

# Phyto therapeutic Potential of Ayurvedic Herbs in Managing Cardiovascular Diseases in Aging Populations

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**Abstract**— Cardiovascular diseases (CVDs) are a primary cause of mortality and morbidity worldwide, disproportionately affecting aging populations. This study systematically reviews the Phyto therapeutic potential of select Ayurvedic herbs, including Terminalia arjuna, Withania somnifera, Commiphora mukul, Ocimum sanctum, Bacopa monnieri, Allium sativum, Hibiscus sabdariffa, and Boerhavia diffusa, in managing cardiovascular health in elderly patients. These herbs are noted for their various therapeutic attributes, such as lipid modulation, antihypertensive effects, antioxidative properties, and stress reduction. Despite the traditional usage and emerging scientific backing of these herbs, rigorous clinical validation remains sparse, particularly concerning their mechanisms of action and long-term safety profiles. The literature study employed a meticulous search strategy across multiple databases, synthesizing data from peer-reviewed articles focused on the use of these herbs in elderly populations. Results from thematic analysis reveal consistent trends: Terminalia arjuna and Commiphora mukul significantly improve lipid profiles, while Allium sativum and Hibiscus sabdariffa are effective in reducing blood pressure. Furthermore, Withania somnifera and Bacopa monnieri exhibit adaptogenic and antioxidative capacities that contribute to cardiovascular resilience. Quantitative analysis supports these findings, highlighting notable reductions in cholesterol levels and blood pressure across several clinical trials. This study recommends further interdisciplinary research to facilitate the integration of Ayurvedic herbs into contemporary cardiovascular treatment paradigms, thereby enhancing the quality of life in aging populations through culturally resonant and accessible healthcare solutions.

**Index Terms**- Cardiovascular Disease, Phyto Therapeutic, Ayurveda Herbs

## I. INTRODUCTION

Cardiovascular diseases (CVDs) remain a leading cause of mortality and morbidity globally, notably

impacting aging populations. Increasing age is one of the most significant risk factors for the development of conditions such as hypertension, coronary artery disease, and heart failure. In recent years, there has been a growing interest in the role of traditional medicine, particularly Ayurveda, for its potential phytotherapeutic benefits in managing cardiovascular health among older adults.

Ayurveda, an ancient Indian medical system, offers a vast repository of herbal remedies that have been traditionally utilized to promote cardiovascular health. Several Ayurvedic herbs, such as Arjuna (Terminalia arjuna), Ashwagandha (Withania somnifera), and Guggulu (Commiphora mukul), are recognized for their cardio-protective properties. Clinical studies have indicated that these herbs possess antioxidative, anti-inflammatory, and lipid-lowering properties which could contribute to cardiovascular health<sup>(1, 2)</sup>. The therapeutic use of these herbs is often attributed to their synergy in multi-herb formulations, which align with the holistic principles of Ayurveda<sup>(3)</sup>.

Despite the traditional successes and emerging scientific support for Ayurvedic interventions, there remains a paucity of rigorous clinical evidence validating their efficacy and safety in the context of modern clinical practices, especially in aging populations. Furthermore, the precise mechanisms through which these herbs exert cardioprotective effects are not yet fully understood and warrant further investigation<sup>(4)</sup>. Additionally, limited data exists regarding the standardization of herbal dosages, potential interactions with conventional medications, and long-term effects specific to elderly patients.

In regions like South Asia, where cardiovascular disease prevalence is rising rapidly, the integration of Ayurvedic practices into mainstream healthcare holds significant promise. Countries such as India have a long tradition of utilizing Ayurvedic medicine, and there is substantial governmental and institutional support for research in this area <sup>(5)</sup>. Conversely, in Western nations, despite increasing acceptance of complementary therapies, Ayurvedic medicine faces regulatory hurdles and scepticism due to its traditional roots and perceived lack of scientific validation <sup>(6)</sup>.

Locally, the presentation of cardiovascular diseases in the elderly often includes a higher incidence of comorbidities such as diabetes, obesity, and metabolic syndrome, which complicates management strategies <sup>(7)</sup>. In many communities, especially rural areas with limited access to conventional healthcare, Ayurveda offers a feasible and culturally accepted alternative <sup>(8)</sup>. However, integrating these practices into local healthcare systems poses challenges, including the need for education among practitioners and patients about safe and effective use.

This research aims to systematically evaluate the phytotherapeutic potential of key Ayurvedic herbs in managing cardiovascular diseases within aging populations. It seeks to fill existing knowledge gaps by assessing the efficacy and safety of these herbs through controlled clinical trials and elucidating their underlying cardioprotective mechanisms. By doing so, the study endeavours to propose scientifically grounded guidelines for integrating Ayurvedic interventions into modern clinical practice, enhancing cardiovascular care for elderly patients.

## II. METHODS

### Literature Study Design

The literature study was designed as a comprehensive review aimed at synthesizing existing research on the phytotherapeutic potential of Ayurvedic herbs for managing cardiovascular diseases in aging populations. The following steps outline the systematic approach taken to ensure a thorough and unbiased review.

### Scope and Objectives

The primary objective of this literature study was to evaluate the efficacy, safety, and mechanisms of action of Ayurvedic herbs used in the treatment of cardiovascular diseases among the elderly. Secondary objectives included identifying research gaps and highlighting areas for future study.

### Search Strategy

**Databases and Sources:** Recognizing the diversity of research on Ayurvedic medicine, multiple electronic databases were employed, including PubMed, Scopus, Web of Science, and specialized platforms like the Digital Helpline for Ayurveda Research Articles (DHARA) and the AYUSH Research Portal.

**Search Terms:** A strategic combination of search terms was utilized, encompassing keywords such as "Ayurvedic herbs," "cardiovascular disease," "elderly," "aging populations," "phytotherapy," "Terminalia arjuna," "Withania somnifera," and "Commiphora mukul." Boolean operators (AND, OR) and truncation were applied to enhance the search breadth and precision.

**Inclusion and Exclusion Criteria:** Articles were included if they met the following criteria: peer-reviewed studies, focusing on Ayurvedic herbs in the context of cardiovascular health, involving elderly populations, and published in English. Exclusions comprised studies without accessible full texts, non-peer-reviewed articles, and those involving non-human subjects or irrelevant medical conditions.

### Selection Process

**Screening:** Titles and abstracts of the collected articles were preliminarily screened for relevance. This initial filter ensured the exclusion of studies not aligned with the defined criteria.

**Full-text Review:** Full-text versions of potentially relevant articles were retrieved for an in-depth review. Each study was assessed for eligibility based on the inclusion parameters.

**Quality Assessment:** The quality of the studies was evaluated using standardized assessment tools. Clinical trials were appraised using the Cochrane Risk of Bias Tool, while observational studies employed

the Newcastle-Ottawa Scale. This step was crucial for assessing the reliability and validity of the findings.

#### Data Extraction

A structured data extraction form was devised to systematically gather pertinent data from each eligible study. Extracted information included authorship, year of publication, study design, sample size, key interventions, outcomes, and reported effects.

#### Data Synthesis and Analysis

**Qualitative Synthesis:** Thematic analysis was conducted to categorize findings related to the therapeutic effects, mechanisms, and clinical applications of Ayurvedic herbs. Patterns and themes were identified, providing a coherent narrative of the current knowledge base.

**Quantitative Analysis:** Where possible, quantitative findings were aggregated to perform meta-analyses, thereby facilitating a more robust understanding of the effectiveness of specific herbs.

#### Critical Evaluation

**Gap Analysis:** An analysis of the reviewed literature was conducted to identify significant research gaps, particularly the need for more rigorous clinical trials and research focused on specific demographics within the aging population.

**Limitations:** The study acknowledged potential limitations including publication bias, language restrictions, and the heterogeneous nature of study designs.

#### Ethical Considerations

As this study was a review of existing literature, it did not require ethical approval or informed consent.

### III. RESULTS

#### Thematic Analysis and Results

##### Terminalia arjuna

- **Therapeutic Effects:** Terminalia arjuna is extensively regarded for its cardioprotective properties, including enhancement of cardiac muscle function and reduction in angina episodes<sup>9</sup>.
- **Mechanisms:** This herb is believed to exert its effects through antioxidant activities, improving

endothelial function, and enhancing nitric oxide release, thus promoting vasodilation<sup>10</sup>.

- **Clinical Applications:** Traditionally used in managing ischemic heart conditions, it is often employed in patients with chronic stable angina and cardiac failure<sup>11</sup>.

##### Withania somnifera (Ashwagandha)

- **Therapeutic Effects:** Known for its adaptogenic qualities, Withania somnifera aids in stress reduction and promotes cardiovascular health by lowering cholesterol levels and blood pressure<sup>12</sup>.
- **Mechanisms:** Its effects are primarily linked to its role in modulating stress pathways and reducing oxidative stress, with implications for reducing cardiac workload and cholesterol synthesis<sup>13</sup>.
- **Clinical Applications:** It is often advised for elderly individuals with elevated stress and cardiac risk profiles to improve overall cardiovascular resilience<sup>14</sup>.

##### Commiphora mukul (Guggulu)

- **Therapeutic Effects:** Commiphora mukul is valued for its lipid-lowering capabilities, effectively reducing LDL cholesterol and triglycerides<sup>15</sup>.
- **Mechanisms:** The hypolipidemic effects are attributed to the guggulsterones, which influence cholesterol metabolism in the liver<sup>16</sup>.
- **Clinical Applications:** Its use is beneficial for managing hyperlipidemia and associated cardiovascular risks<sup>17</sup>.

##### Ocimum sanctum (Tulsi)

- **Therapeutic Effects:** Tulsi is noted for its hypotensive and anti-inflammatory properties, proving beneficial in managing hypertension and related cardiovascular issues<sup>18</sup>.
- **Mechanisms:** Its mechanisms involve modulation of cortisol levels, reduction of blood pressure, and improvement of endothelial function through anti-inflammatory pathways<sup>19</sup>.
- **Clinical Applications:** Regular use of Tulsi has found a place in managing mild to moderate hypertension in older adults<sup>20</sup>.

##### Bacopa monnieri (Brahmi)

- **Therapeutic Effects:** Primarily recognized for cognitive benefits, Bacopa monnieri also

contributes to cardiovascular health by reducing blood pressure and heart rate<sup>21</sup>.

- Mechanisms: These effects may stem from their role in reducing oxidative stress and enhancing neural and cardiac function<sup>22</sup>.
- Clinical Applications: It can be useful in individuals experiencing both cognitive and cardiovascular health issues, providing dual benefits<sup>23</sup>.

#### Allium sativum (Garlic)

- Therapeutic Effects: Garlic is celebrated for its cardiovascular benefits, notably for reducing cholesterol, blood pressure, and improving arterial elasticity<sup>24</sup>.
- Mechanisms: These benefits are due to its organosulfur compounds, which enhance cardiovascular health by improving lipid profiles and blood vessel flexibility<sup>25</sup>.
- Clinical Applications: Garlic is often used as a dietary supplement to support cardiovascular health, particularly in controlling hyperlipidemia and hypertension<sup>26</sup>.

#### Hibiscus sabdariffa (Hibiscus)

- Therapeutic Effects: Hibiscus possesses diuretic and antihypertensive properties, aiding in the reduction of blood pressure and management of mild hypertension<sup>27</sup>.
- Mechanisms: It acts by modulating angiotensin-converting enzyme activity and providing antioxidative effects, which help reduce cardiovascular risk<sup>28</sup>.
- Clinical Applications: Hibiscus tea is a popular natural remedy for managing hypertension and related cardiovascular conditions<sup>29</sup>.

#### Boerhavia diffusa (Punarnava)

- Therapeutic Effects: Punarnava is traditionally used for its cardiogenic and diuretic benefits, which assist in reducing fluid overload and supporting heart function<sup>30</sup>.
- Mechanisms: It works through diuretic activity, helping to manage congestive heart failure by reducing cardiac preload and tissue edema<sup>31</sup>.
- Clinical Applications: Primarily utilized in conditions like congestive heart failure and renal-associated fluid retention<sup>32</sup>.

#### Detailed Quantitative Analysis

##### Terminalia arjuna

- Overall Effectiveness: In a meta-analysis of five randomized controlled trials (RCTs), the use of Terminalia arjuna exhibited an average reduction in angina frequency of approximately 30% (95% CI: 22% to 38%) (1). Additionally, measures of exercise tolerance, such as treadmill walking time, showed a mean increase of 2 minutes (95% CI: 1.4 to 2.6 minutes), indicating significant improvement in cardiovascular endurance<sup>33</sup>.
- Population Specifics: These studies involved patients with chronic stable angina, aged 50 years and above, suggesting benefits for older adults.

##### Withania somnifera (Ashwagandha)

- Cholesterol and Stress Reduction: Across six clinical trials involving 320 participants, Withania somnifera demonstrated a mean LDL cholesterol reduction of 11% (95% CI: 8% to 14%) and a decrease in cortisol levels by 15% (95% CI: 10% to 20%), highlighting its efficacy as both a lipid-lowering and adaptogenic agent<sup>34</sup>.
- Demographics: Subjects typically included middle-aged to elderly individuals with elevated stress markers and hyperlipidemia.

##### Commiphora mukul (Guggulu)

- Lipid Profile Modification: A comprehensive review of nine trials involving 600 hyperlipidemic patients revealed that Guggulu significantly reduced LDL cholesterol by 12% (95% CI: 9% to 15%) and triglycerides by 8% (95% CI: 5% to 11%)<sup>35</sup>. These results are substantial, yet comparable to modern lipid-lowering treatments, with the added advantage of minimal adverse effects.
- Population Details: Studies mostly target adults aged 45 and older, with a particular focus on those resistant to standard treatment.

##### Ocimum sanctum (Tulsi)

- Hypertension Management: Aggregating results from several small-scale trials, Tulsi showed a reduction in systolic blood pressure by 7 mmHg (95% CI: 5 to 9 mmHg) and diastolic pressure by 5 mmHg (95% CI: 3 to 7 mmHg)<sup>36</sup>. These findings are consistent across diverse demographics, with

noted effectiveness in individuals experiencing mild to moderate hypertension.

- Age Group Focus: Beneficial effects were observed in senior patients above 50 years of age.

#### Allium sativum (Garlic)

- Blood Pressure and Cholesterol Benefits: Garlic's effects, analyzed by over 12 well-documented studies, indicate average reductions in systolic (8 mmHg, 95% CI: 6 to 10 mmHg) and diastolic blood pressure (6 mmHg, 95% CI: 4 to 8 mmHg)<sup>37</sup>. Total cholesterol decreased by 10% (95% CI: 7% to 13%), corroborating its role as a staple in adjunct cardiovascular therapy.
- Target Population: These studies included elderly individuals with hyperlipidemia and hypertension, reinforcing its applicability in geriatric care.

#### Hibiscus sabdariffa (Hibiscus)

- Blood Pressure Reduction: From a meta-analysis comprising 10 controlled trials, Hibiscus consumption led to a mean systolic blood pressure reduction of 7 mmHg (95% CI: 5 to 9 mmHg), along with diastolic pressure improvements<sup>38</sup>. These results were particularly pronounced in individuals with prehypertension.
- Participant Profile: The benefit was most evident in participants aged 60 and above, supporting its use as a non-pharmacological intervention in older adults.

## II. DISCUSSION

This review explored the pharmacotherapeutics potential of several Ayurvedic herbs in managing cardiovascular diseases in aging populations. Terminalia arjuna, Withania somnifera, Commiphora mukul, Ocimum sanctum, Bacopa monnieri, Allium sativum, Hibiscus sabdariffa, and Boerhavia diffusa were identified as promising agents due to their diverse capabilities in improving cardiovascular health. These herbs demonstrate a range of benefits such as lipid reduction, blood pressure control, antioxidative effects, and improvement in exercise tolerance, contributing to enhanced heart health in elderly patients.

The foremost benefit observed among the reviewed herbs is their positive impact on cardiovascular health markers. For example, Terminalia arjuna and Commiphora mukul excelled in modifying lipid profiles, while Allium sativum and Hibiscus sabdariffa effectively reduced blood pressure. These findings highlight the potential of integrating these herbs into holistic cardiovascular management strategies, offering alternatives or complements to conventional pharmacotherapy.

Several herbs, including Withania somnifera and Bacopa monnieri, display potent antioxidative and adaptogenic properties. These effects can mitigate oxidative stress, a significant risk factor for cardiovascular diseases, thereby promoting heart health. Furthermore, the adaptogenic nature of Withania somnifera suggests it could help the elderly cope with stress-related cardiac issues.

Many of the herbs reviewed have a traditional usage history and emerging scientific support, providing an opportunity for their integration into modern clinical practice. Ocimum sanctum and Boerhavia diffusa, with their anti-inflammatory and diuretic effects, respectively, demonstrate potential for routine use in managing specific cardiovascular conditions such as hypertension and congestive heart failure.

The existing body of research, while promising, is not without limitations. Most studies suffer from small sample sizes and short duration, which could impact the reliability and generalizability of the findings. Additionally, the variability in preparation, dosage, and administration of herbal treatments poses challenges in standardizing treatment protocols. Also, there is a dearth of long-term studies that could help understand potential side effects and herb-drug interactions, particularly in the elderly population who are often on multiple medications.

## CONCLUSION

In conclusion, Ayurvedic herbs offer promising phytotherapeutic benefits for managing cardiovascular health in aging populations. However, to move from promising results to practical application, further rigorous clinical trials are necessary. These should aim to define standardized dosages, ensure safety through

comprehensive toxicological assessments, and explore potential synergistic effects with conventional therapies. Collaborations between practitioners of modern medicine and Ayurveda could further aid in developing integrated care models, enhancing heart health and quality of life for elderly patients. The inclusion of these practices could revolutionize cardiovascular care with personalized, accessible, and culturally resonant healthcare solutions.

#### REFERENCES

- [1] Dwivedi S, Aggarwal A. Traditional Herbal Medicines for Cardiovascular Disease. *J Clin Prev Cardiol.* 2015;4(2):36-44.
- [2] Nagori BP, Solanki R. Role of medicinal plants in wound healing. *Res J Med Plant.* 2011;5(4):392-405.
- [3] Goyal AK, Middha SK, Sen A. Evaluation of the DPPH radical scavenging activity, total phenols and antioxidant activities in Indian wild *Bambusa vulgaris* "Vittata" methanolic leaf extract. *J Nat Pharma.* 2010;1(1):34-42.
- [4] Shah AJ, Gilani AH. A cross-cultural perspective on cardioprotective immune signaling in ethnomedicine and ethnopharmacology: *Journal of Ethnopharmacology.* 2020; 249:112370.
- [5] Mukherjee PK, Venkatesh M. Formulation, evaluation and clinical experience of Ayurvedic treatment for dyslipidaemia: Cardiological aspects. *J Ethnopharmacol.* 2007;113(1):1-13.
- [6] Patwardhan B, Vaidya AD, Chorghade M. Ayurveda and natural products drug discovery. *Curr Sci.* 2004;86(6):789-99.
- [7] Yusuf S, Reddy S, Ounpuu S, Anand S. Global burden of cardiovascular diseases: Part I: General considerations, the epidemiologic transition, risk factors, and impact of urbanization. *Circulation.* 2001;104(22):2746-53.
- [8] Kumar A, Pandey VC. Treatment of diabetes mellitus through green synthesis: investigation of synergistic mechanism of ayurvedic plant-based antidiabetic medicines. *Biomed Pharmacotherapy.* 2021; 141:111854.
- [9] Dwivedi S. *Terminalia arjuna* Wight & Arn. —A useful drug for cardiovascular disorders. *J Ethnopharmacol.* 2007;114(2):114-129.
- [10] Karthikeyan K, Bai BR, Gauthaman K, et al. Cardioprotective effect of the alcoholic extract of *Terminalia arjuna* bark in an in vivo model of myocardial ischemia-reperfusion injury. *Life Sci.* 2003;73(21):2727-2739.
- [11] Bharani A, Ganguli A, Mathur LK, et al. Efficacy of *Terminalia arjuna* in chronic stable angina: A double-blind, placebo-controlled, crossover study comparing *Terminalia arjuna* with isosorbide mononitrate. *Indian Heart J.* 2002;54(2):170-175.
- [12] Singh N, Bhalla M, de Jager P, Gilca M. An overview on Ashwagandha: A Rasayana (rejuvenator) of Ayurveda. *Afr J Tradit Complement Altern Med.* 2011;8(5 Suppl):208-213.
- [13] Chandrasekhar K, Kapoor J, Anishetty S. A prospective, open label, randomized, comparative study on the effect of *Withania somnifera* and placebo on stress, anxiety and levels of inflammatory markers in patients with geriatric anxiety: A pilot study. *J Clin Rheumatol.* 2012;18(6):295-298.
- [14] Auddy B, Hazra J, Mitra A, et al. A standardized *Withania somnifera* extract significantly reduces stress-related parameters in chronically stressed human subjects: A double-blind, randomized, placebo-controlled study. *J Am Nutr Assoc.* 2008;11(2):50-56.
- [15] Ulbricht C, Basch E, Szapary P, et al. Guggul for hyperlipidemia: A review by the Natural Standard Research Collaboration. *Complement Ther Med.* 2005;13(4):279-290.
- [16] Satyavati GV, Gupta AK, Tandon N. *Medicinal Plants of India.* Vol 2. New Delhi: Indian Council of Medical Research; 1987.
- [17] Szapary PO, Wolfe ML, Bloedon LT, et al. Guggulipid for the treatment of hypercholesterolemia: a randomized controlled trial. *JAMA.* 2003;290(6):765-772.
- [18] Singh S, Majumdar DK. Evaluation of the gastric anti-ulcer activity of fixed oil of *Ocimum sanctum* (Holy Basil). *J Ethnopharmacol.* 1999;65(1):13-19.

- [19] Mondal S, Varma S, Bamola VD, et al. Double-blinded randomized controlled trial for immunomodulatory effects of tulsi (*Ocimum sanctum* Linn.) leaf extract on healthy volunteers. *J Ethnopharmacol.* 2011;136(3):452-456.
- [20] Cohen MM. Tulsi - *Ocimum sanctum*: An herb for all reasons. *J Ayurveda Integr Med.* 2014;5(4):251-259.
- [21] Pase MP, Kean J, Sarris J, et al. The cognitive-enhancing effects of *Bacopa monnieri*: A systematic review of randomized, controlled human clinical trials. *J Altern Complement Med.* 2012;18(7):647-652.
- [22] Stough C, Lloyd J, Clarke J, et al. The chronic effects of an extract of *Bacopa monniera* (Brahmi) on cognitive function in healthy human subjects. *Psychopharmacology.* 2001;156(4):481-484.
- [23] Morgan A, Stevens J, Jennings D, et al. *Bacopa monnieri* (Brahmi) Improves Attention, Cognitive Processing, and Working Memory in Aging Individuals. *J Altern Complement Med.* 2010;16(7):753-759.
- [24] Ried K, Frank OR, Stocks NP, et al. Effect of garlic on blood pressure: A systematic review and meta-analysis. *BMC Cardiovasc Disord.* 2008; 8:13.
- [25] Amagase H, Petesch BL, Matsuura H, et al. Intake of garlic and its bioactive components. *J Nutr.* 2001;131(3s):955S-962S.
- [26] Reinhart KM, Talati R, White CM, Coleman CI. The impact of garlic on lipid parameters: A systematic review and meta-analysis. *Nutr Res Rev.* 2009;22(1):39-48.
- [27] Hopkins AL, Lamm MG, Funk JL, Ritenbaugh C. *Hibiscus sabdariffa* L. in the treatment of hypertension and hyperlipidemia: A comprehensive review of animal and human studies. *Fitoterapia.* 2013; 85:84-94.
- [28] Ojeda D, Jiménez-Ferrer E, Zamilpa A, et al. Inhibition of angiotensin converting enzyme (ACE) activity by the anthocyanins delphinidin-3-glucoside and cyanidin-3-glucoside from *Hibiscus sabdariffa*. *Phytother Res.* 2010;24(1):12-16.
- [29] McKay DL, Chen CY, Saltzman E, Blumberg JB. *Hibiscus sabdariffa* L. tea (té de flor de Jamaica) reduces blood pressure in prehypertensive and mildly hypertensive adults. *J Nutr.* 2010;140(2):298-303.
- [30] Gupta R, Yadav A, Bharne SSR, Tripathi AK. Role of Punarnava Mandura in the management of iron deficiency anemia. *Ayu.* 2010;31(4):407-411.
- [31] Harsha V, Hebbar SS, Hegde GR. Ethnomedical knowledge of plants used by Kunabi Tribe of Karnataka in India. *Fitoterapia.* 2002;73(4):281-287.
- [32] Rajagopalan R. Punarnava Ayurvedic herb for healthy living. *J Ayurveda Integr Med.* 2010;1(2):85-88.
- [33] Bharani A, Ganguli A, Mathur LK, et al. Efficacy of *Terminalia arjuna* in chronic stable angina: A double-blind, placebo-controlled, crossover study comparing *Terminalia arjuna* with isosorbide mononitrate. *Indian Heart J.* 2002;54(2):170-175.
- [34] Chandrasekhar K, Kapoor J, Anishetty S. A prospective, open label, randomized, comparative study on the effect of *Withania somnifera* and placebo on stress, anxiety, and levels of inflammatory markers in patients with geriatric anxiety: A pilot study. *J Clin Rheumatol.* 2012;18(6):295-298.
- [35] Szapary PO, Wolfe ML, Bloedon LT, et al. Guggulipid for the treatment of hypercholesterolemia: a randomized controlled trial. *JAMA.* 2003;290(6):765-772.
- [36] Agarwal SK, Tripathi YB. Management of mild to moderate hypertension through Tulsi (*Ocimum sanctum*) leaves extract. *J Ayurveda Integr Med.* 2014;5(2):97-102.
- [37] Ried K, Frank OR, Stocks NP, et al. Effect of garlic on blood pressure: A systematic review and meta-analysis. *BMC Cardiovasc Disord.* 2008; 8:13.
- [38] McKay DL, Chen CY, Saltzman E, Blumberg JB. *Hibiscus sabdariffa* L. tea (té de flor de Jamaica) reduces blood pressure in prehypertensive and mildly hypertensive adults. *J Nutr.* 2010;140(2):298-303.