Declaration of patient consent: Patient's consent was not required as there are no patients in this study.

Financial support and sponsorship: Nil.

Conflicts of interest: There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation: The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript, and no images were manipulated using AI.

REFERENCES

1. Aburto NJ, Ziolkovska A, Hooper L, Elliott P, Cappuccio FP, Meerpohl JJ. Effect of lower sodium intake on health: Systematic review and meta-analyses. *BMJ* 2013;22:346-7.
2. Allison DB, Fontaine KR, Heshka S, Mentore JL, Heymsfield SB. Alternative treatments for weight loss: A critical review. *Crit Rev Food Sci Nutr* 2001;41:1-28.
3. Al-Majed AA, Bakheit AH, Abdel Aziz HA, Alajmi FM, AlRabiah F. Profiles of drug substances, excipients, and related methodology. *BMJ* 2012;41:287-338.

4. Baldwin DS, Anderson IM, Nutt DJ, Allgulander C, Bandelow B, Boer JA, *et al.* Evidence-based pharmacological treatment of anxiety disorders, post-traumatic stress disorder and obsessive-compulsive disorder: A revision of the 2005 guidelines from the British Association for Psychopharmacology. *J Psychopharmacol* 2014;28:403-39.
5. Batelaan NM, Bosman RC, Muntingh A, Scholten WD, Huijbregts KM, van Balkom AJ. Risk of relapse after antidepressant discontinuation in anxiety disorders, obsessive-compulsive disorder, and post-traumatic stress disorder: Systematic review and meta-analysis of relapse prevention trials. *BMJ* 2017;42:375-6.
6. Bienvenu OJ, Ginsburg GS. Prevention of anxiety disorders. *Int Rev Psychiatry* 2007;19:647-564.
7. Blamey M, Grey-Wilson C. *Flora of Britain and Northern Europe*. Telangana: University Press; 1989. p. 76-8.
8. Bryson PD. Comprehensive review in toxicology for emergency clinicians. *Crit Rev Food Sci Nutr* 2017;4:167-8.
9. Chinnadurai S, Fonnesbeck C, Snyder KM, Sathe NA, Morad A, Likis FE, *et al.* Pharmacologic interventions for infantile hemangioma: A meta-analysis. *Pediatrics* 2017;137:345-9.
10. Davidson JR. Pharmacotherapy of social anxiety disorder. *J Clin Psychiatry* 2006;67:20-6.
11. Dhillon S, Oxley J, Richens A. Bioavailability of diazepam after intravenous, oral and rectal administration in adult epileptic patients. *Br J Clin Pharmacol* 1982;13:427-32.
12. Dluhy RG, Williams GH. Endocrine hypertension. In: Williams' textbook of endocrinology. 9th ed. Philadelphia, PA: W.B. Saunders; 1998. p. 729-34.
13. Dodds TJ. Prescribed benzodiazepines and suicide risk. A book of review of the literature. *Prim Care Companion CNS Disord* 2017;19:12-4.
14. Ehret GB, Munroe PB, Rice KM, Bochud M, Johnson AD, Chasman DI. Genetic variants in novel pathways influence blood pressure and cardiovascular disease risk. *Curr Sci* 2011;478:103-9.
15. Emamghoreishi M, Heidari-Hamedani G. Sedative-hypnotic activity of extracts and essential oil of coriander seeds. *Iran J Med Sci* 2006;31:22-7.
16. Epocrates. Diazepam contraindications and cautions. US: Epocrates Online; 2011.
17. Evans K, Sullivan MJ. Dual diagnosis: Counseling the mentally ill substance abuser. Vol. 31. New York: Guilford Press; 2001. p. 75-6.
18. Farooqi AA, Sreeramu BS, Srinivasappa KN. *Cultivation of spice crops*. Telangana: Universities Press; 2005. p. 36-9.
19. Fisher ND, Williams GH. Hypertensive vascular disease. *BMJ* 2005;51:34-7.
20. Freires IA, Denny C, Benso B, de Alencar SM, Rosalen PL. Antibacterial activity of essential oils and their isolated constituents against cariogenic bacteria: A systematic review. *Molecules* 2015;20:7329-58.
21. Go AS, Bauman MA, Coleman King SM, Fonarow GC, Lawrence W, Williams KA, *et al.* An effective approach to high blood pressure control: A science advisory from the American Heart Association, the American College of Cardiology, and the Centers for Disease Control and Prevention of Hypertension. *BMJ* 2014;63:878-85.
22. Kaviani H, Mousavi AS. Psychometric properties of the Persian version of beck anxiety inventory (BAI). *Tehran Univ Med J TUMS Publ* 2008;66:136-40.
23. Khalsa KP, Tierra M. *The way of Ayurvedic herbs: The most complete guide to natural healing and health with traditional Ayurvedic herbalism*. 1st ed. Delhi: Motilal Banarsidass Publishers; 2009.
24. Kowti R, Vishwanath Swamy AH, Inamdar SS, Joshi V, Kurnool AN. Hepatoprotective and antioxidant activity of ethanol extract of *Mentha arvensis* leaves against carbon tetrachloride-induced hepatic damage in rats. *Int J PharmTech Res* 2013;31:426-30.
25. Kumar D, Kumar S. Screening of antianxiety activity of *Abies pindrow* Royle aerial parts. *Indian J Pharm Educ Res* 2015;49:66-70.
26. Semlitsch T, Jeitler K, Berghold A, Horvath K, Posch N, Poggenburg S, *et al.* Long-term effects of weight-reducing diets in people with hypertension. *Cochrane Database Syst Rev* 2016;41:34-6.
27. Sewell RD, Rafieian-Kopaei M. The history and ups and downs of herbal medicine usage. *J Herbmed Pharmacol* 2014;5:32-7.

How to cite this article: Gaur A, Mazumder A, Das S, Raghuvanshi S, Sinha A. Ameliorative effects of *Saussurea lappa* against hypertension and anxiety in an animal models. *Indian J Physiol Pharmacol*. doi: 10.25259/IJPP_290_2025