

A Cross-cultural Analysis of the Utilization and Efficacy of Traditional Herbal Medicine to Cure High Blood Pressure Among People of Rawalakot

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Abstract

Safety and efficacy of herbal medicines have not yet been established in treating hypertension. The current study examined the prevalence of herbal medicine use among hypertensive patients in Rawalakot, Poonch, Azad Jammu and Kashmir. The study included 100 hypertensive patients using systemic random sampling. The independent variables were herbal medicine and conventional medicine, while the dependent variable was hypertension. The most known and used herbal medicine was garlic followed by ginger and onion. Among the female respondents, garlic was the most frequently cited herbal remedy for high blood pressure, with 44 mentions. This was followed by ginger (16 mentions), onion (15), watercress (14), and coriander (11). 61 of the patients showed strong belief in herbal medicine efficacy against hypertension while 39 disagreed. The younger respondents were found less in their belief and use of herbal remedies. Unemployed, and government-employed respondents were found more frequent cases of hypertension followed by people doing their own business. Similarly, those less educated were the higher cases of hypertension. Most respondents not engaging in daily exercise were found among both male and female participants, with 46 out of 100 not adhering to a daily exercise routine. In contrast, only 16 respondents reported following a regular exercise pattern. Higher systolic and diastolic blood pressure levels were reported by respondents with greater body weight. Herbal medicines were perceived to have varying degrees of effectiveness in controlling blood pressure among hypertensive patients who solely relied on herbal remedies and those who combined them with conventional treatments.

Keywords: Hypertension, herbal medicine, garlic, ginger, onion, blood pressure, Rawalakot

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INTRODUCTION

High blood pressure, commonly known as hypertension, is a disease in which the pressure in arterial blood vessels is increased. Hypotension is a disease in which the pressure in the arterial blood vessels of an individual becomes very low. Blood pressure is assessed using systolic and diastolic readings. Systolic blood pressure is the first value measured when the heart muscles contract to carry blood into the systemic blood circulation in the body. The normal systolic blood pressure was 120 mm Hg. On the other hand, when the heart muscles relax, the chambers of the heart are filled again with blood coming from the body, creating pressure in the arteries called diastolic pressure [1]. Broadly speaking, humans should have a normal systolic

blood pressure normal value between 70-80 mmHg. However, a blood pressure value between 80 and 85 mmHg should be representative of senior citizens (older people). In general, normal blood pressure systolic values range from 130 to 139 mmHg and diastolic blood pressure ranges from 85 to 89 mmHg [1]. According to the World Health Organization, high blood pressure exists when the systolic value is at least 140 mmHg, and the diastolic blood pressure exceeds 90 mmHg. In this definition, temporary increases in blood pressure by, for example, pregnancy or drugs are not included. In 1999, the World Health Organization published a classification of arterial hypertension, followed by physicians worldwide. In view of such reports, systolic values between 130 and 139 mmHg and diastolic values between 85 and 89 mmHg indicate normal blood pressure [2]. The World Health Organization in a recent statistic reported that about 25 % of the world population is suffering from elevated blood pressure and that these records could increase to about 29% by 2025 [2, 3]. The number of adults experiencing elevated blood pressure surged from 594 million in 1975 to 1.13 billion in 2015, primarily escalating in low- and middle-income nations. By 2015, central and eastern Europe, sub-Saharan Africa, and South Asia had recorded the highest levels of blood pressure. The prevalence of raised blood pressure has decreased in high-income and some middle-income countries; it has remained unchanged elsewhere [4]. The prevalence of hypertension in developed countries is relatively high for instance 44%, and 28% in Western Europe and North America respectively [5]. In Pakistan, approximately one out of every four adults aged 18 and above has hypertension, and there are elevated levels of smoking, particularly among men 38% and women 7% [2]. Indigenous cultures have a wealth of traditional knowledge on herbal remedies for treating various ailments, many of which remain undocumented [6].

The use of herbal medicine as a treatment approach has increased notably over the past decade [7]. Plants and herbs have served as the foundation for synthesizing over 50% of the pharmaceutical drugs in current use [8]. This can be attributed to various factors, primarily because herbal medicine offers a less expensive alternative with fewer adverse side effects [7–11]. Although the prevalence of herbal medicine use is significant in many countries, there is a lack of scientific evidence on the safety, efficacy, and quality of traditional medicines to support their curative claims [12, 13]. In addition, documenting the results of scientific research on traditional medicine may also help conserve an important part of indigenous people's cultural heritage for future generations [14]. In this paper, we investigated the traditional herbal medicine used in curing high blood pressure among different age groups of the people of Rawalakot and their belief in the effectiveness of traditional herbal medicines used as an alternative to the allopathic medicines in curing hypertension among different age groups of the people of Rawalakot.

EXPERIMENTAL SETUP AND PROCEDURES

Design of the Study

The present study involved a cross-sectional survey to explore the use of herbal medicines for hypertension.

Location of Study

This study was conducted in the Rawalakot District of Azad Jammu and Kashmir. The geographical location of the study area is illustrated in Figure 1.

Selection of Populations

A population of communities with hypertension was targeted in the present study. The present study was conducted in 10 different localities in the Rawalakot District.

Field Survey and Sampling Techniques

The field survey was designed to record information on the use of herbal medicine from local communities, mainly ethnic groups in far-off areas. Local herbal practitioners were contacted, and the objectives of this study were shared with them to document the use and belief in the efficacy of medicinal plants for hypertension.

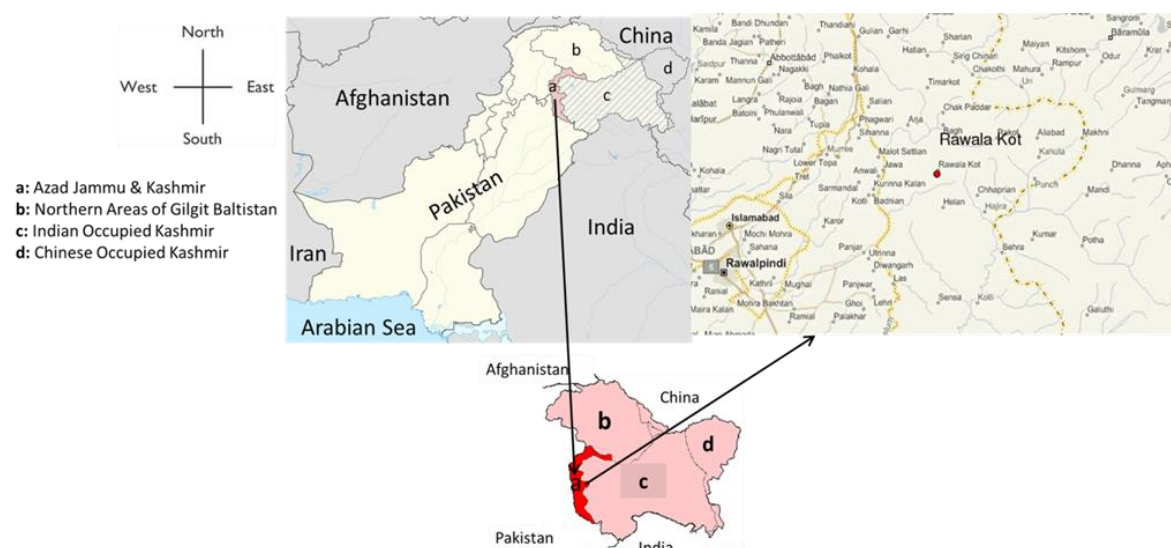


Figure 1. Map showing the geographical location of the area of the present study where ‘a’, ‘b’, ‘c’, and ‘d’ together make the complete State of Jammu and Kashmir.

Source: Modified maps, from Atlas of Azad Jammu and Kashmir and Geo News Urdu.

Volunteers who agreed to participate were interviewed. Patients diagnosed with hypertension by a physician at any of the clinics in Rawalakot for at least 6 months, who were on conventional medicine, were selected randomly from 10 different localities. Patients aged between 18 and 75 years were included after confirming their willingness to participate in the present study. Individuals under 18 and above 75 years of age were excluded from the present questionnaire-based survey study.

Data Collection and Analysis for Questionnaire-based Interviews

A well-defined questionnaire was used to interview each selected patient with hypertension. The questionnaires were divided into three groups. The first part specified patient-related information. The second fragment contained information on the use of herbal medicine by patients, and the third fragment included doctor-patient communication. Data collection was completed over two months. The data collected during this study were analyzed and presented in a tabularized form using Microsoft Excel. Data were presented and analyzed using the Statistical Software Minitab 18 for Biological Sciences. Descriptive statistics, including frequency distributions and percentages, were used to characterize demographic and other categorical variables.

Use Value (UV) Calculation

The relative importance of each herbal medicine can be evaluated by analyzing its value. It is based on the comparative usage among informants [15]. UV was calculated using the following formula:

$$UV = \sum U_i / N_i$$

Where, U_i is the number of reports cited for the use of a given herbal medicine by each respondent, and N_i is the total number of respondents who were interviewed for a given herbal medicine [16, 17], modified from Phillips and Gentry [18].

Analysis of the Relative Frequency of Citation (RFC) and Family Importance Value (FIV)

The consensus among the informants on the use of wild medicinal plants in the study area was quantitatively determined by calculating RFC and FIV. This provides the local significance of a species or family [19, 20]. To calculate RFC and FIV, the standard method of Vitalini et al. [21] was adopted, which makes use of the formula:

$$RFC = FC/N \quad (0 < RFC < 1)$$

FC is the number of informants who mentioned that species N is the total number of informants participating in the study. Family importance value is calculated using the standard method of Kayani et al. [19], which is.

$$\text{FIV} = \text{FC}/\text{N} \times 100$$

Where FC is the number of respondents citing the family and N is the total number of respondents taking part in the study [14].

RESULTS AND DISCUSSIONS

The results for the demographic background and other data were summarized using descriptive statistics. Pie charts were included for each parameter surveyed using questionnaire-based interviews with respondents. The respondents were participants who had hypertension and were interviewed individually.

Male and Female Respondents of Different Age Groups

In total, 100 individuals with hypertension were enrolled. The frequencies of male and female respondents with hypertension in different age groups are shown in Figures 2 and 3, respectively. Among them, 56 were male and 44 were female among all age groups in the present study, such as the first age group, which included younger respondents ranging from 18 to 29 years of age (15). Similarly, the age group of 30 to 44 years consisted of 16 respondents, the age group of 45 to 59 years consisted of 13, and the age group of 60 and above 60 years consisted of 12.

Body Weight of Respondents

The average body weight ranged from 50 to a maximum of 80, and above 80 kg among all age groups studied for both male and female respondents. Respondents with higher body weights reported higher systolic and diastolic blood pressure levels. The frequency of average body weight among the different age groups is shown in Figure 4.

Education Levels of Respondents

Different education levels were observed among the 100 individual respondents, ranging from primary to doctoral levels. The education levels of the respondents with hypertension are shown in Figure 5. The number of graduates was the maximum, while the number of PhDs was the minimum. The level of education was not directly linked with a higher risk of catching hypertension; instead, a dispersed population of individuals with hypertension was observed in the present study. However, few studies have investigated the link between low educational levels and hypertension prevalence.

Professional Background

The professional backgrounds of the respondents with hypertension are shown in Figure 6. The number of unemployed respondents was the maximum with a count of 31, while the number of governments employed was the maximum with a count of 32. Ten respondents were self-employed or jobless 10 while respondents 13 were involved in the private sector.

Exercise Habits

The number of respondents who were not engaged in daily exercise was the highest among both male and female cases. A total of 46 out of 100 participants did not follow daily exercise routines. Only 16 respondents followed regular exercise patterns. The exercise habits of the participants are shown in Figure 7.

Belief in Herbal Medicine

The frequency of beliefs among the respondents regarding the efficacy of herbal medicine use against hypertension is shown in Figure 8. Among all age groups, 61 out of hundred respondents believed that the use of herbal medicine was efficient at high levels of blood pressure. However, some 39 did not believe that herbal medicines were of any use.

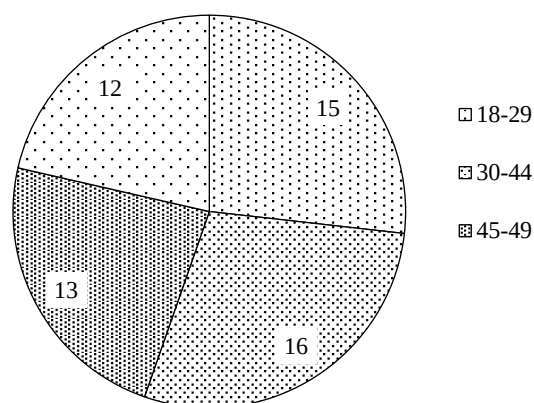


Figure 2. Frequencies of the male respondents among different age groups.

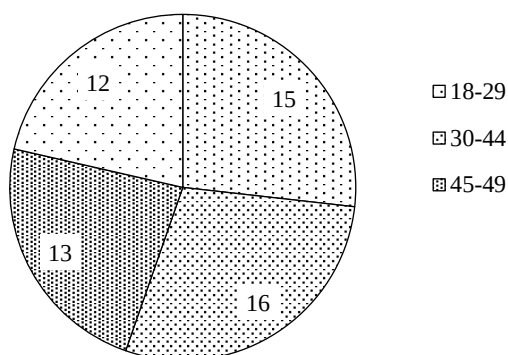


Figure 3. Frequencies of the female respondents among different age groups.

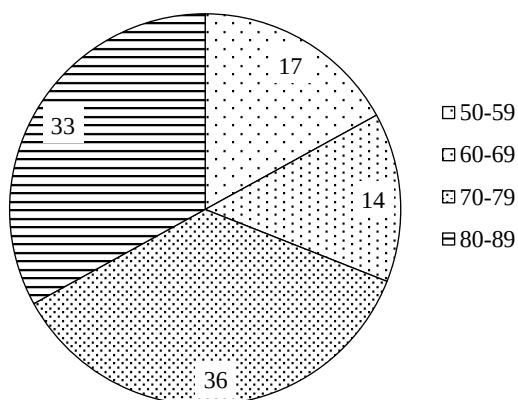


Figure 4. Frequency of the average body weight among different age groups.

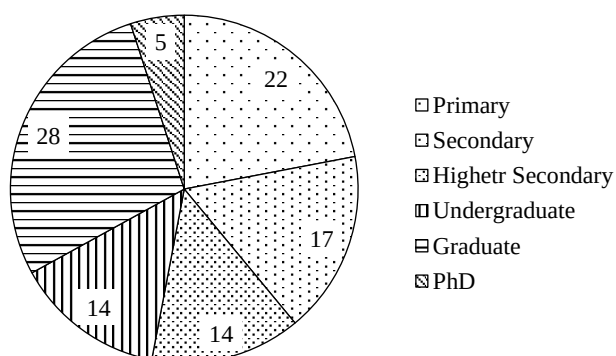


Figure 5. Education levels of the respondents having hypertension.

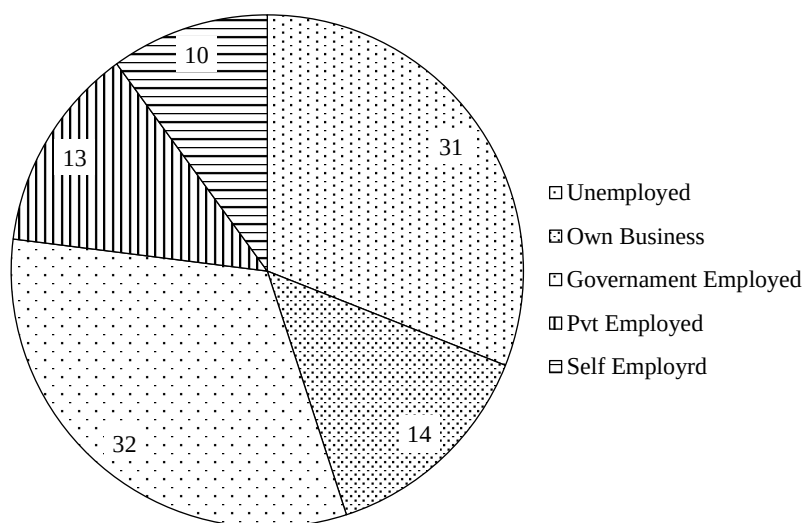


Figure 6. The professional background of the respondents.

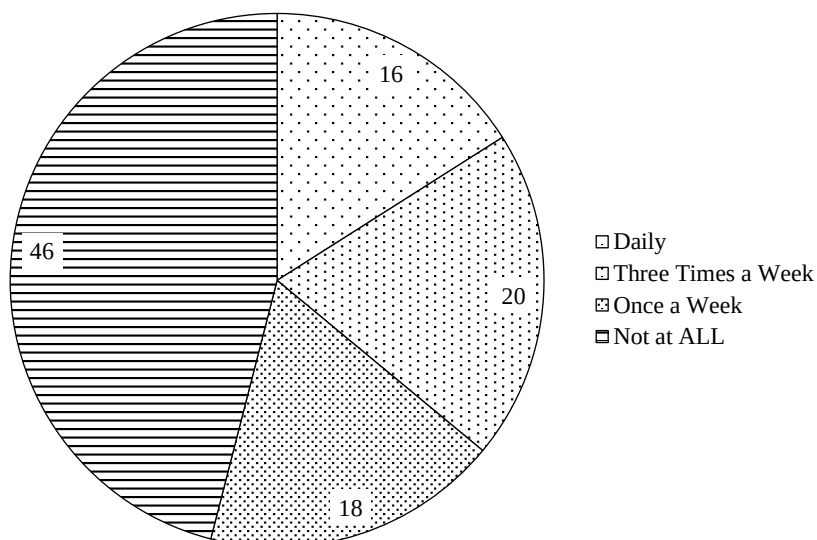


Figure 7. Exercise habits of respondents.

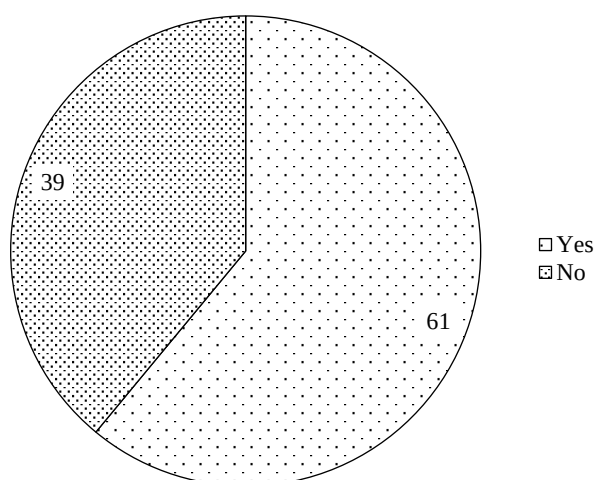


Figure 8. Beliefs of the respondents in the herbal medicine use efficacy against hypertension.

Most older respondents showed their belief in the use of herbal medicine as a remedy against high blood pressure among both male and female respondents.

Herbal Medicine Knowledge (Species Cited by Respondent)

The frequency of respondents' knowledge of herbal medicine against hypertension is shown in Figure 9.

Garlic is the most well-known local plant species and is cultivated in many households. Female respondents were the highest in reporting garlic as an herbal remedy against high blood pressure. It was reported by 44 respondents, followed by ginger (16), onion (15), watercress (14), and coriander (11) reported by the local species grown and used as herbal medicine.

Herbal Medicine Found Most Effective by Respondents

Fifty-one respondents were reported by 51 respondents as the most effective herbal medicine. This was followed by ginger (16), onion (15), watercress (11), and coriander (7). The frequency of herbal medicines found by the respondents to be most effective against hypertension is shown in Figure 10.

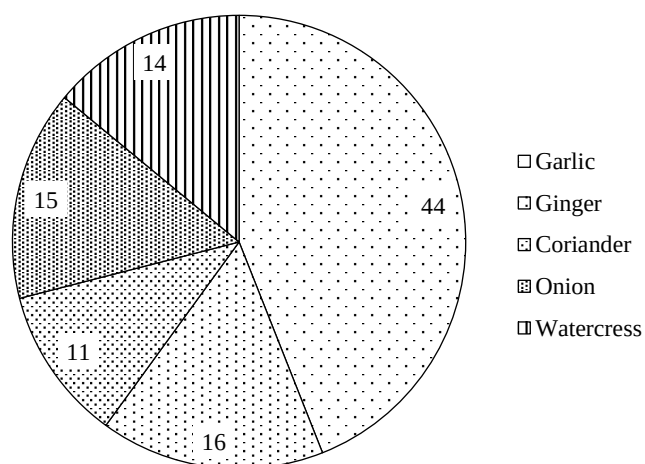


Figure 9. Knowledge of the respondents about the herbal medicine against hypertension.

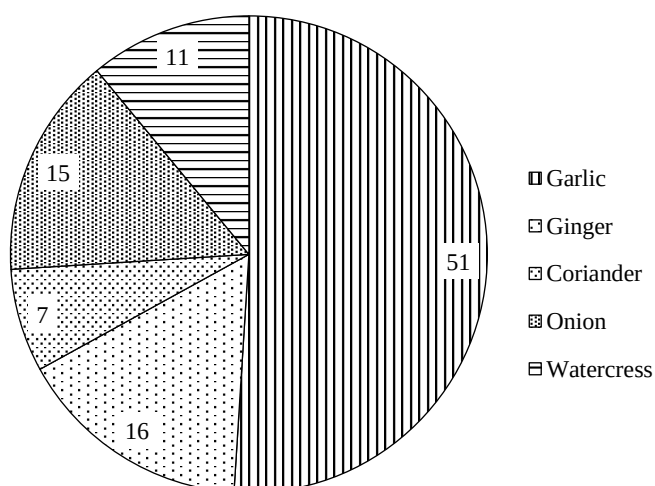


Figure 10. Herbal medicine was found by the respondents most effective against hypertension.

Herbal Medicine use Frequency of Respondents

The frequency of herbal medicine use by the respondents is shown in Figure 11. Male respondents most frequently used herbal medicines. Similarly, the number of non-users was higher for the male gender as compared with the female gender.

Belief in Herbal Medicine in Contrast with English Medicine

Forty-three respondents supported the use of herbal medicines. They were mostly elderly and deliberately avoided English medicine. The frequency of respondents' belief in the efficacy of herbal medicine against hypertension is shown in Figure 12. Instead, they stressed that the use of English medicine could be shifting to worsen their present state of hypertension and that they would be dependent on allopathic remedies which they did not like to be the case.

English Medicine Use Frequency of Respondents

Most of the respondents who were interviewed revealed that there was no use of any English medicine to lower abnormal hypertension levels. The frequency of English medicine use by the respondents is shown in Figure 13.

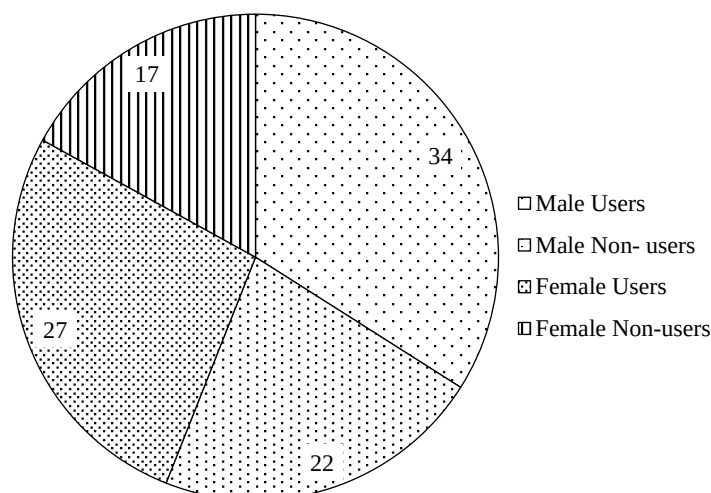


Figure 11. Frequency of herbal medicine use by the respondents.

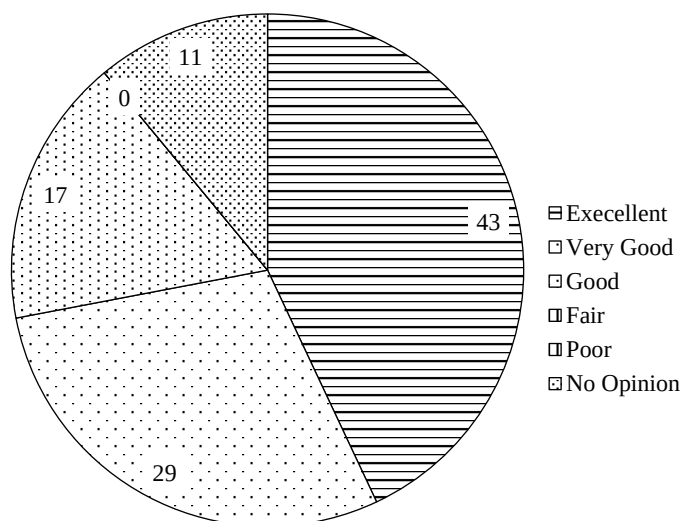


Figure 12. The beliefs of the respondents in the herbal medicine use efficacy against hypertension.

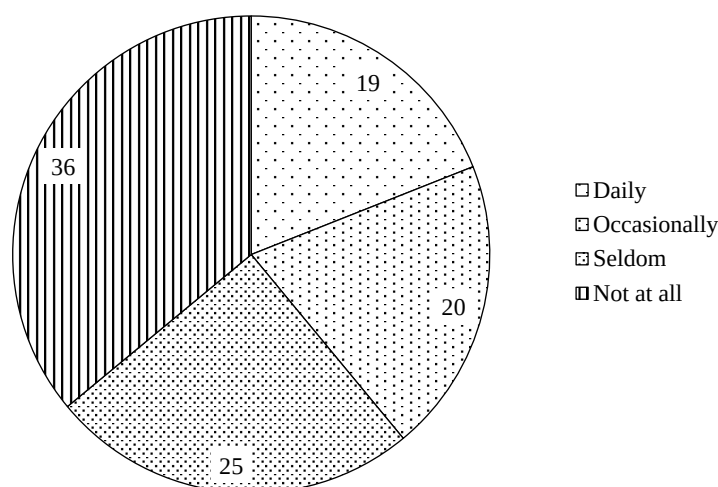


Figure 13. Frequency of English medicine used by respondents.

Moreover, it was interesting that many educated individuals were also avoiding such uses, as they were afraid of any side effects about which they were not clear. Younger respondents were more likely than the elderly to have such a habit. Similarly, one-fifth of the respondents occasionally used English medicines.

The present survey revealed that a significantly large number of residents use herbal plants as a remedy to control hypertension among the communities of Rawalakot, Azad Jammu, and Kashmir. The results for herbal medicine use in Rawalakot area were higher (61%) than those reported by Hughes et al. [22] (21%), Nuwaha et al., [23] (28.6%), and Aziz et al., (33.9%) [24].

However, the present study showed lower estimates than the ones found in other countries such as Malaysia 64.6% [25] and Jamaica 80% [26] respectively, but higher than those reported earlier by Shafiq et al. [27]. As 14.4%. These findings show that the utilization of herbal medicine is manifested all over the world and that its use is based on the common belief that herbal medicines are effective in lowering hypertension and relieving the symptoms of ailments [28].

Conventionally, in ethnobotanical studies, values are used to determine the relative importance of a given single plant species among other plant species. UV is high for plants with more use reports (approach 1), and it is lowest for plants with few use reports (approaching 0) as compared to the number of respondents [14]. In the present investigation, UV ranged from 0.44 to 0.11 which is comparable with 0.95 to 0.47 reported earlier by Ahmed et al. [14].

Plant species with low use values should not be overlooked, as they would take them away from future generations and could promote the threat of a gradual loss of their knowledge. Plant species that show high UV can be further evaluated in pharmacological studies for the valuable biochemicals present in plants [29]. The people of Rawalakot have their traditional way of sharing knowledge of herbal plant generations, which is a traditional value of high importance for future generations.

In the present survey, it was found that among garlic (44), ginger (16), onion (15), watercress (14), and coriander (11), garlic was predominantly used to control high blood pressure by the respondents. These findings are contradictory to those for herbal medicine use among hypertensive participants reported by Ann Mbulo [30], for which *Aloe barbadensis* constituted 27.1%, followed by *Moringa oleifera* (20%), and only 12.9% used *Allum sativum* to control hypertension. However, the present reports are much closer to those of Amira and Okubadejos (2013) [31] whose reports showed that the majority of respondents used garlic (69.3%) and *Aloe vera* (4.5%) [31].

It was interesting to find that in Rawalakot, there was a reasonable number (36%) of respondents suffering from high blood pressure were not taking any English medicine for its control. This behavior of avoiding English medicine was due to their fear of uncertainty and contraindications. It was found that herbal medicine use was more common among unemployed and less-educated respondents. Therefore, lack of education with other factors such as socioeconomic factors, availability, and accessibility of health facilities might be the reason for the more frequent use of herbal medicine among less educated and unemployed individuals [28]. The respondents in the present study belonged to Rawalakot, which is topographically mountainous and rich in wild medicinal plants. People in this area have adopted indigenous ways and means of curing many diseases, such as diabetes, high blood pressure, asthma, cough, and other chronic diseases affecting general body health and reproductive health. It was observed that the elderly male (11) and female (7) respondents were more likely to use herbal medicine than the younger ones among both males (5) and females (4). However, the median age male and female was also significantly higher than that of the youngest age group of hypertensive respondents.

The study revealed that the principal basis of information about herbal medicine utilization was parents and friends, accompanied by local herbal practitioners. This finding agrees with other reports that also demonstrate that professional advice is very rarely sought by users of herbal medicines in choosing herbal medicines, but mostly relies on friends and relatives [22, 32]. Over half (53%) of respondents were found not to disclose their practice of using herbal medicine, which is lower than the previous report of 70% in a study that determined the patterns and elements of such use in Ghana [33] and that presented in a finding by Ali-Shtayeh et al. [32] as 68.1%. Such high rates of hiding herbal medicine use might be due to the fear of patients and the non-inquiry of physicians, as described previously [33]. The variance in the findings might be due to deviations in the method of proactive doctors taking a comprehensive drug history. Since there is a potential interaction between conventional and herbal medicines, such behaviors lead the patients to danger of being mishandled during treatment by physicians [32], in a report over 80% of the respondents agreed to communicate with the physicians regarding their use of herbal remedies only if they were questioned [28].

CONCLUSION

The present investigation suggests that any herbal medicine used by hypertensive respondents is of great importance for physicians because they have to analyze patient needs pertaining to medication observance behaviors, treatment consequences, and potential drug interactions. If patients lack such monitoring, they may develop complications originating from poor blood pressure control. Hence, the present study emphasizes the use of herbal medicines under the consultancy of a medical adviser. There is a strong need for mutual communication between patients with hypertension using herbal medicine in general and those who use allopathic medicine in combination with herbal medicine.

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REFERENCES

1. Daskalopoulou SS, Rabi DM, Zarnke KB, Dasgupta K, Nerenberg K, Cloutier L, et al. The 2015 Canadian Hypertension Education Program recommendations for blood pressure measurement, diagnosis, assessment of risk, prevention, and treatment of hypertension. *Can J Cardiol.* 2015 May 1;31(5):549-68.
2. WHO. Health topics: Hypertension. Available from: <http://www.who.int/topics/hypertension/>. Accessed 2023 Dec 21.
3. WHO. Health topics: Hypertension. Online Questions and Answers. 2012. Available from: <http://www.who.int/features/qa/82/en/>. Accessed 2023 Dec 21.

4. Zhou B, Bentham J, Di Cesare M, Bixby H, Danaei G, Cowan MJ, et al. Worldwide trends in blood pressure from 1975 to 2015: a pooled analysis of 1479 population-based measurement studies with 19.1 million participants. *Lancet*. 2017 Jan 7;389(10064):37-55.
5. Ogah OS, Stewart S, Falase AO, Akinyemi JO, Adegbite GD, Alabi AA, et al. Contemporary profile of acute heart failure in Southern Nigeria: data from the Abeokuta Heart Failure Clinical Registry. *JACC Heart Fail*. 2014 Jun;2(3):250-9.
6. Offiah NV, Makama S, Elisha IL, Makoshi MS, Gotep JG, Dawurung CJ, et al. Ethnobotanical survey of medicinal plants used in the treatment of animal diarrhoea in Plateau State, Nigeria. *BMC Vet Res*. 2011 Dec;7:1-9.
7. Frishman WH, Beravol P, Carosella C. Alternative and complementary medicine for preventing and treating cardiovascular disease. *Dis Mon*. 2009 Mar 1;55(3):121-92.
8. Pan SY, Zhou SF, Gao SH, Yu ZL, Zhang SF, Tang MK, et al. New perspectives on how to discover drugs from herbal medicines: CAM's outstanding contribution to modern therapeutics. *Evid Based Complement Alternat Med*. 2013;2013:1-15.
9. Al Disi SS, Anwar MA, Eid AH. Anti-hypertensive herbs and their mechanisms of action: part I. *Front Pharmacol*. 2016 Jan 19;6:172320.
10. Susalit E, Agus N, Effendi I, Tjandrawinata RR, Nofiarny D, Perrinjaquet-Moccetti T, et al. Olive (*Olea europaea*) leaf extract effective in patients with stage-1 hypertension: comparison with Captopril. *Phytomedicine*. 2011 Feb 15;18(4):251-8.
11. Tabassum N, Ahmad F. Role of natural herbs in the treatment of hypertension. *Pharmacogn Rev*. 2011 Jan;5(9):30-40.
12. Lotika AA, Mabuza LH, Okonta HI. Reasons given by hypertensive patients for concurrently using traditional and Western medicine at Natalspruit Hospital in the Gauteng Province, South Africa. *Afr J Prim Health Care Fam Med*. 2013 Jan 1;5(1):1-7.
13. Marinac JS, Buchinger CL, Godfrey LA, Wooten JM, Sun C, Willsie SK. Herbal products and dietary supplements: a survey of use, attitudes, and knowledge among older adults. *J Osteopath Med*. 2007 Jan 1;107(1):13-23.
14. 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 Dec 4;175:138-46.
15. Gairola S, Sharma J, Gaur RD, Siddiqi TO, Painuli RM. Plants used for treatment of dysentery and diarrhoea by the Bhoja community of district Dehradun, Uttarakhand, India. *J Ethnopharmacol*. 2013 Dec 12;150(3):989-1006.
16. Rossato SC, Leitão-Filho HD, Begossi A. Ethnobotany of caíçaras of the Atlantic Forest coast (Brazil). *Econ Bot*. 1999 Oct 1;387-95.
17. Silva VA, Albuquerque UP, Nascimento VT. Técnicas para análise de dados etnobotânicos. Métodos e técnicas na pesquisa etnobotânica. 2004:63-88.
18. Phillips O, Gentry AH. The useful plants of Tambopata, Peru: I. Statistical hypotheses tests with a new quantitative technique. *Econ Bot*. 1993 Jan 1:15-32.
19. Kayani S, Ahmad M, Zafar M, Sultana S, Khan MP, Ashraf MA, et al. Ethnobotanical uses of medicinal plants for respiratory disorders among the inhabitants of Gallies–Abbottabad, Northern Pakistan. *J Ethnopharmacol*. 2014 Oct 28;156:47-60.
20. Tardío J, Pardo-de-Santayana M. Cultural importance indices: a comparative analysis based on the useful wild plants of Southern Cantabria (Northern Spain). *Econ Bot*. 2008 May;62:24-39.
21. Vitalini S, Iriti M, Puricelli C, Ciuchi D, Segale A, Fico G. Traditional knowledge on medicinal and food plants used in Val San Giacomo (Sondrio, Italy)—An alpine ethnobotanical study. *J Ethnopharmacol*. 2013 Jan 30;145(2):517-29.
22. Hughes GD, Aboyade OM, Clark BL, Puoane TR. The prevalence of traditional herbal medicine use among hypertensives living in South African communities. *BMC Complement Altern Med*. 2013 Dec;13:1-8.
23. Nuwaha F, Musinguzi G. Use of alternative medicine for hypertension in Buikwe and Mukono districts of Uganda: a cross-sectional study. *BMC Complement Altern Med*. 2013 Dec;13:1-8.

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24. Aziz Z, Tey NP. Herbal medicines: prevalence and predictors of use among Malaysian adults. *Complement Ther Med*. 2009 Jan 1;17(1):44-50.
 25. Siew-Mooi C, Vasudevan R, Zakaria ZA, Paimin F. Frequency of complementary and alternative medicine usage among Malaysian hypertensive subjects. *Life Sci J*. 2013;10(4):2526-31.
 26. Delgoda R, Ellington C, Barrett S, Gordon N, Clarke N, Younger N. The practice of polypharmacy involving herbal and prescription medicines in the treatment of diabetes mellitus, hypertension, and gastrointestinal disorders in Jamaica. *West Indian Med J*. 2004 Dec 1;53(6):400-5.
 27. Shafiq N, Gupta M, Kumari S, Pandhi P. Prevalence and pattern of use of complementary and alternative medicine (CAM) in hypertensive patients of a tertiary care center in India. *Int J Clin Pharmacol Ther*. 2003 Jul 1;41(7):294-8.
 28. Tachjian A, Maria V, Jahangir A. Use of herbal products and potential interactions in patients with cardiovascular diseases. *J Am Coll Cardiol*. 2010 Feb 9;55(6):515-25.
 29. Mahmood A, Malik RN, Shinwari ZK, Mahmood AQ. Ethnobotanical survey of plants from Neelum, Azad Jammu and Kashmir, Pakistan. *Pak J Bot*. 2011 Dec 1;43(1):105-10.
 30. Mbulo A. A survey of herbal medicine use in hypertensive patients at the University Teaching Hospital Lusaka, Zambia [dissertation]. 2012.
 31. Amira OC, Okubadejo NU. Frequency of complementary and alternative medicine utilization in hypertensive patients attending an urban tertiary care centre in Nigeria. *BMC Complement Altern Med*. 2007 Dec;7:1-5.
 32. Ali-Shtayeh MS, Jamous RM, Jamous RM, Salameh NM. Complementary and alternative medicine (CAM) use among hypertensive patients in Palestine. *Complement Ther Clin Pract*. 2013 Nov 1;19(4):256-63.
 33. Kretchy IA, Owusu-Daaku F, Danquah S. Patterns and determinants of the use of complementary and alternative medicine: a cross-sectional study of hypertensive patients in Ghana. *BMC Complement Altern Med*. 2014 Dec;14:1-7.