



## A Review of Medicinal Herbs in the Lamiaceae Family Used to Treat Arterial Hypertension

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### ABSTRACT

Today, high blood pressure (arterial hypertension) is one of the most common cardiovascular diseases all over the world, particularly in developing countries. The Lamiaceae family is considered as one of the most important herbal families that have many plants with various pharmacological and therapeutic use around the world. This study aims to review medicinal herbs in the Lamiaceae family used to treat hypertension around the world. The obtained results of the present review investigation demonstrated that 26 medicinal herbs were traditionally used to treat hypertension around the world. The most important parts of these plants are leaves, roots, and flowers, respectively; whereas these medicinal herbs are most commonly used in Asian and African countries such as Iran, Pakistan, India, South Africa, etc. The results demonstrated that medicinal herbs in Lamiaceae family have universally used to treat hypertension. Thus, we can consider them as alternative agents for treatment of hypertension; nevertheless, more investigations are mandatory to elucidate the precise anti-hypertensive mechanisms and also toxicity of these plants in human subjects.

**Keywords:** hypertension, anti-hypertensive, herbal medicines, Lamiaceae, traditional medicine.

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### INTRODUCTION

One of the most common cardiovascular diseases among the world population particularly in developing countries is high blood pressure which is also called "arterial hypertension" (AHT) [1]. This condition occurs when there is a change in cardiac output, regional vascular resistance, or both [1]. Hypertension has been defined as bringing up the blood vessel pulse, ordered into three phases as indicated by the patient's level of systolic and diastolic circulatory strain [2]. According to the definitions of World Health Organization, AHT was described as a health condition that results in a constant increase in blood pressure (BP) of the arteries of individuals [3].

Today, it has been proven that AHT increases the risk of a number of cardiovascular diseases

such as coronary heart disease, congestive heart failure, ischemic and hemorrhagic brain strokes, angina, myocardial infarction, development of thrombosis, etc. in individuals [4, 5]. Now, there are two important approach for treatment of AHT, (a) use of the chemical and synthetic agents including diuretics, beta blockers, calcium channel blockers, etc.; (b) modifying lifestyle through consistent exercise, decreasing salt consumption, keeping the ideal weight, etc. [6-8]. In recent years, studies have shown that the use of chemical medications due to a number of adverse side effects have some limitations; thus, people tend to use alternative therapies especially natural products including herbal medicines with high efficacy and lower complications [9-12].

The use of herbal medicine represents a long history of human body [13]. And, medicinal plants have also been widely used as medicinal

and aromatic plants since the ancient times [14]. Many studies around the world have been conducted on the use of medicinal plants in the treatment of AHT which demonstrated high potential and minimum side effects of medicinal herbs compared to the existing chemical drugs [15-19].

Among the plants, Lamiaceae is considered as one of the most important families that have many plants with various pharmacological and therapeutic use around the world [20]. As [21] pointed out the Lamiaceae family is one of the most popular and representative plant groups, and nowadays, it is used both in traditional and modern medicine, as well as in the pharmaceutical and food industries. This study aims to review medicinal herbs in the Lamiaceae family used to treat hypertension worldwide.

#### MATERIALS AND METHODS

In the present review investigation, we used different databases including Web of Science,

PubMed, Google scholar EMBASE, Scopus and directory of open access journals (DOAJ). To achieve better results, our search was performed based on the combinations of some key words and their equivalents; hypertension, arterial hypertension, high blood pressure, herbal medicines, ethnobotany, medicinal plants, traditional medicine, Lamiaceae, etc.

#### RESULTS

The obtained results of the present review investigation demonstrated that 26 medicinal herbs were traditionally used to treat hypertension around the world. The most important parts of these plants are leaves, roots, and flowers, respectively; whereas these medicinal herbs are most commonly used in Asian and African countries such as Iran, Pakistan, India, South Africa, etc. Table 1 shows the medicinal plants that traditionally used to treat hypertension around the world.

**Table 1.** The medicinal herbs in Lamiaceae family used to treat hypertension around the world.

No.	Plant	Growth form	Part(s) of used	Distinct
1	<i>Ajuga bracteosa</i> Wall. ex Benth	Herb	Leaves	[22]
2	<i>Ballota Africana</i> (L.) Benth	Herb	Leaves	[23-26]
3	<i>Coleus forskohlii</i>	Herb	Root	[27]
4	<i>Isodon rugosus</i> (Wall. ex Benth.) Codd	Shrub	Leaves, roots	[28, 29]
5	<i>Lamium album</i> L.	Herb	Leaves	[28]
6	<i>Lavandula stoechas</i> L.	Herb	Leaves	[30]
7	<i>Leonotis leonurus</i> (L.) R.Br	Shrub	leaves, roots and flowers	[23-26]
8	<i>Mentha aquatic</i>	Herb	Leaves, stems, seeds	[31-33]
9	<i>Mentha longifolia</i> L.	Shrub	Stem and leaves	[23-26]
10	<i>Mentha longifolia</i> L.	Herb	Leaves, stem	[34]
11	<i>Mentha viridis</i> L.	Herb	Leaves	[35]
12	<i>Ocimum basilicum</i> L.	Herb	Leaves, roots	[22]
13	<i>Origanum vulgare</i> L.	Herb	Leaves	[36]
14	<i>Otostegia limbata</i> Benth. ex Hook.	Shrub	Leaves	[22]
15	<i>Polygonum orientale</i>	Herb	Leaves, roots, flowers	[37]
16	<i>Polygonum punctatum</i>	Herb	Leaves, roots	[38]
17	<i>Salvia africanacaerulea</i> L.	Herb	Leaves	[23-26]
18	<i>Salvia bucharica</i> Popov	Herb	Flower, leaves	[39]
19	<i>Tetradenia riparia</i>	Shrub	Leaves, seeds	[40]
20	<i>Teucrium stocksianum</i> Boiss.	Herb	Leaves, twigs, roots	[41]

Table 1. Continued

No.	Plant	Growth form	Part(s) of used	Distinct
1	<i>Ajuga chamaecistus</i>	Herb	Aerial part	[42]
2	<i>Lavandula stoechas</i>	Herb	Leaves, roots	[35]
3	<i>Marrubium anisodon</i> Koch	Herb	Leaves, roots	[43]
4	<i>Ocimum gratissimum</i>	Herb	Leaves	[44]
5	<i>Rosmarinus officinalis</i> L.	Herb	leaves, roots and flowers	[45]
6	<i>Salvia</i> spp.	Shrub, herb	Leaves, petal	[42]

## DISCUSSION

Today, among cardiovascular diseases, hypertension is considered as a major health problem around the world; with a prevalence of 35-40% among the world's population [46]. The disease is described an increase in systolic blood pressure  $\geq 140$  mm/hg and diastolic blood pressure  $\geq 90$  mm/Hg, distinctly or together [47, 48].

Based on the existing documents, humans applied medicinal herbs from thousands of years ago until now to treat their diseases around the world. Recently, the use of numerous drugs for the treatment of hypertension, and also the occurrence of some dangerous side effects of these medications result in a change in people's attitudes toward more use of medicinal plants [49]. For these reasons, the present investigation was designed to review medicinal herbs in the Lamiaceae family used to treat hypertension around the world. The obtained results of the present review investigation demonstrated that 26 medicinal herbs in Lamiaceae family were traditionally used to treat hypertension around the world. The most important parts of these plants are leaves, roots, and flowers, respectively; whereas these medicinal herbs are most commonly used in Asian and African countries such as Iran, Pakistan, India, South Africa, etc.

Based on the previous phytochemical investigations on plants from this family, the main compounds were tannin, polyphenol, flavonoids, alkaloids, as well as terpenoides. Previous studies have demonstrated that polyphenols have been measured as a therapeutic agent against various diseases such as cardiovascular diseases; whereas it can play a preventive role for hypertension [45-49]. Considering the flavonoides which are the main constituents in the plants of Lamiaceae family, previous study has proven

that these compounds are directly associated with lower coronary heart disease mortality [50].

Regarding the sesquiterpene as terpenes derivatives which were observed in Lamiaceae family, it has been previously proven that these components are associated with numerous biological and pharmacological characteristics including antitumor, antibacterial, cardiotoxic and anti-inflammatory effects and relax smooth muscles [51-54].

Another important ingredient in the plants of this family is tannin; in the study conducted by Zargham et al (2008), high efficacy of tannin has been proven to prevent or treat atherosclerosis and its clinical symptoms [55].

In the case of alkaloid components, previous investigations demonstrated that these components had high potential for treatment of cardiovascular and central nervous systems diseases including hypertension, bradycardia, arrhythmia, sedation, vascular dementia, and amnesia [56]. Therefore, it can be proposed that anti-hypertensive effects of these plants in Lamiaceae family are probably associated with the presence of these components.

## CONCLUSION

The results demonstrated that medicinal herbs in Lamiaceae family have universally been used to treat and reduce hypertension. Thus, we can consider them as alternative agents for treatment of hypertension; nevertheless, more investigations are mandatory to elucidate the precise anti-hypertensive mechanisms and also toxicity of these plants in human subjects.

### Conflicts of interest

The authors declare no conflict of interest in this study.

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**REFERENCES**

1. Leng, G.C., Lee, A.J., FOWKERS, F.G.R., WHITEMAN, M., Dunbar, J., Housley, E., Ruckley, C.V. 1996. Incidence, natural history and cardiovascular events in symptomatic and asymptomatic peripheral arterial disease in the general population. *International journal of epidemiology*, 25: 1172-1181.
2. Abd Elwahaab, H.A. Rahmy, A.F. Hagag, A.A. Fares, H.M. & Fouad, Sh.A. (2019). Effect of Aerobic exercises on Blood coagulation and Fibrinolysis factors in Elderly Hypertensive patients. *J Adv Pharm Edu Res*, 9(1), pp. 44-48.
3. World Health Organisation New data highlight increases in hypertension, diabetes incidence. Available from: [http://www.who.int/mediacentre/news/releases/2012/world\\_health\\_statistics\\_20120516/en/](http://www.who.int/mediacentre/news/releases/2012/world_health_statistics_20120516/en/). (Accessed: 30/05/15).
4. Lawes CM, Vander Hoorn S, Rodgers A. Global burden of blood-pressure-related disease, 2001. *Lancet* 2008; 371:1513-8.
5. MacMahon, S., Peto, R., Collins, R., Godwin, J., Cutler, J., Sorlie, P., Abbott, R., Neaton, J., Dyer, A., Stamler, J. 1990. Blood pressure, stroke, and coronary heart disease: part 1, prolonged differences in blood pressure: prospective observational studies corrected for the regression dilution bias. *The Lancet*, 335: 765-774.
6. Brook RD, Appel LJ, Rubenfire M, Ogedegbe G, Bisognano JD, Elliott WJ, et al. Beyond medications and diet: alternative approaches to lowering blood pressure. *J Hypertens* 2013; 61:1360-83.
7. Sarafidis PA, Li S, Chen SC, Collins AJ, Brown WW, Klag MJ, et al. Hypertension awareness, treatment, and control in chronic kidney disease. *Am J Med* 2008; 121:322-40.
8. Appel, L.J., Champagne, C.M., Harsha, D.W., Cooper, L.S., Obarzanek, E., Elmer, P.J., Stevens, V.J., Vollmer, W.M., Lin, P.-H., Svetkey, L.P. 2003. Effects of comprehensive lifestyle modification on blood pressure control: main results of the PREMIER clinical trial. *Journal of the American Medical Association*.
9. Collaboration, B.P.L.T.T. 2000. Effects of ACE inhibitors, calcium antagonists, and other blood-pressure-lowering drugs: results of prospectively designed overviews of randomised trials. *The Lancet*, 356: 1955-1964.
10. Mitaliya KD, Bhatt DC, Patel NK, Dodia SK. Herbal remedies used for hair disorders by tribals and rural folk in Gujarat. *Indian J Tradit Know* 2003; 2:389-92.
11. Snyder FJ, Dundas ML, Kirkpatrick C, Neill KS. Use and safety perceptions regarding herbal supplements: a study of older persons in southeast Idaho. *J Nutr Elder* 2009; 28:81-95.
12. Tekol, Y., 2007. The medieval physician Avicenna used an herbal calcium channel blocker, *Taxus baccata* L. *Phytotherapy Research*, 21: 701-702.
13. Sayed Ahmad, M. Shawky, A. Ghobashy, M.O. & Ahmed Felifel, R.H. (2018). Effect of Some medicinal plants on life cycle of Citrus Brown Mites (*Eutetranychus orientalis*). *International Journal of Pharmaceutical Research & Allied Sciences*, 7(4), pp.13-17.
14. Ojewumi, M. E. Adeyemi, A. O. & Ojewumi, E. O. (2018). Oil extract from local leaves - an alternative to synthetic mosquito repellents. *Pharmacophore*, 9(2), pp. 1-6.
15. Mensah JK, Okoli RI, Turay AA, Ogie-Odia EA. Phytochemical analysis of medicinal plants used for the management of hypertension by Esan people of Edo state, Nigeria. *Ethnobot Leaflets* 2009; 10:7.
16. World Health Organization. The use of herbal medicine in primary health care. In: Report of the Regional Meeting. 10-12 March 2009, Yangon, Myanmar. WHO, New Delhi, 2009. World Health Organization. In: Adherence to long term therapies: evidence for action. WHO, Geneva, Switzerland, 2003.
17. Sharma I, Parashar B, Dhamija HK, Sharma R. An ayurvedic arena for hypertension treatment. *Asian J Pharmaceut Res* 2012; 2:54-8.

18. Stockwell C. Nature's pharmacy: a history of plants and healing. Random House, London, UK, 1988.
19. World Health Organization. WHO traditional medicine strategy 2014–2023. WHO, Geneva, Switzerland, 2013.
20. Bekut M., Brkić S., Kladar N., Dragović G., Gavarić N., Božin B. Potential of selected Lamiaceae plants in anti(retro)viral therapy. 2017 doi: 10.1016/j.phrs.2017.12.016.
21. Bouhabila, A. Zellagui, A. Telci, I. Maarfia, S. & Gherraf, N. (2018). Changeability of Essential Oils in Algerian *Mentha Rotundifolia* L.(Lamiaceae) Growing in Sub Humid Area. *World Journal of Environmental Biosciences*. 7(4),pp.45-47.
22. Ahmad L, Semotiuk A, Zafar M, Ahmad M, Sultana S, Liu QR, et al. Ethnopharmacological documentation of medicinal plants used for hypertension among the local communities of DIR Lower, Pakistan. *J Ethnopharmacol* 2015; 175:138–46.
23. Nortje, J. 2011. Medicinal ethnobotany of the Kamiesberg, Namaqualand, Northern Cape Province. MSc thesis. University of Johannesburg.
24. Philander, L. A. 2011. An ethnobotany of Western Cape Rasta bush medicine. *Journal of ethnopharmacology*. 138(2), 578-594.
25. Van-Wyk, B. E., Van Heerden, F., Van Oudtshoorn, B. 2005. *Poisonous Plants of South Africa*. Briza Publications, Pretoria.
26. Mintza Mi Nzue, A. P. 2009. Use and conservation status of medicinal plants in the Cape Peninsula, Western Cape Province of South Africa. Unpublished MSc thesis. Stellenbosch: University of Stellenbosch.
27. Agrawal M, Nandini D, Sharma V, Chauhan NS. Herbal remedies for treatment of hypertension. *Inte J Pharm Sci Res* 2010; 1(5): 1-21.
28. Ahmad I, Jan S, Begum A, Wali S. Taxonomic diversity and ethnobotanical characteristics of the family Lamiaceae of Swat, Khyber Pakhtunkhwa, Pakistan. *Pak J Bot* 2007; 39:699–710.
29. Amjad MS, Qaeem MF, Ahmad I, Khan SU, Chaudhari SK, Zahid MN, et al. Descriptive study of plant resources in the context of the ethno-medicinal relevance of indigenous flora: a case study from Toli Peer National Park, Azad Jammu and Kashmir, Pakistan. *PLoS One* 2017; 12(2): e0171896. doi:10.1371/journal.pone.0171896.
30. Shah SA, Shah NA, Ullah S, Alam MM, Badshah H, Ullah S, et al. Documenting the indigenous knowledge on medicinal flora from communities residing near Swat River (Suvastu) and in high mountainous areas in Swat-Pakistan. *J Ethnopharmacol* 2016; 182:67–79.
31. Moffett RO. *Sesotho Plant and Animal Names and Plants used by the Basotho*. Bloemfontein: Sun Press; 2010
32. Moteetee A, van Wyk BE. The medical ethnobotany of Lesotho. *Bothalia* 2011; 5: 209–228
33. Olorunnisola OS, Bradley G, Afolayan AJ. Ethnobotanical information on plants used for the management of cardiovascular diseases in Nkonkobe Municipality. *S Afr J Med Plants Res* 2011; 5: 4256–4260.
34. Alamgeer MS, Jabeen Q, Bashir S, Malik MNH, Khan HU, Rahman MSU, et al. Antihypertensive and toxicity studies of aqueous methanolic extract of *Mentha longifolia* L. *J Anim Plant Sci* 2013; 23(6):1622–27.
35. Gilani AH, Aziz N, Khan MA, Shaheen F, Jabeen Q, Siddiqui BS, et al. Ethnopharmacological evaluation of the anticonvulsant, sedative and anti-spasmodic activities of *Lavandula stoechas* L. *J Ethnopharmacol* 2000; 71:161–7.
36. Haq F. The ethno botanical uses of medicinal plants of Allai Valley, western Himalaya Pakistan, *Int J Plant Res* 2012; 2:21–34.
37. Li WG, Zhang XY, Wu YJ, Tian, X. Anti-inflammatory effects and mechanism of *Polygonum paleaceum* Wall extracts. *Journal of Pharmacology and Clinic of Traditional Chinese Medicine* 2002; 18:18–20.
38. Oliveira-Simoes CM, Ribeiro-do-Vale RM, Poli A, Nicolau M, Zanin M 1989. Pharmacological investigation on *Polygonum punctatum* Elliott extracts. Part I. Tests in vivo. *J Pharm Belg* 1989; 44: 275-284.
39. Tareen RB, Bibi T, Khan MA, Ahmad M, Zafar M. Indigenous knowledge of folk medicine by the women of Kalat and Khuzdar regions of Balochistan, Pakistan. *Pak J Bot* 2010; 42:1465–85.

40. Davids D, Gibson D, Johnson Q. Ethnobotanical survey of medicinal plants used to manage high blood pressure and type 2 diabetes mellitus in Bitterfontein, Western Cape Province, South Africa. *J Ethnopharmacol* 2016; 194: 755–766
41. Ahmad L, Semotiuk A, Zafar M, Ahmad M, Sultana S, Liu QR, et al. Ethnopharmacological documentation of medicinal plants used for hypertension among the local communities of DIR Lower, Pakistan. *J Ethnopharmacol* 2015; 175:138–46.
42. Razmjouei D, Zarei Z, Akbari M. Ethnobotanical study of medicinal plants of Abadeh city in Fars province. *Journal Plants Eco-physiology* 2015; 7(3): 222-234.
43. Rajaeia P and Mohamadi N. Ethnobotanical Study of Medicinal Plants of Hezar Mountain Allocated in South East of Iran. *Iranian Journal of Pharmaceutical Research* 2012; 11 (4): 1153-1167.
44. Mensah JK, Okoli RA, Turay AA, Ogie-Odia EA. Phytochemical Analysis of Medicinal Plants Used for the Management of Hypertension by Esan people of Edo State, Nigeria. *Ethnobotanical Leaflets* 13: 1273-87. 2009.
45. al-Sereiti M. R., Abu-Amer K. M., Sen P. Pharmacology of rosemary (*Rosmarinus officinalis* Linn.) and its therapeutic potentials. 1999;37(2):124–130. [PubMed]
46. Poulter NR, Prabhakaran D, Caulfield M. Hypertension. *Lancet* 2015; 386: 801–812
47. Chow CK, Teo KK, Rangarajan S, Islam S, Gupta R, Avezum A, et al. Prevalence, awareness, treatment, and control of hypertension in rural and urban communities in high, middle, and low-income countries. *J Am Med Ass* 2013; 310:959–68.
48. James PA, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J, Lackland DT, Lefevre ML, Mackenzie TD, Oggedegbe O, Smith SC, Svetley LP, Taler SJ, Townsend RR, Wright JT, Narva AS, Ortiz E. 2014 Evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee (JNC 8). *JAMA* 2014; 311: 507–520. doi:10.1001/jama.2013.284427.
49. Nole T, Lionel TW, Cedrix TS, Gabriel AA. Ethnomedical and ethnopharmacological study of plants used for potential treatments of diabetes and arterial hypertension by indigenous people in three phyto-geography regions of Cameroon, *Diabetes Case Rep* 2016; 110:2.
50. Peterson JJ, Dwyer JT, Jacques PF, McCullough ML. Associations between flavonoids and cardiovascular disease incidence or mortality in European and US populations. *Nutr Rev.* 2012 Sep;70(9):491-508.
51. Rodriguez E, Towers G, Mitchell J. Biological activities of sesquiterpene lactones. *Phytochemistry.* 1976;15:1573-80.
52. de P. Emerenciano V, S. Ferreira Z, Auxiliadora C. Kaplan M, R. Gottlieb O. A chemosystematic analysis of tribes of asteraceae involving sesquiterpene lactones and flavonoids. *Phytochemistry.* 1987;26:3103-15.
53. Asadi-Samani M, Rafieian-Kopaei M, Azimi N. Gundelia: a systematic review of medicinal and molecular perspective. *Pak J Biol Sci.* 2013; 16:1238- 1247.
54. da Silveira e Sá Rde C, Andrade LN, de Sousa DP. Sesquiterpenes from essential oils and anti-inflammatory activity. *Nat Prod Commun.* 2015; 10:1767-74.
55. Zargham H, Zargham R. Tannin extracted from Sumac inhibits vascular smooth muscle cell migration. *McGill J Med.* 2008; 11(2): 119–123.
56. Zhou JY, Zhou SW. Isorhynchophylline: A plant alkaloid with therapeutic potential for cardiovascular and central nervous system diseases. *Fitoterapia* 2012; 83 (4): 617-626.