

SEÇÃO: ORIGINAL ARTICLE

Prevalence and Factors Associated with Hypertension: A Cross-Sectional Study among Elderly Population in Pokhara Metropolitan

Prevalência e fatores associados à hipertensão: um estudo transversal entre a população idosa na região metropolitana de Pokhara

Prevalencia y factores asociados con la hipertensión: un estudio transversal entre la población anciana en Pokhara Metropolitan

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Abstract

Aims: hypertension (HTN) is rapidly emerging as a public health problem among elderly in developing countries. The objective of this study was to assess the prevalence of hypertension and its associated factors among the elderly in Pokhara Metropolitan, Nepal.

Methods: a cross-sectional analytical study was carried out to assess hypertension among 323 community dwelling elderly in Pokhara Metropolitan from October 2019 to March 2020. Quota sampling was used to collect the samples. Elderly those who were attending hospitals or with any serious medical conditions were excluded from the study. Face to face interview was done for data collection and anthropometric measurements, and semi structured standard STEPS questionnaires were used as data collection tools. Data were entered in Epi DATA [Version 3.1] and analyzed using SPSS [Version 20] as per data analysis plan. Bivariate logistic regression analysis were conducted and statistical significance was declared at a p-value ≤ 0.05 .

Results: prevalence of hypertension was reported among 34.4 percent (Male: 39.3%, Female 29%) elderly in Pokhara Metropolitan. The higher proportion of hypertensive cases were in age group 60-69 years (36%). The prevalence of hypertension was significantly associated with ethnicity (OR= 1.74, CI: 1.07-2.83), current alcohol intake (OR= 2.56, CI: 1.30-5.05) and mental stress (OR= 2.25, CI: 1.19-4.28).

Conclusion: more than one third of the elderly had hypertension. Ethnicity, current alcohol intake and mental stress are found to be factors associated with hypertension. Periodic screening for early detection of hypertension and implementing health promotion interventions to encourage behavior change among elderly may promote healthy ageing.

Keywords: hypertension, prevalence, risk factors, elderly, Nepal.

Resumo

Objetivos: a hipertensão (HA) está emergindo rapidamente como um problema de saúde pública entre os idosos nos países em desenvolvimento. O objetivo deste estudo foi avaliar a prevalência de hipertensão e seus fatores associados em idosos de Pokhara Metropolitan, Nepal.

Métodos: foi realizado um estudo transversal analítico para avaliar a hipertensão em 323 idosos residentes na comunidade em Pokhara Metropolitan de outubro de 2019 a março de 2020. A amostragem por cota foi utilizada para a coleta das amostras. Idosos que frequentavam hospitais ou com qualquer condição médica grave foram excluídos do estudo. Entrevista face a face foi realizada para coleta de dados e medidas antropométricas, e questionários padrão semiestruturados STEPS foram usados como ferramentas de coleta de dados. Os dados foram inseridos no Epi DATA [Versão 3.1] e analisados usando SPSS [Versão 20] de acordo com o plano de análise de dados. A análise de regressão logística bivariada foi conduzida e a significância estatística foi declarada para um valor de $p \leq 0.05$.



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Resultados: a prevalência de hipertensão foi relatada entre 34,4% idosos em Pokhara Metropolitan (Masculino: 39,3%, Feminino 29%). A maior proporção de hipertensos estava na faixa etária de 60 a 69 anos (36%). A prevalência de hipertensão foi significativamente associada com etnia (OR = 1,74, IC: 1,07-2,83), consumo atual de álcool (OR = 2,56, IC: 1,30-5,05) e estresse mental (OR = 2,25, IC: 1,19-4,28).

Conclusão: mais de um terço dos idosos eram hipertensos. Etnia, consumo atual de álcool e estresse mental são fatores associados à hipertensão. A triagem periódica para detecção precoce da hipertensão e a implementação de intervenções de promoção da saúde para estimular a mudança de comportamento entre os idosos podem promover o envelhecimento saudável.

Palavras-chave: hipertensão, prevalência, fatores de risco, idoso, Nepal.

Resumen

Objetivos: la hipertensión (HTA) está emergiendo rápidamente como un problema de salud pública entre los ancianos en los países en desarrollo. El objetivo de este estudio fue evaluar la prevalencia de hipertensión y sus factores asociados entre los ancianos en Pokhara Metropolitan, Nepal.

Métodos: se llevó a cabo un estudio analítico transversal para evaluar la hipertensión entre 323 comunidad de ancianos en Pokhara Metropolitan desde octubre de 2019 a marzo de 2020. Se utilizó un muestreo por cuotas para recolectar las muestras. Los ancianos que asistían a hospitales o con alguna condición médica grave fueron excluidos del estudio. Se realizó una entrevista cara a cara para la recopilación de datos y mediciones antropométricas, y se utilizaron cuestionarios STEPS estándar semiestructurados como herramientas de recopilación de datos. Los datos se ingresaron en Epi DATA [Versión 3.1] y se analizaron utilizando SPSS [Versión 20] según el plan de análisis de datos. Se realizaron análisis de regresión logística bivariados y se declaró significancia estadística a un valor de $p \leq 0,05$.

Resultados: la prevalencia de hipertensión se informó entre el 34,4 por ciento (hombres: 39,3%, mujeres 29%) ancianos en Pokhara Metropolitan. La mayor proporción de casos de hipertensión se registró en el grupo de edad de 60 a 69 años (36%). La prevalencia de hipertensión se asoció significativamente con la etnia (OR = 1,74, IC: 1,07-2,83), la ingesta actual de alcohol (OR = 2,56, IC: 1,30-5,05) y el estrés mental (OR = 2,25, IC: 1,19-4,28).

Conclusión: más de un tercio de los ancianos tenían hipertensión. Se ha descubierto que la etnia, la ingesta actual de alcohol y el estrés mental son factores asociados con la hipertensión. El cribado periódico para la detección temprana de la hipertensión y la implementación de intervenciones de promoción de la salud para fomentar el cambio de comportamiento entre los ancianos pueden promover un envejecimiento saludable.

Palabras clave: hipertensión, prevalencia, factores de riesgo, anciano, Nepal.

Background

Hypertension is rising public health problem among elderly in developing countries.^{1,2} It is one of the vital risk factors for cardiovascular mortality and morbidity globally.^{1,3,4} Hypertension prevalence increases with age.⁵⁻⁸ Hypertension, a "SILENT KILLER", is a condition

where the systolic blood pressure is equal to or above 140 mmHg and/or diastolic blood pressure is equal to or above 90 mmHg.^{9,10}

Hypertension is an outcome of behavioral risk factors including unhealthy diet, physical inactivity, tobacco use, poor stress management, harmful alcohol intake.^{9,11,12} Other factors related to hypertension are sex, dietary salt intake, parental history of hypertension⁹, body mass index¹³, obesity (BMI>30 kg/m²) and sleep duration.¹⁴ According to World Health Organization (WHO), among South Asian countries, Nepal reported the second highest proportion of hypertensive individuals (27,3%) after Afghanistan (29%); indicating the high burden of hypertension among Nepalese population. Therefore, this study was carried out with the objective of estimating prevalence of hypertension and its associated factors among elderly in Pokhara Metropolitan, Kaski, Nepal.

Methods

This was a community based cross-sectional study conducted in Pokhara Metropolitan from October 2019 to March 2020. Ethical approval was taken from the Ethical Review Board (ERB) of Nepal Health Research Council (NHRC). Written informed consent was obtained from each participant. All those people aged 60 years and older and those who have been residing for at least 1 year in the study area were included for study from the selected wards and elderly who refused or were unwilling to participate and those who were attending hospitals or with any serious medical conditions were excluded from the study using quota sampling.

The total area of this Metropolitan city is 464.24 km² (179.24 sq mi) and the total population of the municipality according to 2011 (2068 BS) Nepal census is 600,759 individuals. It is divided into 33 wards. Among total 33 wards of Pokhara Metropolitan, 11 wards (1, 2, 3, 4, 6, 9, 11, 17, 18, 29 and 30) were selected randomly using the android random number generator application. The study was conducted among 323 community dwelling elderly. Total sample size (323) was equally divided among the 11 selected wards. Three blood pressure measurements were taken

from participants in a sitting position with every 5 minutes of rest using a digital sphygmomanometer where the mean of second and third readings was used to determine single value of blood pressure.¹⁵ First, all ethnicities were classified into three categories, advantaged group (upper caste group), relatively advantaged group (relatively advantaged janajati), and disadvantaged group (Dalit, disadvantaged Janajati, disadvantaged non-Dalit terai group and religious minorities) and further advantaged group was classified as privileged (advantaged group) and non-privileged as relatively advantaged and disadvantaged group.¹⁶ Those who had smoked tobacco within last 30 days and is still smoking were classified as current smokers where those who have consumed a drink containing alcohol in the last 12 months was classified as current alcohol intake. BMI was classified as per the WHO's BMI chart for elderly which classified underweight, normal weight and overweight with BMI less than 23 kg/m², 23-29.9 kg/m² and ≥30 kg/m² respectively. Physical activity like brisk walking, gardening, housework, domestic chores/ moving moderate loads (<20kg) etc. noticeably accelerating the heart rate were classified as moderate level physical activity. Sleep duration typically refers to the total amount of sleep obtained across the 24-hour period.

Data were collected by face-to-face interview and anthropometric measurements. The survey questionnaire (WHO STEP wise questionnaires) was used as data collection tools. Descriptive statistics (frequency, percentage, mean and SD) was calculated to study the characteristics of the participants where Chi-square test. Bivariate and multivariable logistic regression analysis were conducted and statistical significance was declared at a p-value ≤0.05. Data were entered using Epidata (version 3.1) where SPSS (version 20) was used for data analysis.

Results

Among 323 subjects, 52 percent were male. The mean age of the participants was 71.4 years (Range 60-99 years). Almost half (46.4%) of them were of age group (60-69 years) and least (2.8%) were of age group (90-99) (**Table 1**). Majority

(79.6%) of the participants were Hindus. More than half (53.9%) of the participants were illiterate and three-fourths (74.3%) were living in a joint family.

Table 1 – Distribution of socio-demographic characteristics of the elderly in Pokhara Metropolitan, Nepal

Variable	Frequency (n=323)	Percentage (%)
Sex		
Male	168	52
Female	155	48
Age (in Years)		
60-69	150	46.4
70-79	108	33.4
80-89	56	17.3
90-99	9	2.8
Mean=71.4, Min=60, Max=99, SD=8.7		
Education		
Illiterate	174	53.9
Informal	113	35
Basic	20	6.2
Secondary	13	4
Bachelors	2	0.6
Masters and above	1	0.3
Ethnicity		
Advantaged group	221	68.4
Relatively advantaged group	81	25.1
Disadvantaged group	21	6.5

Socio-demographic characteristics of the participants.

The study revealed that 34.4 percent (111/323) of the participants were hypertensive. Among them, only 56.5 percent (169/323) were diagnosed having hypertension and 150 (88.8%) were currently taking medications for hypertension after being diagnosed with hypertension. The prevalence of hypertension was slightly higher among males (39.3%) than females (29%) however the differences observed between male and female were not statistically significant (p= 0.053) (**Table 2**). The higher percentage of hypertensive cases were seen in non-vegetarians and current alcohol consumption (p = 0.006) (**Table 3**). Slightly higher proportion of hypertensive cases were seen in the current smokers (39.7%) as compared to non-smokers and difference between these

groups were not statistically significant ($p = 0.349$).
Physical activity, family history of hypertension,

sleep duration had no any significant association
with hypertension (Table 2).

Table 2 – Distribution of association of hypertension with various risk factors

Variable	Hypertension		Total	p-value
	Yes	No		
	n (%)	n (%)		
Sex				
Male	66(39.3)	102(60.7)	168	0.053
Female	45(29)	110(71)	115	
BMI				
Underweight	49(44.1)	105(49.5)	154	0.143
Normal	49(44.1)	95(44.8)	144	
Overweight	13(11.7)	12(5.7)	25	
Current Smoker				
Yes	23(39.7)	35(60.3)	58	0.349
No	45(29.0)	110(71.0)	115	
Current alcohol users				
Yes	34(54.8)	28(45.2)	62	0.006*
No	27(32.1)	57(67.9)	84	
Family history of hypertension				
Yes	16(35.6)	29(64.4)	45	0.831
No	60(35.5)	109(64.5)	169	
Don't know	35(32.1)	74(67.9)	109	
Physical activity (minutes)				
<30	14(35.9)	25(64.1)	39	0.825
≥30	62(37.8)	102(62.2)	164	
Salt intake				
High	27(39.7)	41(60.3)	68	0.508
Normal	63(33.9)	123(66.1)	186	
Low	21(30.4)	48(69.6)	69	
Dietary habit				
Vegetarian	33(30)	77(70)	110	0.235
Non-vegetarian	78(36.6)	135(63.4)	213	
Mental stress				
Yes	97(37.6)	160(62.3)	257	0.012*
No	14(21.2)	52(78.8)	66	
Sleep duration (hours)				
<8	55(36.4)	96(63.6)	151	0.465
≥8	56(32.6)	116(67.4)	172	

*p-value significant at $\alpha < 0.05$

Note: Values in the parenthesis indicate percentage. Chi-square test
Distribution of association of hypertension with risk factors.

Table 3 – Binary logistic regression analysis of hypertension and various risk factors

Variable	Hypertension		UOR	p-value	95% CI	
	Yes	No			Lower	Upper
Age						
60-69	54(36)	96(64)	1.10	0.76	0.60	2.02
70-79	35(32.4)	73(67.6)	0.92	0.84	0.49	1.80
≥80	22(33.8)	43(66.2)	1			
Ethnicity						
Privileged	67(30.3)	154(69.7)	1	0.02*	1.07	2.83
Non-privileged	44(43.1)	58(56.9)	1.74			
BMI						
Underweight	49(44.1)	105(49.5)	1			
Normal	49(44.1)	95(44.8)	1.11	0.69	0.68	1.79
Overweight	13(11.7)	12(5.7)	2.32	0.053	0.98	5.46
Salt Intake						
High	27(39.7)	41(60.3)	1.51	0.26	0.74	3.05
Normal	63(33.9)	123(66.1)	1.17	0.60	0.65	2.13
Low	21(30.4)	48(69.6)	1			
Frequency of mental stress						
Rarely	7(22.6)	24(77.4)	1			
Sometimes	27(26.2)	76(73.8)	1.22	0.68	0.47	3.15
Often	44(46.8)	50(53.2)	3.02	0.02*	1.19	7.68
Daily	19(65.5)	10(34.5)	6.51	0.001*	2.09	20.33

*p-value significant at $\alpha < 0.05$

Note: Values in the parenthesis indicate percentage.

Binary logistic regression analysis of hypertension prevalence.

The results from binary logistic regression showed higher prevalence of hypertension among the participants with BMI 23-29.9 (44.1%). More hypertensive cases were in age group 60-69 years (36%) and less in the age group 70-79 (32.4%). The percentage of participants who had high dietary salt intake had high risk of developing hypertension (39.7%). Hypertension was more common among non-privileged groups than among privileged groups ($p < 0.02$).

Discussion

The purpose of this study was to assess the prevalence of hypertension among the elderly and

to examine the associations of socio-demographic, physical, behavioral and psychological characteristics of the elderly residing in Pokhara with hypertension. The results of this study are discussed here by comparing the study findings.

The present study revealed that more than one-third of the elderly had hypertension. A similar study in Surkhet District of Nepal showed higher prevalence (59.3%) of hypertension among elderly.¹⁷ In other countries, hypertension was evident among 26 percent elderly in Haikou.¹⁸ Similarly, 62.5% in Iran¹⁹ had hypertension. The prevalence of hypertension for the period from 1980 to 2010, according to the JNC criteria, was

68.0% (95% CI, 65.1%–69.4%) in Urban Brazil.⁴ Large variation was seen in prevalence of hypertension with different countries. High prevalence may be due to poor accessibility of health facilities.

There was no significant association between the socio-demographic characteristics except ethnicity ($p=0.02$). The odds of developing hypertension were higher among non-privileged groups than privileged groups (OR 1.74, CI: 1.07-2.83). The similar result was seen in a study where Dalit (50%) and Janajati (41%) participants had high blood pressure in comparison to upper caste groups like Brahman and Kshetri in Surkhet Nepal.¹⁷ As a study conducted in Western Nepal also showed the respondents belonging to disadvantaged ethnic communities had a 6.1 (95% CI, 4.9–6.3) times higher odds of ever having consumed alcohol than other ethnic groups. Alcohol use in Nepal is socially and culturally accepted in many disadvantaged ethnic groups. So, the chances of having hypertension might be higher in this ethnic groups and the consumption has been increasing over the years across all ethnicities and age groups.²⁰

The study revealed the prevalence of hypertension higher among males compared to female which matched out with the findings from a study conducted in Uttarakhand, India²¹ that may be due higher treatment rates among women and males involvement in risky behavior. But contradicted with results from the studies conducted in India^{1,13,19,22} and study conducted in low-and middle-income countries.²³ This study showed higher prevalence of hypertension among literate respondents than illiterate. The odds of HTN increased with increasing educational level which was similar to the findings of the community based survey in Haikou¹⁸ and in Uttarakhand, India^{1,21} but difference was observed in another study conducted in mid-western region of Nepal where the proportion of hypertension was highest among uneducated participants (46.3%)¹⁷ and people with no education were less likely to have hypertension in Ghana.²³

Present study revealed the highest prevalence of hypertension among participants with BMI 23-29.9. This is somehow congruent with the findings from the study where the odds of having

hypertension was greater among overweight participants than those with normal weight in Northern Thailand¹³, Chinese population²⁴, rural Ethiopia²⁵ and Haikou.¹⁸

There was no significant association between current smoking and hypertension. It could be because once a patient diagnosed as hypertensive, he or she might change his or her lifestyle or other relevant factors. Although, smokers had higher prevalence of hypertension than non-smokers with OR; 1.32 (0.74-2.37). A similar results are shown by previous studies conducted in rural community of western Nepal⁷ and a community based survey in Haikou.¹⁸ This may be due to quitting of smoking by the hypertensive patients to control hypertension. But in a study of hypertension among elderly in Iran showed inverse (reduced hypertension) between current smoking and hypertension.¹⁹

The results of this study showed the odds of having hypertension increased with the current use of alcohol where the same was seen in a study where the current alcohol users had positive association with high blood pressure with OR 2.58 (0.98-6.78) in Western Nepal.⁷ but the result contradicted with a study where the alcohol abstainers had a slightly higher prevalence of hypertension than the elderly who consumed alcohol (26.6% [alcohol abstainers] vs. 22.6% [alcohol consumers] in Haikou.¹⁸

In this study, out of 169 hypertensive population, 88.8 percent were on medication. The reason behind majority of the respondents taking medication might be the counseling by health personnel to those who were diagnosed with hypertension. Family history of hypertension had no significant association ($p=0.83$) with hypertension. Slightly more than 1/3rd (35.6) of the respondents, who were hypertensive were having family history of hypertension which was similar with the study of western Nepal⁷, rural Ethiopia²⁵ and northern Thailand.¹³ The reason behind it may be due to recall bias in study population.

In this study types of dietary intake didn't show significant association with hypertension; however, non-vegetarians were more hypertensive than

vegetarian which is consistent with the findings of a study in Uttarakhand.²¹ Majority of the respondents were found to never add salt before eating rather think that they consume just the right amount of salt. The prevalence of hypertension was seen high among those consuming high amount of salt than those consuming low amount of salt.

The study showed the prevalence of hypertension slightly higher among those who performed physical activity for more than 30 minutes than those performing physical activity for less than 30 minutes. On the other hand some previous studies showed higher prevalence of hypertension in subjects doing irregular physical activity in Uttarakhand, India¹ and in Brazil.²⁶

In this study mental stress was found to be significantly associated with hypertension ($p=0.01$). The prevalence of hypertension was higher among those who had stress on a daily basis than those who had rare stress. Here, mental stress was measured by the factors: financial problem, health problem, occupational problem and family problem.

Limitations

The study was carried out in an urban population with defined methods. Hence, the findings must be utilized carefully with due considerations of methodological limitations of sampling, population targeted, accuracy of verbal reporting by elderly (recall and social desirability biases).

Conclusion

Hypertension was prevalent among one-third elderly in Pokhara Metropolitan. Ethnicity, alcohol consumption and mental stress were identified as the factors associated with hypertension. Interventions aiming to reduce/restrict the consumption of alcohol and establishing elderly friendly service centre for health care and social support would be useful to curb down the hypertension among elderly. Periodic screening for early detection of hypertension and implementing health promotion interventions to encourage behavior change among elderly may promote healthy ageing.

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References

1. Kapil U, Khandelwal R, Ramakrishnan L, Khenduja P, Gupta A, Pandey RM, et al. Prevalence of hypertension, diabetes, and associated risk factors among geriatric population living in a high-altitude region of rural Uttarakhand, India. *J Family Med Prim Care*. 2018;7(6):1527-36. https://doi.org/10.4103/jfmpc.jfmpc_108_18
2. Xiao L, Le C, Wang G-Y, Fan L-M, Cui W-L, Liu Y-N, et al. Socioeconomic and lifestyle determinants of the prevalence of hypertension among elderly individuals in rural southwest China: a structural equation modelling approach. *BMC Cardiovasc Disord*. 2021;21(1):1-10. <https://doi.org/10.1186/s12872-021-01885-y>
3. Sekeon S, Kalesaran A, Kandou GD. The association between hypertension and quality of life among elderly: A population based comparison study with general population in Tomohon, Indonesia. *Glob J Med Public Health*. 2017;6:1-6.
4. Picon RV, Fuchs FD, Moreira LB, Fuchs SC. Prevalence of hypertension among elderly persons in urban Brazil: a systematic review with meta-analysis. *American journal of hypertension*. 2013;26(4):541-8. <https://doi.org/10.1093/ajh/hps076>
5. World Health Organization. Noncommunicable diseases in the South-East Asia Region, 2011: situation and response; 2012.
6. Bosu WK, Aheto JM, Zucchelli E, Reilly S. Prevalence, awareness, and associated risk factors of hypertension in older adults in Africa: a systematic review and meta-analysis protocol. *Systematic reviews*. 2017;6(1):192. <https://doi.org/10.1186/s13643-017-0585-5>
7. Kafle R, Sharma D, Paudel N, Sapkota S, Alurkar V. Prevalence and Associated Risk Factors of Hypertension in a Rural Community of Western Nepal: A Cross Sectional Study. *JAIM*. 2018;7(1):11-6. <https://doi.org/10.3126/jaim.v7i1.19577>
8. Dhakal S, Singh R, Yadav U, Gurung L. Prevalence and factors associated with hypertension among elderly population in Dhapasi VDC of Kathmandu district. *J Hypertens (Los Angel)*. 2017;6(242):2167-1095. <https://doi.org/10.4172/2167-1095.1000242>
9. World Health Organization. A global brief on hypertension: silent killer, global public health crisis: World Health Day 2013. World Health Organization; 2013.

10. Kumanan T, Guruparan M, Sreeharan N. Hypertension: "The Silent Killer". Chennai: Kumaran Book House; 2018.
11. World Health Organization. High blood pressure—country experiences and effective interventions utilized across the European Region; 2013.
12. Boateng GO, Luginaah IN, Taabazuing M-M. Examining the risk factors associated with hypertension among the elderly in Ghana. *Journal of aging and health*. 2015;27(7):1147-69. <https://doi.org/10.1177%2F0898264315577588>
13. Apidechkul T. Prevalence and factors associated with type 2 diabetes mellitus and hypertension among the hill tribe elderly populations in northern Thailand. *BMC public health*. 2018;18(1):694. <https://doi.org/10.1186/s12889-018-5607-2>
14. Guo J, Fei Y, Li J, Zhang L, Luo Q, Chen G. Gender- and age-specific associations between sleep duration and prevalent hypertension in middle-aged and elderly Chinese: a cross-sectional study from CHARLS 2011–2012. *BMJ open*. 2016;6(9):e011770. <http://dx.doi.org/10.1136/bmjopen-2016-011770>
15. Aryal KK. Non communicable diseases risk factors: STEPS Survey Nepal 2013: Nepal Health Research Council (NHRC); 2014.
16. Ministry of Health. Nepal Demographic and Health Survey. New Era, Kathmandu, Nepal; 2016.
17. Khanal MK, Dhungana RR, Bhandari P, Gurung Y, Paudel K. Prevalence, associated factors, awareness, treatment, and control of hypertension: Findings from a cross sectional study conducted as a part of a community based intervention trial in Surkhet, Mid-western region of Nepal. *PLoS One*. 2017;12(10):e0185806. <https://doi.org/10.1371/journal.pone.0185806>
18. Zhao C, Wong L, Zhu Q, Yang H. Prevalence and correlates of chronic diseases in an elderly population: A community-based survey in Haikou. *PLoS one*. 2018;13(6):e0199006. <https://doi.org/10.1371/journal.pone.0199006>
19. Mehboudi M, Nabipour I, Vahdat K, Darabi H, Raeisi A, Mehrdad N, et al. Inverse association between cigarette and water pipe smoking and hypertension in an elderly population in Iran: Bushehr elderly health programme. *J Hum Hypertens*. 2017;31(12):821. <https://doi.org/10.1038/jhh.2017.64>
20. Adhikari TB, Rijal A, Kallestrup P, Neupane D. Alcohol consumption pattern in western Nepal: findings from the COBIN baseline survey. *BMC psychiatry*. 2019;19(1):1-8. <https://doi.org/10.1186/s12888-019-2264-7>
21. Bartwal J, Rawat CS, Awasthi S. Prevalence, Awareness, Treatment and Control of Hypertension among the Elderly Residing in Rural Area of Haldwani Block, in Nainital District of Uttarakhand. *J Cardiovasc Disease Res*. 2016;7(3):112-5. <https://doi.org/10.5530/jcdr.2016.3.3>
22. Hanif AAM, Shamim AA, Hossain MM, Hasan M, Khan MSA, Hossaine M, et al. Gender-specific prevalence and associated factors of hypertension among elderly Bangladeshi people: findings from a nationally representative cross-sectional survey. *BMJ open*. 2021;11(1):e038326. <http://dx.doi.org/10.1136/bmjopen-2020-038326>
23. Lloyd-Sherlock P, Beard J, Minicuci N, Ebrahim S, Chatterji S. Hypertension among older adults in low- and middle-income countries: prevalence, awareness and control. *International journal of epidemiology*. 2014;43(1):116-28. <https://doi.org/10.1093/ije/dyt215>
24. Zhou J, Fang S. Association between Undiagnosed Hypertension and Health Factors among Middle-Aged and Elderly Chinese Population. *Int. J. Environ. Res. Public Health*. 2019;16(7):1214. <https://doi.org/10.3390/ijerph16071214>
25. Shukuri A, Tewelde T, Shaweno T. Prevalence of old age hypertension and associated factors among older adults in rural Ethiopia. *Integr Blood Press Control*. 2019;12:23-31. <https://dx.doi.org/10.2147%2Fibpc.s212821>
26. Mendes TdAB, Goldbaum M, Segri NJ, Barros MBdA, César CLG, Carandina L. Factors associated with the prevalence of hypertension and control practices among elderly residents of São Paulo city, Brazil. *Cad. Saúde Pública*. 2013;29:2275-86. <https://doi.org/10.1590/0102-311x00151312>

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