

Awareness of hypertension among the medical students and junior doctors — a multicenter study from Pakistan

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Abstract

Objectives: To evaluate the awareness of hypertension among medical students and junior doctors in Karachi, Pakistan.

Methods: This cross-sectional study was conducted using a structured questionnaire consisting of eleven multiple choice questions, encompassing major aspects of hypertension such as the definition, diagnosis, treatment, complications and risk factors. This survey was conducted from June to August 2010 on final year medical students of Dow University of Health Sciences and interns and residents working at four tertiary care hospitals.

Results: Analysis of 475 participants showed that only 127(26.74%) participants were acquainted with the basic definitions including the cut-off levels for blood pressure among the general population, in diabetics, in those with chronic kidney disease and pre-hypertension.

We further inquired about the drugs to be used as first-line of treatment in uncomplicated hypertension, in those with diabetic nephropathy and drugs that worsen blood-pressure and renal dysfunction. Only 40(8.42%) participants correctly responded to all the three questions. While 97(20.42%) answered all the three questions incorrectly.

No participant correctly answered all of the 11 questions. Only 1 participant could answer 10 questions, correctly, whereas, 14 participants answered 9 correctly and 18 did 8. Majority of the participants (442) correctly answered 7 or less questions. Mean number of correct answers given by the final year students was 5.2 ± 1.6 , by interns 4.4 ± 1.6 and those given by residents was 5.04 ± 2.0 . Statistically significant difference was noted between the number of correct answers by medical students, interns and residents.

Conclusion: This study highlights obvious deficiencies in the knowledge of both junior and future doctors of Pakistan regarding hypertension which should be dealt seriously.

Keywords: Hypertension, Awareness, Treatment, Diagnosis, Risk factors, Residents, medical students, Questionnaire (JPMA 61: 1153; 2011).

Introduction

The present era has shown an upsurge in the incidence of hypertension among the general population aged 50 years or more. Hypertension is defined as a mean systolic blood pressure above 140 mm Hg and a mean diastolic blood pressure above 90 mm Hg.¹ Estimates suggested that approximately 972 million (26.4%) adults around the globe had hypertension in the year 2000. These numbers are expected to approach 1.56 billion (29.2%) by the year 2025, a 60% rise in the total number of people affected.² Due to a higher growth rate, lower socioeconomic status and presence of a greater array of risk factors, developing nations will constitute the bulk of this increase.³ In Pakistan, cardiovascular diseases have been predicted to overtake the infectious disease as the major cause of morbidity and mortality within the next decade.⁴

Hypertension being a silent killer remains

asymptomatic until complications like coronary artery disease, stroke, and renal failure develop. This necessitates the need for appropriate diagnosis followed by treatment along with compliance of the patient. The 1990 to 1994 National Health Survey of Pakistan showed that about 70% to 85% of Pakistani hypertensive patients were unaware of their disease.⁵

Realising the need for uniform guidelines for the management of this common condition, Joint National Committee (JNC) 7,¹ and International Society of Hypertension (ISH)¹ had proposed guidelines, which helped to reduce inappropriate approaches and have proved to an evidence-based, cost effective option for treating patients. Despite of all the present evidence, this potentially lethal chronic disease continues to be inadequately diagnosed and treated. Even in the developed world,⁷ the proportion of hypertensive patients with properly controlled blood pressure is reportedly low. For

example, in the United States⁸ only 24% of those affected with hypertension meet the recommended target of achieving a blood pressure less than 140/90 mm Hg.¹ The situation is even worse in Pakistan, where less than 3% of those effected with hypertension had a blood pressure of 140/ 90 mmHg or below.⁹ Factors such as insufficient knowledge of physicians regarding the management of hypertension as recommended by the guidelines,¹⁰ poor patient compliance, awareness¹¹ and access to health care have lead to such a dismal state of affairs.

Undergraduate and post-graduate trainees assume an imperative role in any health care system, since they are the future health care professionals of any society. The purpose of this research study was to evaluate the knowledge about hypertension among medical students, interns and residents working in four tertiary care hospitals of a metropolitan city, Karachi, Pakistan.

Methods

This descriptive cross-sectional study was conducted from June to August 2010 at 6 centers namely; Dow Medical College, Sindh Medical College, Civil Hospital Karachi, Lyari General Hospital, Jinnah Post Graduate Medical Centre and National Institute of Child Health.

The sample size of 289 was calculated using epi info calculator (open epi online calculator) and taking study by Cuspidi etal as the reference sample size and keeping 95% confidence interval.¹²

The study instrument was a structured, self-administrable questionnaire consisting of eleven multiple choice questions (MCQs), encompassing major aspects of hypertension such as the definition, diagnostic modalities, treatment, possible lab workup to rule out the underlining end organ damage and risk factors for the development of hypertension.

These MCQs were based on the facts regarding hypertension from the current guidelines from the JNC 7¹ and ISH.¹⁰ The questionnaire was discussed with the teaching faculty members and consultants who had been treating hypertensive patients. It was further pilot tested on 20 participants to clear any ambiguity.

The demographics included the institution, teaching hospital and the medical college to which the participants belonged along with their designation as residents, interns or

final year medical students.

The questionnaires were distributed in person after ensuring anonymity of the participants and taking an informed consent. They were asked to fill the questionnaire under supervision for which ample time was provided. The filled sheets were then collected and analyzed. Incompletely filled questionnaires were discarded.

Convenient sampling was employed to interview the participants. Final year medical students from Dow Medical College, and Sindh Medical College, were contacted at their campuses. Interns and residents were contacted at Civil Hospital, Lyari General Hospital, Jinnah Post Graduate Medical Center, and National Institute of Child Health. Exclusion criteria were medical students from first to fourth year, faculty members and those who had completed their residency but were working as Registered Medical Officers (RMOs).

The statistical analysis on the gathered data was carried out with The Statistical Package for Social Sciences (SPSS, version 15.0), and Statistical Analysis Software (SAS). The data was expressed as means or percentage of participants correctly responding to each question. Chi square analysis was done and p-values were obtained to find out any significant differences in the variables of categorical data considered. The value of <0.05 for p was considered to be statistically significant.

Review Committee of Dow University of Health Sciences approved the study before the data collection process started.

Results

Of those who returned the questionnaire, 475 were considered for analysis; Few participants, (5%) refused to participate. Among the responding participants 135 (28.4%) were from Civil Hospital; 72 (15.2%) were from Dow Medical College; 40 (8.4%) from Lyari General Hospital; 120 (25.3%) from Jinnah Post Graduate Medical Centre; 60 (12.6%) from National Institute of Child Health, and 48 (10.1%) were from Sind Medical College. The distribution of the participants according to their academic level that is final year students, interns or residents is shown in Table-1.

The survey questionnaire included three questions regarding the cut off levels of blood pressures that is in the

Table-1: Demographics of subjects with respect of institutions. The results shown in terms of frequencies and relative percentages.

Institution	DUHS	CHK	LGH	JPMC	NICH	Total
Students	121 (25.47%)	-----	-----	-----	-----	121 (25.47%)
Interns	-----	88 (18.53%)	25 (5.26%)	73 (15.36%)	38 (8.00%)	224 (47.16%)
Residents	-----	46 (9.68%)	15 (3.16%)	47 (9.89%)	22 (4.63%)	130 (27.37%)

DUHS: Dow University of Health Sciences. CHK: Civil Hospital Karachi. LGH: Lyari General Hospital. JPMC: Jinnah Postgraduate Medical Centre. NICH: National Institute of Childs Health.

Table-2: Academic distribution of the subjects with respect to the number of correct answers. The results are shown in terms of frequencies and percentages.

Number of correct answers	Medical Students		Interns		Residents	
	N (121)	% (100)	N(224)	% (100)	N(130)	% (100)
0 to 5 Correct Answers	67	55.37	159	70.98	84	64.62
6 to 8 Correct Answers	49	40.50	62	27.68	39	30.00
9 or more Correct Answers	5	4.13	3	1.34	7	5.38

p-value 0.0179.

Table-3: Academic distribution of the subjects with respect to at least six correct answers including the definition of hypertension. The results are shown in terms of frequencies and percentages.

Awareness*	Medical students	Interns	Residents	Total	p-value
Inadequate	72 (59.50%)	162 (72.32%)	91(70.00%)	325 (68.42%)	0.04
Adequate	49 (40.50%)	62 (27.68%)	39 (30.00%)	150 (31.58%)	

*Correctly answering at least 6 questions including definition of HTN.

general population, in patients with comorbid conditions such as diabetes, chronic kidney disease and in pre-hypertensives. One hundred and twenty seven (26.74%) participants correctly answered all three questions. Among these participants 34.65% were final year students, 37.01% were house officers (interns) and 28.35% were post graduation residents. Forty-nine (10.32%) participants did not answer any of the three question correctly while 299 (62.95%) had one or two correct answers.

Majority, 74.5% (354) of the participants correctly responded to the question about the cutoff level of blood pressure that defined hypertension in general population. Of the final year students, 81.8% answered this question correctly as compared to 76.3% of the interns and 64.6% of the residents. On the other hand, regarding cutoff levels of blood pressures in patients with comorbidities such as diabetes and chronic kidney disease, the level of awareness was less, as only 42.9% correctly answered this question.

None of the 475 participants correctly answered all of the 11 questions. Only 1 participant correctly answered 10 questions. 14 participants got 9 answers correct while 18 had 8 answers correct. Remaining participants (442) answered 7 or less questions correctly. The mean number of correct answers was 4.8. The mean number of correct answers given by the final year students was 5.2 ± 1.8 , those by interns was 4.4 ± 1.8 and those given by residents was 5.04 ± 2.0 . The range was 1 to 10.

Out of the study participants who correctly defined hypertension in general population 204 (42.95%) gave 0-5 correct answers, 135 (28.42%) gave 6-8 score and 15 (13.6%) had high correct response rate of 9 or more. Greater than 5 correct answers including the definition of hypertension question are considered as acceptable level of awareness (Table-2).

Only 150 (31.58%) of the participants demonstrated

adequate level of awareness about hypertension. Further distribution according to the academic level showed that medical students have better knowledge regarding hypertension. Chi Square test was applied on the designation (Chi square =6.18, $p=0.04$) (Table-3).

The questionnaire contained three questions regarding the medical treatment of hypertension. These included a question about the drugs to be used as first line of treatment in uncomplicated hypertension, the other was about the drugs to be used as first line anti-hypertensive therapy in patients with diabetic nephropathy and another question was on drugs that worsen blood pressure and renal dysfunction. Only 40 (8.42%) participants correctly responded to all the three questions. Around 97 (20.42%) participants answered all the three questions incorrectly. Remaining 338 (71.16%) of the participants answered either one or two questions correct. Among those who correctly answered all the questions, 25(62.5%) were post-graduation residents, 12 (30%) were interns and 3 (7.5%) were final year medical students. Among those who answered one or two questions correctly, included 90(69.23%) post-graduation residents, 155 (69.23%) interns and 93 (76.86%) medical students. The Chi square value was 34.1467 and the p value was $<.0001$. Hence the results showed significant difference with respect to academic designation.

The incidence of drugs prescribed by the participants as first line therapy in uncomplicated hypertension were ACE inhibitors (45%), thiazide diuretics (24.2%), Ca^{++} channel blockers (13.7%) and loop diuretics (17%). For the treatment of hypertensives with diabetic nephropathy ACE inhibitors (69.3%), thiazide diuretics (14.3%), beta blockers (11.1%) and direct renin inhibitors (5.0%) were prescribed. Only a small proportion of doctors (38.9%) correctly identified steroids as the medication that worsens blood pressure and causes renal dysfunction.

Discussion

Prompt diagnosis of Hypertension is crucial due to potentially detrimental complications which the untreated condition can pose. Since it remains asymptomatic until late in its course, even newly diagnosed patients are at the brink of developing subtle cardiovascular and end organ damage. But these complications can be avoided with prompt diagnosis and appropriate management. The result of our study undoubtedly indicated an inadequate level of awareness of diagnosis, work up and treatment of arterial hypertension. Of the total participants 74.5% knew the cut off level of blood pressure to define hypertension in an otherwise healthy person. This value was 70-90% in Polish medical students.¹³ Our study showed that only about 42.9% knew the cut off level to define hypertension in the presence of co-morbidities such as diabetes and/ or chronic kidney disease. These figures are alarming as the prevalence of diabetes in Pakistani population is high.^{14,15} A study from Jordon showed that 66.2% were aware of the cut off level of blood pressure to define hypertension in individuals without diabetes mellitus and 75.9% knew the levels for those with diabetes and/or chronic kidney disease.¹⁶

The affordability of the anti hypertensive medications being prescribed directly affects the compliance of the patients^{17,18} especially in a developing country like Pakistan. Our study showed ACE inhibitors as the most common choice (45%) for the first line of treatment in the uncomplicated hypertension, followed by thiazide diuretics, Ca++ channel blockers and loop diuretics. This observation finds implication in Pakistan where a patient with low socioeconomic status can not afford an expensive pharmacological treatment regime, which would lead to poor patient compliance. However, diuretics and beta blockers are recommended by JNC VI as the first line drug of choice in uncomplicated hypertension on the basis of meta-analysis.^{19,20} Anti-hypertensives like ACE inhibitors should be the drug of choice only in high risk patients with compelling indications such as chronic kidney disease.²¹ Therefore low awareness about the recommended treatment along with poor patient compliance could be the culprit for lower rate of blood pressure control within the acceptable limits in patients. Moreover, diuretics which are a cheaper class of drugs as compared to ACE inhibitors or Calcium channel blockers are found to be more effective than the latter in prevention of one or more major forms of cardiovascular diseases including stroke and cardiac failure.²² Therefore the use of ACE inhibitor is inappropriate because a cheaper and more effective drug class is available. A United Kingdom based study showed thiazides as the most popular choice²² while a study in the Tunisian Republic also showed similar result.²³

A study conducted in Italy showed that 22.6% of the

participants had satisfactory knowledge.¹² Our study showed that overall 150 (31.58%) subjects possessed adequate knowledge of hypertension. This was higher among final year medical students 49 (40.50%), followed by residents 39 (30.00%) and interns 62 (27.68%). Nevertheless, residents tend to have better knowledge regarding the treatment as 62.5% responded the correct drugs while only 30% of the interns and 7.5% of the students were aware of treatment options for hypertension. Our results predict gradual increase in knowledge regarding the treatment as subjects advance in academic years.

Limitations:

The survey was conducted at various institutions of only one metropolitan city, Karachi and hence does not represent the whole country. However the institutes here cater to a variety of students, from both urban and rural background and from many areas of Sindh and Balochistan provinces. The variables such as gender, age, time since graduation, or duration of the practice were not considered during the analysis of data in the study. The study population was divided into subgroups such as final year medical students, house officers, and residents, to determine any major differences in the level of awareness between these subgroups.

Conclusion

This study has highlighted obvious deficiencies in the knowledge of the junior and future doctors of Pakistan regarding hypertension, its risk factors, diagnosis and treatment. This situation is apprehending as studies show that recent graduates from other developing countries are more likely to have an updated knowledge as compared to recent graduates from medical schools here who are practicing inappropriate medicine. Promotion of evidence based curriculum is likely to plug the gap in deficient knowledge of our future physicians.

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References

1. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, et al. National Heart, Lung, and Blood Institute Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure; National High Blood Pressure Education Program Coordinating Committee. 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: 2560-72.
2. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: analysis of worldwide data. *Lancet* 2005; 365: 217-23.

3. Stewart L, McInnes GT, Murray L, Sloan B, Walters MR, Morton R, et al. Risks of socioeconomic deprivation on mortality in hypertensive patients. *J Hypertens* 2009; 27: 730-5.
4. Murray CJ, Lopez AD. Mortality by cause for eight regions of the world: Global Burden of Disease Study. *Lancet* 1997; 349: 1269-76.
5. National Health Survey of Pakistan 1990-1994. Karachi, Pakistan: Pakistan Medical Research Council, 1998; pp 50.
6. Guidelines subcommittee. 1999 World Health Organization-International Society of Hypertension Guidelines for the Management of Hypertension. *J Hypertens* 1999; 17: 151-83.
7. Primatesta P, Brookes M, Poulter NR. Improved hypertension management and control: results from the health survey for England 1998. *Hypertension* 2001; 38: 827-32.
8. Hypertension Detection and Follow-up Program Cooperative Group. Five-year findings of the hypertension detection and follow-up program, I: reduction in mortality of persons with high blood pressure, including mild hypertension. *JAMA* 1979; 242: 2562-71.
9. Jafar TH, Levey AS, Jafary FH, White F, Gul A, Rahbar MH, et al. Ethnic subgroup differences in hypertension in Pakistan. *J Hypertens* 2003; 21: 905-12.
10. Hyman DJ, Pavlik VN, Vallbona C. Physician Role in Lack of Awareness and Control of Hypertension. *J Clin Hypertens (Greenwich)* 2000; 2: 324-30.
11. Ashfaq T, Anjum Q, Siddiqui H, Shaikh S, Vohra EA. Awareness of hypertension among patients attending primary health care centre and outpatient department of tertiary care hospital of Karachi. *J Pak Med Assoc* 2007; 57: 396-9.
12. Cuspidi C, Michev I, Meani S, Severgnini B, Sala C, Salerno M, et al. Awareness of hypertension guidelines in primary care: results of a regionwide survey in Italy. *J Hum Hypertens* 2003; 17: 541-7.
13. Wizner B, Gryglewska B, Kocemba J, Grodzicki T. Knowledge of hypertension and blood pressure measurement procedure among students of last year of medical school in Cracow. *Przegl Lek* 2003; 60: 508-11.
14. Shera AS, Jawad F, Maqsood A. Prevalence of diabetes in Pakistan. *Diabetes Res Clin Pract* 2007; 76: 219-22.
15. Jafar TH, Levey AS, White FM, Gul A, Jessani S, Khan AQ, et al. Ethnic differences and determinants of diabetes and central obesity among South Asians of Pakistan. *Diabet Med* 2004; 21: 716-23.
16. Al-Azzam SI, Najjar RB, Khader YS. Awareness of physicians in Jordan about the treatment of high blood pressure according to the seventh report of the Joint National Committee (JNC VII). *Eur J Cardiovasc Nurs* 2007; 6: 223-32.
17. Vawter L, Tong X, Gemilyan M, Yoon PW. Barriers to antihypertensive medication adherence among adults--United States, 2005. *J Clin Hypertens (Greenwich)* 2008; 10: 922-9.
18. Elliott WJ. What factors contribute to the inadequate control of elevated blood pressure? *J Clin Hypertens (Greenwich)* 2008; 10: 20-6.
19. Psaty BM, Smith NL, Siscovick DS, Koepsell TD, Weiss NS, Heckbert SR, et al. Health outcomes associated with antihypertensive therapies used as first-line agents. A systematic review and meta-analysis. *JAMA* 1997; 277: 739-45.
20. MacMahon SW, Cutler JA, Furberg CD, Payne GH. The effects of drug treatment for hypertension on morbidity and mortality from cardiovascular disease: a review of randomized controlled trials. *Prog Cardiovasc Dis* 1986; 29: 99-118.
21. Jafar TH, Stark PC, Schmid CH, Landa M, Maschio G, de Jong PE, et al. Progression of chronic kidney disease: the role of blood pressure control, proteinuria, and angiotensin-converting enzyme inhibition: a patient-level meta-analysis. *Ann Intern Med* 2003; 139: 244-52.
22. Curt D, Furberg, Jackson T, Wright, Barry R, Davis, et al. Major outcomes in high-risk hypertensive patients randomized to angiotensin-converting enzyme inhibitor or calcium channel blocker vs diuretic: The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT). *JAMA* 2002; 288: 2981-97.
23. Ekpo EB, Shah IU, Fernando MU, White AD. Isolated systolic hypertension in the elderly: survey of practitioners' attitude and management. *Gerontology* 1993; 39: 207-14.
24. Aounallah Skhiri H, Ben Romdhane H, Chebbi R, Gharbi D, Ennigrou S, Ben Azouz H, et al. Management of arterial hypertension: results of a Tunisian general practitioner survey. *Tunis Med* 2005; 83: 47-52.