e-ISSN:2322-0066

Research & Reviews: Research Journal of Biology

Alternative Herbal Medicine for Hypertension and Anxiety: *Passiflora sp.*-A Short Review

Sabyasachi Chatterjee[1]*, Kaniz Wahida Sultana[1], Anindita Roy[2], Indrani Chandra[1]

[1]Department of Biotechnology, the University of Burdwan, Burdwan, West Bengal, India
[2]M.U.C. Women's College, The University of Burdwan, Burdwan, West Bengal, India

Editorial

Received date: 30/12/2015
Accepted date: 01/01/2016
Published date: 04/01/2016

***For Correspondence**

Dr.Sabyasachi Chatterjee, Faculty, Department of Biotechnology, the University of Burdwan, Burdwan, West Bengal, India. Tel: (+91)9474786086

E-mail: sabsach@rediffmail.com

Keywords: Hypertension, Anxiety, *Passiflora sp*., Chrysin, GABA (γ-amino butyric acid), Antihypertensive, Anxiolytic.

ABSTRACT

Hypertension, a major public health issue is responsible for cardiovascular diseases worldwide. Increase of either cardiac output or peripheral resistance of an individual will results in increase of blood pressure, which is related to hypertension. Anxiety, another health problem related to most of the people in the World, is a psychological disorder characterized by a persistent and disproportionate fear unrelated to genuine risk.

Though, several well-known drugs are available now a day in the market, but most of the drugs have reports of side effects on patients. So, finding of alternative herbal medicine for the treatment of both the health issues are the main objectives of research groups. Some species of *Passiflora* plants having antihypertensive and antianxiety properties may be considered as herbal drugs as there are few reports on the above said properties.

INTRODUCTION

Hypertension is a common cardiovascular disease and now a day it is a major public health issue. Cardiovascular diseases account for 12 million deaths annually Worldwide.

Hypertension scientifically indicates the increase of blood pressure. Sum of cardiac output and peripheral vascular resistance signifies the blood pressure of an individual. Since, increase in either cardiac output or peripheral resistance will increase the blood pressure, this health issue is known as hypertension. Hypertension accounts for several cardiovascular pathologies such as arteriosclerosis, coronary artery disease, and myocardium infarct, renal insufficiency, stroke and dissecting aneurysm of aorta [1]. Various drugs has been introduced to control the hypertension health problems, but some of them causes side effects such as kidney failure, skin diseases, diarrhea, fever, vomiting, headache etc. So, now herbal medicines are considered as alternative of synthetic drugs.

Anxiety is a psychological disorder characterized by a persistent and disproportionate fear unrelated to genuine risk. There are several types of anxiety disorders including generalized anxiety disorder, panic disorder, social anxiety disorder and specific phobias. Though, therapeutic drugs such as monoamines, neurosteroids, benzodiazepines and serotonin are used in the treatment of anxiety disorders but due to the side effects of them, now herbal medicines are thought to be safe for treatment of anxiety disorders.

This review is about the contribution of some species of *Passiflora* (medicinal plant) in treatment of hypertension as well as anxiety disorders. *Passiflora sp*., belongs to the family of *Passifloraceae*, is also known as Passionflower or passion vines. *Passiflora* is a genus of about 500 species of flowering plants. They mostly vines, with some being shrubs and a few species being herbaceous. Mostly they are native to South America, Eastern Asia (including India), South Asia and New Guinea. Some are native to United States, California, Florida and Australia and also to New Zealand [2].

Scientific Classification [3]

Kingdom: Plantae

Class: Magnoliopsida

Subclass: Dilleniidae

Order: Violales

Family: Passifloraceae

Genus: Passiflora

Some common *Passiflora species* are *Passiflora edulis* (Passion fruit), *Passiflora incarnata* (Maypop), *Passiflora foetida* (Stinking passion flower), *Passiflora alata* (Winged stem passion flower), *Passiflora actinia, Passiflora quadrangularis* (Giant granadilla), *Passiflora caerulae* (Blue passion flower) and *Passiflora lutea.* Some of these have antihypertensive and anxiolytic property and those species can be considered as alternative herbal medicine for hypertension and anxiety instead of using drug.

Antihypertensive activity

Significantly decreased systolic and diastolic blood pressure of spontaneously hypertensive rats were observed after 1 to 7 hours of oral administration of methanolic extract of *Passiflora* edulis rind (outer skin of Passion fruit) (10 mg/kg or 50 mg/kg) in those spontaneously hypertensive rats (SHRs). The concentration of γ-amino butyric acid (GABA) contained in the methanolic extract of *Passiflora* edulis rind was measured as 2.4 mg/g of dry weight using amino acid quantitative analysis with Liquid Chromatography tandem mass spectrometry (LC-MS)/ Mass Spectrometry [4] and it has been reported that oral administration of GABA (0.5 mg/kg) significantly lowered systolic blood pressure in SHRs but not in normotensive rats [5]. Konta et al., have evaluated the antihypertensive properties of fruit pulp of *Passiflora edulis* on spontaneously hypertensive rats and they have reported that the highest dose of fruit pulp significantly reduced the systolic blood pressure [6]. The reduced systolic and diastolic blood pressure was observed in the hypertensive Wistar rats (hypertension -induced by administering 8% salt NaCl solution for 2 weeks) after administering the ethyl acetate extract of aerial part of the *Passiflora foetida* plant [7]. Patel et al., have reported that the methanolic extract of whole plant of *Passiflora nepalensis* possess antihypertensive activity and the reduction in mean arterial pressure, pulse and blood pressure in renal hypertensive rats after administration of 75, 150 and 225 mg/kg of that extract indicates antihypertensive effect of *Passiflora nepalensis* [8]. Antihypertensive effect of aqueous extract of whole plant of *Passiflora nepalensis* have evaluated on renal hypertensive rats [9]. *Passiflora incarnata* possesses the antihypertensive activity due to the presence of water-soluble substance isolated as mercury salt ($C_{10}H_{22}O_8NHgCl_2$) [10]. *Passiflora caerulae* flower extract contains chrysin ($C_{15}H_{10}O_4$), a naturally occurring flavone (flavonoid). Antihypertensive activity of chrysin was observed on hepatic and renal activity of Nω-nitro-l-arginine-methylester induced hypertensive rats [11].

Antianxiety or anxiolytic activity

Antianxiety activity of *Passiflora edulis* plant is reported in the elevated plus maze, open-field and horizontal–wire tests performed on mice [12]. Anxiolytic activity of aqueous extract of Passiflora *edulis* and *Passiflora alata* leaves have evaluated using the elevated plus-maze test (used as anxiety animal model) and leaf extract of the both the plants at doses of 50, 100 and 150 mg/ kg have showed anxiolytic activity in the elevated plus-maze model [13]. Spray-dried powders of Passiflora *edulis* and Passiflora *alata* leaves have potential anxiolytic activity on the male adult Swiss rats administered with 200, 400 and 800 mg/kg of that spray- dried powder (evaluated by elevated plus-maze test) [14]. It is reported that butanol and ethanol extract of the aerial parts of *P. edulis* have anxiolytic effect at low doses [15]. It was evaluated that the methanolic extracts and fractions of Passiflora *actinia* leaves showed significant increase in the percentage of entries and time into the open arms of the maze (elevated maze test for anxiolytic activity) and suggested the potential anxiolytic property of *Passiflora actinia* [16]. A significant anxiolytic activity at a dose of 10 mg/kg of methanolic extract of *P. incarnata* flower have evaluated in mice using the elevated plus-maze test (model of anxiety test) [17]. Grundmann et al., demonstrated the GABA- mediated anxiolytic activity of HPLC characterized flower extracts of *P. incarnata* using elevated plus maze test [18]. Chrysin, a naturally occurring flavone of *Passiflora caerulae* flowers showed anxiolytic effect by binding to the central benzodiazepine receptors displacing [3H] flunitrazepam when examined in mice [19]. It was observed that hydroalcohol extract of *Passiflora quadrangularis* leaves exhibited a significant increase in time spent in the open arms at a dose of 500 mg/kg and it was evaluated in two animal models (adult male Wistar rats and Swiss mice) using elevated plus maze test for anxiety. This suggested the anxiolytic effect of *Passiflora quadrangularis* [20] which needs to be further explored.

REFERENCES

1. Oparil S. Treating multiple risk hypertensive populations. Am J Hypertens. 1999;12:121-129.
2. http://en.wikipedia.org/wiki/*Passiflora*.
3. http://plants.usda.gov/java/classification.

4. Ichimura T. Antihypertensive effect of *Passiflora edulis* Rind in spontaneously hypertensive rats. *Biosci Biotechnol Biochem.* 2006;70(3):718-721.
5. Hayakawa K, Kimura M and Kamata K. Mechanism underlying GABA-induced antihypertensive effect in spontaneously hypertensive rats. Eur J Pharmacol. 2002;438: 107-113.
6. Konta EM. Evaluation of the antihypertensive properties of yellow passion fruit pulp (*Passiflora edulis* Sims f. flavicarpa Deg.) in spontaneously hypertensive rats. Phytother Res. 2014;28(1):28-32.
7. Ranganatha N, Kuppast I J and Veerashekar T. Study of Antihypertensive activity of Aerial parts of *Passiflora foetida* Linn. An International Research Journal of Pharmacy and Plant Science. 2013;1(3):1-12.
8. Patel SS et al. Antihypersensitive effect of *Passiflora nepalensis*. Brazilian Journal of pharmacognosy. 2011;21(1):187-189.
9. Patel SS et al. Antihypertensive effect of an aqueous extract of *Passiflora nepalensis* Wall. International Journal of Applied Research in Natural Products. 2010;3(2):22-27.
10. The Wealth of India. A Dictionary of Indian Raw Materials and Industrial Products CSIR. 7: 278-9.
11. Ramanathan V and Thekkumalai M. Role of Chrysin on hepatic and renal activities of $N^{(\omega)}$-nitro-l-arginine-methylester induced hypertensive rats. International Journal of Nutrition Pharmacology Neurological Diseases. 2014;4(1):58-63.
12. Coleta M et al. Comparative evaluation of *Melissa officinalis* L., *Tilia europaea* L., *Passiflora edulis* Sims. and *Hypericum perforatum* L. in the elevated plus maze anxiety test. Pharmacopsychiatry.2001;34(1):20-21.
13. De Paris F et al. Pharmacochemical study of aqueous extracts of *Passiflora alata* Dryander and *Passiflora edulis* Sims, *Acta Farm.* Bonaerense. 2002;21(1):5-8.
14. Reginatto FH et al. Evaluation of anxiolytic activity of spray dried powders of two South Brazilian *Passiflora* species. Phytother Res. 2006;20(5):348-351.
15. Deng J et al. Anxiolytic and sedative activities of *Passiflora edulis* f. flavicarpa. J Ethnopharmacol. 2010;128:148-153.
16. Da Santos KC et al. Sedative and anxiolytic effects of methanolic extract from the leaves of *Passiflora actinia*. Braz Arch Boil Technol. 2006;49(4):565-573
17. Dhawan K, Kumar S and Sharma A. Antianxiety studies on extracts of *Passiflora incarnata* Linn. J Ethnopharmacol. 2001;78(2-3):165-170.
18. Grundmann O et al. Anxiolytic activity of a Phytochemically Characterized *Passiflora incarnata* extract is mediated via the GABAergic system. Planta Med. 2008;74:1769-1773.
19. Wolfman C et al. Possible Anxiolytic effects of chrysin a central benzodiazepine receptor ligand isolated from *Passiflora caerulae*. Pharmacol Biochem Behav. 1994;47(1):1-4.
20. De Castro PF et al. Possible Anxiolytic Effect of two extracts of *Passiflora quadrangularis* L. in Experimental Models. Phytother Res. 2007;21:481-484.