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Impact of literacy on the prevalence, awareness, treatment and control of hypertension in adults in Golestan Province (northern Iran)

Abstract

Background Hypertension is considered as a major health problem in our society. The association between educational level with hypertension and its control in the Golestan Province (northern Iran) were the main objectives of this study.

Methods: This was a population-based cross-sectional study that enrolled 3497 subjects aged 15-65 years using stratified and cluster sampling. The interviewers recorded the data using a multidimensional questionnaire, including blood pressure level. Blood pressure was measured three times with 5 minutes interval and defined based on Join National Committee (JNC-7).

Results: Totally, 741 (21.2 %) cases suffered from hypertension and illiterate people were significantly more aware of their disease ($p=0.011$). In the aware group, 435 (89.6%) cases used one method to control their disease and it was not statistically significant as far as educational levels was concerned. The control of hypertension was significantly greater in college educated group than the illiterate one (32.4% vs 68.8%) ($p=0.001$). Logistic regression analysis revealed that illiteracy is a risk factor for hypertension ($p<0.001$).

Conclusion: In spite of awareness in the illiterate people was high, the rate of hypertension control was low in this group. Prevention, detection, treatment, and control of hypertension especially the illiterate people should be given high priority.

Keywords: Literacy, Awareness, Control, Treatment, Hypertension, Iran

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Hypertension is an important public-health challenge worldwide and it is responsible of 7.1 million deaths annually (1). The estimated total number of adults with hypertension in 2000 was 972 million and the number of adults with hypertension in 2025 was predicted to increase about 60 % to a total of 1.56 billion (2). Literacy is considered as a mediating factor to health education and the relationship between education and health knowledge is approved by some reports (3-8). Studies about prevalence, awareness and control procedure of hypertension have been established abroad (9-13). Similar to most countries that have undergone rapid economic and demographical changeover, non-communicable diseases, especially cardiovascular disease, are the major causes of mortality and morbidity in Iran and reported with high prevalence (14-16). From the 1.6 million people in this area, 66.4 % were 15-64 years old, whereas, 43.9 % live in the urban areas (17). Agriculture is the main source of living in the rural areas and different ethnic groups such as Fars (native), Turkaman and Sistani are living in these regions. We chose education as a marker of socioeconomic status because it could easily be quantified in terms of number of years, reliably recalled and reverse incentive did not confuse the interviewer (18). Due to the restriction in executing epidemiological projects, there has not been any study on the hypertension in this area up to now; therefore, it was necessary to design a research project about it.

The aims of this study were to examine the prevalence of hypertension and to assess the association between its educational level on the awareness, treatment and control of the adults in Golestan province (northern Iran).

Methods

This is a cross-sectional–descriptive study based on population and 3497 cases (1750 men and 1747 women) between 15-65 years old were chosen by stratified and cluster sampling. The subjects were randomly chosen from 175 clusters and each cluster included 20 cases. The family code of primary health center in rural areas and postal code in urban areas were used to classify with equal proportion the age and sex.

From each district, one team was trained to complete the questionnaire and measure blood pressure. Blood pressure was measured three times with 5 minutes interval in the right arm. The interviewers recorded the data using a multi-dimensional questionnaire including socio-demographic indexes, blood pressure status, and procedure of control disease and awareness of their problem. Pregnant women and unwilling cases were excluded from this study.

Blood pressure levels were classified according to the guidelines from the JNC 7 report (19). Hypertension was defined as a systolic blood pressure of ≥ 140 mm/Hg or diastolic blood pressure of ≥ 90 mm/Hg or currently taking antihypertensive medication. Pre-hypertension was defined as a systolic blood pressure of 120-139 mm/Hg or a diastolic blood pressure of 80-89 mm/Hg. Normal blood pressure was defined as a systolic blood pressure of < 120 mm/Hg and a diastolic blood pressure of < 80 mm/Hg.

Awareness of hypertension was defined as self-reporting any prior diagnosis of hypertension by healthcare professionals or family doctors among the population was

defined as being hypertensive. Treatment of hypertension was defined as using antihypertensive medication at the time of the interview or during the last two weeks of hypertension. Control of hypertension was defined as measuring an average systolic blood pressure of < 140 mm/Hg and an average diastolic blood pressure of < 90 mm/Hg among the populations defined as being hypertensive (20). Educational level and classified in four groups: 1) illiterate: People who neither read nor write, 2) People having 1-9 years of schooling 3) 9-12 years of schooling, 4) college degree. SPSS version 16.0 was used for the statistical analysis and chi-square test for comparing frequencies. Logistic regression analysis was applied in order to estimate the odds ratio of hypertension considering the educational level at 95% significant level. The p-value less than 0.05 was considered as statistical significant. The reliability was assessed using Cronbach's alpha coefficient and found to be 0.83.

Results

Totally, 3497 subjects (1740 men, 1747 women) with the mean age of 39.5 ± 14.3 years were evaluated. Hypertension was detected in 346 (19.8%) men and in 395 (22.6%) of women. Totally, 21.2% had hypertension. There was a significant inverse correlation between literacy and hypertension, the illiterate people were two times more hypertensive that those with tertiary or third level of education ($p=0.001$). From the hypertensive patients 435 (58.7%) were aware and significantly seen in illiterate people more than the educated people ($p=0.001$).

Only 378 (86.9%) cases of the awareness patients used an antihypertensive medication. Control rate was 273 (62.8%) cases and in educated people was two times more than the illiterate (68.8% vs 32.4%) ($p=0.011$) (table 1).

Table 1. Relationship between educational level and prevalence, awareness, treatment and control of hypertension.

Education Level	N (%)	Hypertension****		Awareness*** (N=741)		Treatment**(N=435)		Normalized*(N=435)	
		Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
Illiterate	1032 (29.5)	349 (33.8)	683 (66.2)	247 (70.8)	102 (29.2)	218 (88.3)	29 (11.7)	80 (32.4)	167 (67.6)
1-9 schooling	1445 (41.3)	277 (19.2)	1168 (80.8)	129 (46.6)	148 (54.4)	114 (88.4)	15 (11.6)	51 (39.5)	78 (60.5)
9-12 schooling	793 (22.7)	84 (10.4)	79 (89.4)	43 (51.2)	41 (48.8)	32 (74.4)	11 (25.6)	20 (46.5)	23 (53.5)
College	227 (6.5)	31 (13.7)	196 (86.3)	16 (51.6)	15 (48.4)	14 (87.5)	2 (12.5)	11 (68.8)	5 (31.2)
Total	3497 (100)	741 (21.2)	2756 (78.8)	435 (58.7)	306 (41.3)	378 (86.9)	57 (13.1)	162 (37.2)	273 (62.8)

*chi2=0.011 **chi2=0.083 ***chi2=0.001 **** chi2=0.001

Multiple logistic regressions were used to identify the educational levels that contributed to hypertension. The odds ratio estimated for hypertension was 3.093 [95% CI: 2.265-

4.225] for illiterate people compared to educated people was 1.480 [95% CI: 1.061-2.065] only when age was adjusted (table 2).

Table 2. Odds Ratios and 95% CI obtain from crude and age adjusted logistic regression.

Educational Level	Crude		Age adjusted	
	OR (95% CI)	p-value	OR (95% CI)	p-value
College (Ref)	1.00		1.00	
Illiterate	3.093 (2.265-4.225)	0.001*	1.480 (1.061-2.065)	0.021*
1-9 years schooling	1.339 (0.986-1.818)	0.062	1.286 (0.935-1.770)	0.122
9-12 years schooling	0.828 (0.597-1.150)	0.260	1.099 (0.780-1.550)	0.589

Ref=Reference category * There is a statistical significant difference.

Discussion

In the present study, hypertension investigation of adults in Golestan province was 21.2%, the prevalence of hypertension in entire Iran and Isfahan was reported to be 23.3% (19.8% in men and 26.9% in women) and 18.0%, respectively (21, 22). The prevalence in other countries such as America, France and Singapore was reported to be 20.1%, 37% and 24%, respectively (23-25). In agreement with the results of other studies, one-fifth of the adults were hypertensive in northern Iran. The illiterate people in comparison to the educated people were more aware about their morbidity, but control disease in this group was lower than the others.

The role of educational level in cardiovascular disease varied in the different studies. In some studies, the educational level had a positive correlation with cardiovascular disease but in others, illiteracy was included a risk factor (26, 27).

This way, awareness rate was more in the educated people than the illiterate and cardiovascular disease risk factors had been seen in deprived or less developed regions more than the developed countries (28-35). A study conducted in China had shown an inverse correlation between education and both awareness and treatment rate, but normalization of blood pressure in this group was better than the others and the low control hypertension had been seen in illiterate patients as compared with the educated patients (20, 36).

According to the health promotion policy in the last decades in Iran, primary health care had been expanded in

rural areas and was strongly covered by health education. This was possibly the way this procedure resulted to raise

awareness about hypertension, although, they had little knowledge and low attitude about the risk of hypertension because of illiteracy and poverty.

A similar study in Austria showed that not only awareness but also the warning over dangers of hypertension were necessary (32).

We did not investigate all of the factors related to hypertension, such as quantity and quality of diet, duration of hypertension morbidity and ethnicity in this area which are the weaknesses of our study.

In conclusion, hypertension has been seen as a health problem in adults in Golestan Province northern Iran. At least one-fifth of them are suffering from it. Illiteracy is a risk factor for poor hypertension control. The other associated factors leading to hypertension increase need to be identified and public action is necessary to reduce adult hypertension especially among the illiterate people in this area.

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References

1. World Health Organization. World Health Report 2002. Reducing risks, promoting healthy life. Geneva, Switzerland: World Health Organization, 2002. Available at: URL: http://www.who.int/whr/2002/overview_E.pdf.
2. Kearney PM, Whelton M, Reynolds K, et al. Global burden of hypertension: analysis of worldwide data. *Lancet* 2005; 365: 217–23.
3. Baker DW, Wolf MS, Feinglass J, et al. Health literacy and mortality among elderly persons. *Arch Intern Med* 2007; 167:1503–9.
4. Laramee AS, Morris N, Littenberg B. Relationship of literacy and heart failure in adults with diabetes. *BMC Health Serv Res* 2007; 7: 98.
5. Schillinger D, Barton LR, Karter AJ, Wang F, Adler N. Does literacy mediate the relationship between education and health outcomes? A study of a low income population with diabetes. *Public Health Rep* 2006; 121: 245–54.
6. Gazmararian JA, Williams MV, Peel J, Baker DW. Health literacy and knowledge of chronic disease. *Patient Educ Couns* 2003; 51: 267–75.
7. Williams MV, Baker DW, Honig EG, Lee TM, Nowlan A. Inadequate literacy is a barrier to asthma knowledge and self-care. *Chest* 1998; 114: 1008–15.
8. Wolf MS, Davis TC, Cross JT, et al. Health literacy and patient knowledge in a Southern US HIV clinic. *Int J STD AIDS* 2004; 15: 747–52.
9. Wu Y, Tai ES, Heng D, et al. Risk factors associated with hypertension awareness, treatment, and control in a multi-ethnic Asian population. *J Hypertens* 2009; 27: 190–7.
10. Ong KL, Cheung BM, Man YB, Lau CP, Lam KS. Prevalence, awareness, treatment, and control of hypertension among United States adults 1999–2004. *Hypertension* 2007; 49: 69–75.
11. Whelton PK, He J, Muntner P. Prevalence, awareness, treatment and control of hypertension in North America, North Africa and Asia. *J Hum Hypertens* 2004; 18: 545–51.
12. Gu D, Reynolds K, Wu X, Chen J, Duan X, Muntner P, et al. Prevalence, awareness, treatment, and control of hypertension in china. *Hypertension* 2002; 40:920-7.
13. Wu Y, Huxley R, Li L, et al. Prevalence, awareness, treatment, and control of hypertension in China: data from the China National Nutrition and Health Survey 2002. *Circulation* 2008; 118: 2679-86.
14. Azizi F, Rahmani M, Emami H, et al. Cardiovascular risk factors in an Iranian urban population: Tehran Lipid and Glucose Study (Phase 1). *Soz Praventivmed* 2002; 47:408-26.
15. Mendis S, Abegunde D, Yusuf S, et al. WHO study on Prevention of Recurrences of Myocardial Infarction and Stroke (WHO-PREMISE). *Bull World Health Organ* 2005; 83: 820-9.
16. Hadaegh F, Harati H, Ghanbarian A, Azizi F. Prevalence of coronary heart disease among Tehran adults: Tehran Lipid and Glucose Study. *East Mediterr Health J* 2009; 15: 157-66.
17. Nourollahi T. 2006 national Population and Housing Census in I. R. of Iran. Available at http://www.ancsdaap.org/cencon2009/papers/Iran/Iran_slids.pdf. Accessed 10 June 2012.
18. Colhoun HM, Hemingway H, Poulter NR. Socio-economic status and blood pressure: an overview analysis. *J Hum Hypertens* 1998; 12: 91–110.
19. Chobanian AV, Bakris GL, Black HR, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure The JNC 7 Report. *JAMA* 2003; 289: 2560-71.
20. Xu T, Wang Y, Li W, et al. Survey of prevalence, awareness, treatment, and control of hypertension among Chinese governmental and institutional employees in Beijing. *Clin Cardiol* 2010; 33: E66-72.
21. Janghorbani M, Amini M, Gouya MM, et al. Nationwide survey of prevalence and risk factors of prehypertension and hypertension in Iranian adults. *J Hypertens* 2008; 26: 419-26.
22. Sarraf-Zadegan N, Boshtam M, Mostafavi S, Rafiei M. Prevalence of hypertension and associated risk factors in Isfahan, Islamic Republic of Iran. *East Mediterr Health J* 1999; 5: 992-1001.
23. Burt VL, Cutler JA, Higgins M, et al. Trends in the prevalence, awareness, treatment, and control of hypertension in the adult US population. Data from the health examination surveys, 1960 to 1991. *Hypertension* 1995; 26: 60-9.
24. Dobbeltsteyn CJ, Joffres MR, MacLean DR, Flowerdew G. A comparative evaluation of waist circumference,

- waist-to-hip ratio and body mass index as indicators of cardiovascular risk factors. The Canadian Heart Health Surveys. *Int J Obes Relat Metab Disord* 2001; 25: 652-61.
25. Bhalla V, Fong CW, Chew SK, Satku K. Changes in the levels of major cardiovascular risk factors in the multi-ethnic population in Singapore after 12 years of a national non-communicable disease intervention program. *Singapore Med J* 2006; 47: 841-50.
 26. Dragano N, Bobak M, Wege N, et al. Neighborhood socioeconomic status and cardiovascular risk factors: a multilevel analysis of nine cities in the Czech Republic and Germany. *BMC Public Health* 2007 ; 7: 255
 27. Banegas JR, Rodríguez-Artalejo F, Ruilope LM, et al. Hypertension magnitude and management in the elderly population of Spain. *J Hypertens* 2002; 20: 2157-64.
 28. Porapakkham Y, Pattaraarchachai J, Aekplakorn W. Prevalence, awareness, treatment and control of hypertension and diabetes mellitus among the elderly: the 2004 National Health Examination Survey III, Thailand. *Singapore Med J* 2008; 49: 868-73.
 29. Tourlouki E, Matalas AL, Panagiotakos DB. Dietary habits and cardiovascular disease risk in middle-aged and elderly populations: a review of evidence. *Clin Interv Aging* 2009; 4: 319-30.
 30. Pakseresht M, Mead E, Gittelsohn J, Roache C, Sharma S. Awareness of chronic disease diagnosis amongst family members is associated with healthy dietary knowledge but not behaviour amongst Inuit in Arctic Canada. *J Hum Nutr Diet* 2010; 23: 100-9.
 31. Samal D, Greisenegger S, Auff E, Lang W, Lalouschek W. The relation between knowledge about hypertension and education in hospitalized patients with stroke in Vienna. *Stroke* 2007; 38: 1304-8.
 32. Samsa G, Cohen S, Goldstein L, Bonito A, Duncan P, Enarson C, et al. Knowledge of risk among patients at increased risk for stroke *Stroke* 1997; 28: 916-21.
 33. Jonas JB, Nangia V, Matin A, Joshi PP, Ughade SN. Prevalence, awareness, control, and associations of arterial hypertension in a rural central India population: the Central India Eye and Medical Study. *Am J Hypertens* 2010; 23: 347-50.
 34. Macintyre K, Stewart S, Chalmer J, Pell J, Finlayson A, Boyd J, et al. Relation between socioeconomic deprivation and death from a first myocardial infarction in Scotland: population based analysis. *BMJ* 2001; 322: 1152-53.
 35. Bosma H, van de Mheen HD, Borsboom GJ, Mackenbach JP. Neighborhood socioeconomic status and all-cause mortality. *Am J Epidemiol* 2001, 153: 363-71.
 36. Pandit AU, Tang JW, Bailey SC, et al. Education, literacy, and health: Mediating effects on hypertension knowledge and control. *Patient Educ Couns* 2009; 75: 381-5.