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Doctors' Knowledge, Attitude and Objective Adherence with Hypertension Guidelines in Quetta, Pakistan: A Cross-sectional Analytical Study

Mirza Khan[1,*], Nafees Ahmed[1], Abdul Wahid[1], Syed Liaquat Ali Khan[1], Asad Khan[2], Zarka Akbar[1], Palwasha Bibi[1]

[1]*Department of Pharmacy Practice, Faculty of Pharmacy and Health Sciences, University of Balochistan, Quetta, Balochistan, PAKISTAN.*

[2]*Department of Pharmacy, Quaid-i-Azam University, Islamabad, PAKISTAN.*

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***Correspondence to:**

Dr. Mirza Khan,

Department of Pharmacy Practice, Faculty of Pharmacy and Health Sciences, University of, Balochistan Quetta, Balochistan, PAKISTAN.

Email: mirza_khan92@yahoo.com

Abstract

Background: There is scarcity of published information about doctors' knowledge, attitude and adherence with hypertension guidelines from Pakistan. **Objectives:** To evaluate doctors' knowledge, attitude and objective adherence with the recommendations of Clinical Practice Guidelines (CPG) developed by American Society of Hypertension/International Society of Hypertension. **Methods:** This cross-sectional questionnaire-based study included 95 doctors from various health care facilities in Quetta, Baluchistan to evaluate doctors' knowledge of and attitude towards guidelines. Physicians' endearment with ASH/ISH (2014) guidelines was evaluated by the prescriptions they wrote to 1900 hypertensive individuals (20 prescriptions of each enrolled doctor). Data was analysed using SPSS 20. **Results:** 58.9% doctors had sufficient knowledge of guidelines. Doctors' with specialization and consultants, doctors of age >35 years and who were in clinical practice for >5 years had significantly (p-value<0.05) greater knowledge and more guidelines adherent practices than their counterparts. There was a significant association between doctors' knowledge and practice scores. (rs=0.758, *p*-value <0.001). Overall, doctors had positive attitudes towards guidelines. A total of 1385 (72.9%) prescriptions were judged guidelines adherent. In multivariate analysis, guidelines adherence had statistically significant positive association with the presence of any comorbidity (OR=2.804, *p*-value<0.001), heart failure (OR=5.101, *p*-value<0.001), chronic kidney disease (OR=2.384, *p*-value<0.001) and benign prostatic hyperplasia (OR=3.137, p-value=0.009) and negative association with diabetes mellitus (OR=0.265, *p*-value<0.001). **Conclusion:** Only 58.9% doctors were adequately aware of guidelines recommendations. A fair number of patients (72.9%) received guidelines adherent prescriptions. Doctors' poor knowledge of guidelines preferred antihypertensive agents in diabetic hypertensive patients reflected in their practices.

Key words: Diabetes mellitus, Duration of clinical practice, Guidelines adherence, Hypertension, Pakistan.

INTRODUCTION

Hypertension is a public health problem. An estimated 31.1% (1390 million) of the world's adult population suffer from high blood pressure[1] resulting in 7.5 million deaths per year.[2] It is estimated that countries with low and middle income (LMIC) harbour 75% of the global hypertension (HTN) burden.[1,3] Over the past three decades, the hypertension attributed mortality in LMIC has increased by 107%.[4] Optimal control of hypertension is crucial for preventing cardiovascular and renal diseases. But unfortunately, the rate of hypertension control reported in published literature ranges from 7.7% in LMIC to 28.4% in high income countries.[3]

To achieve optimal hypertension control, clinical practice guidelines (CPGs) are frequently developed, regularly updated and extensively distributed worldwide. The well formulated and rigorously designed CPGs enhance the standard of care and patients' outcome by introducing the evidence based medicine into practice, reducing the practice variation and health care costs.[5-8] Although, uncontrolled hypertension is extensively correlated with patients' non-adherence to antihypertensive medications and recommended life style modifications,[9] but doctors' non-adherence with guidelines' recommendations are equally contributing to it.[10-16] Guidelines implementation in clinical practice is a multifaceted process. It is affected by various factors including doctors' knowledge, attitude and behaviour towards guidelines, the characteristics of guidelines themselves and its implementation strategies.[17,18] The barriers preventing doctors' adherence to CPGs have been grouped into three domains i.e. (i) *knowledge* related factors, (ii) *attitude* related factors, (iii) *behaviour* related factors like characteristics of guidelines, patients and practice.[17]

Pakistan is the world's sixth most populous country. Like other LMIC, prevalence of hypertension and its suboptimal control are on rise in Pakistan. Diabetes Survey of Pakistan (DPS-PAK) 2016-2017 has reported an alarmingly high prevalence of hypertension in the country.[19] According to the survey results, the age-adjusted weighted prevalence of HTN in Pakistan was 46.2%[19] with an optimal hypertension control rate ranging from 12.5% to 22.3%.[20,21] For the evaluation of standard of medical care provided to hypertensive population, it is necessary to evaluate doctors' adherence to hypertension management guidelines. Unfortunately, despite

a high burden hypertension country with poor rate of hypertension control, published information about doctors' familiarity with hypertension guidelines recommendations and their attitude and adherence with these guidelines from Pakistan is scarce.[15] Therefore, the present study is done with the purpose to fill the above mentioned gap.

METHODS

Design of study, location of study and sample population

A cross-sectional prospective study was carried out in Quetta, Baluchistan between September 1, 2018 and April 30, 2019. As Quetta is the capital and major city of the less developed, low populated and the largest province by area (Baluchistan) of Pakistan and in close proximity with the war torn Afghanistan, it is a hub of public and private medical facilities for the residents of Baluchistan and border areas of nearby Afghanistan. Therefore, patients from the whole province and adjacent border areas of Afghanistan visit Quetta and attend the public and private health facilities for satisfying their health needs. In order to conduct the current study, medical doctors practicing in public and private health facilities in Quetta city were approached and briefed about the study. Those physicians' who were managing hypertensive patients and agreed to take part in the study by a giving a consent were included in the study.

Assessment of doctors' knowledge of and attitude towards guidelines

Pakistan don't have published national CPGs for HTN management. Therefore, ASH/ISH guidelines (2014) which are developed specifically for hypertension management all over the globe, irrespective of residents or resources[22] were used as a reference document. In order to evaluate the doctors' knowledge and attitude regarding ASH/ISH guidelines (2014), a previously published valid and reliable questionnaire[23] was adopted and modified accordingly after getting permission from the authors. The modified study tool (Appendix A) was evaluated by an expert panel comprised of four members that is, a general physician, a nephrologist, a cardiologist and a pharmacist for face and content validity.[23] The key check and items response analysis were used to assess the construct validity of the questionnaire.[23,24] For assessing the language check, clarity and reliability of the questionnaire, it was pilot tested on 25 medical doctors other than the final study participants. The Kuder-Richardson coefficient (K-R 20)=0.781 and Cronbach's alpha=0.817 respectively revealed good internal consistencies of all portions of the questionnaire. Upon test-retest, Pearson's R product moment correlations of 0.821 (p-value<0.001) and 0.834 (p-value<0.001) respectively revealed finest stability of the questionnaire.[23,24]

Administration and scoring of questionnaire

The lead investigator (MK) administered questionnaire to the study participants with a request of filling it immediately. The first portion of questionnaire consisted of eleven multiple choice question related to knowledge about HTN. Score "1" was given to every right answer; whereas, score of "0" was credited to each unanswered and/or wrong question.[23] A doctor was categorized as having adequate knowledge about the guidelines recommendations if he/she correctly answered 7/11 (>60%) questions must including the correct answer about definition of hypertension.[23,25] The attitude assessing portion of questionnaire consisted of six items and the 1st three items were positively opted while the remaining three were reversely keyed. Five point Likert scale was used for scoring these items ranging from "Strongly disagree (score=1) to strongly agree (score=5) and vice versa for last three statements.[23]

Assessment of doctors' adherence with ASH/ISH guidelines (2104)

The doctors' actual prescribing practices were evaluated by noting the prescriptions they wrote to their patients for the treatment of hypertension (20 prescriptions per physician). These prescriptions were then evaluated by comparing with the guidelines recommendations of antihypertensive drugs. A patient was considered hypertensive if it was evident from his/her medical record or taking antihypertensive medications. Patients' medical record was also assessed for identifying any comorbidity. The antihypertensive drugs prescribed to the patients' were first noted down by their generic names and then grouped according to their pharmacological class. Drugs containing a single active pharmaceutical ingredient (API) were categorized as monotherapy, whereas, medications containing 2 or more than 2 API, either two different drugs or in a single fixed dose formulation were categorized as polytherapy.[7,8,23] In order to find acceptable reasons for doctors' non-adherence with guidelines recommendations, patients' medical records were evaluated in detail for adverse events, contraindications and change of previously prescribed ineffective drugs.[7,23] A prescription was classified as adherent to ASH/ISH guidelines (2014) if:[7,23]

i. Patient with a particular medical condition received guidelines recommended first-line antihypertensive medication.

ii. Guidelines proposed first-line antihypertensive medications were advised to patients with more than one concurrent underlying condition with no contraindications to their use.

iii. Patient did not received guidelines proposed first-line antihypertensive medication for a specific condition due to adverse event suspected to be caused by that drug or any contraindication to use was present.

Each guidelines adherent prescription was given a score of "1", whereas, score of "0" was given to each non-adherent prescription.[23] A correlation was then established between doctors' knowledge, attitude and guidelines adherence score.

Analysis of data

Data was analysed using Statistical package for social sciences (SPSS version 20). Mann-Whitney U test and Kruskal Wallis tests (wherever applicable) were used to find difference between doctors' knowledge, attitude and guidelines' adherence scores. Doctors' knowledge, attitude and practice scores were correlated by using Spearman rank order correlation. Association between patients' independent variables and guidelines adherence was assessed by sing univariate analysis. Statistically significant variables obtained in Univariate analysis (p-value<0.05) were then entered into multivariate binary logistic regression (MVBLR) analysis to get the final model of significant variables with guidelines adherence. Upon multi-collinearity diagnostics, those independent variables which had high correlation (variance inflation factor =10 and/or tolerance value <0.1) were eliminated from the model. The value of significance was set at 0.05.

RESULTS

Doctors' knowledge, attitude and adherence with ASH/ISH guidelines (2014)

Out of 125 doctors approached, a total of 95 (76%) doctors agreed to participate in the current study by giving a written consent. 30.81±6.74 years was the mean age of sample doctors'. Majority were males (65.3%),

specialists and consultants (46.3%) and in practice for less than two years (46.3%). Percentage of doctors' correct answers in compliance with recommendations of ASH/ISH guidelines (2014) are given in the Table 1. The mean number of doctors' correct answer was 7.55 ± 1.73 (range: 2-11). Based on definition used in the current study, a total of 56 (58.9%) doctors had adequate knowledge of guidelines recommendations.

On the 30 point scale, the doctors' mean attitude score of 19.67±2.49 revealed that they had positive attitudes towards ASH/ISH guidelines (2014) shown in Table 2.

Upon evaluating 1900 prescriptions written by 95 enrolled doctors (20 prescriptions/doctor), a total of 1385 (72.9%) were judged as guidelines' adherent. The average number of guidelines adherent prescription was 14.58±3.25 (range 7-19). Doctors who were more than 35 years old had statistically higher knowledge (*p*-value=0.001) and guidelines adherent practice scores (*p*-value<0.001) than their younger counterparts as shown in the Table 3. The results also showed a statistically significant difference in doctors' knowledge, attitude and guidelines adherence practice score based on doctors' designation and duration in practice. Consultants and specialists had significantly higher knowledge (*p*-value<0.001), attitude (*p*-value=0.009) and guidelines adherent practice (*p*-value=0.001) scores than house medical and medical officers. Furthermore, doctors who were practicing for more than five years had significantly higher knowledge (*p*-value=0.004), attitude (*p*-value=0.025) and guidelines adherent practice (*p*-value=0.001) scores than their counterparts. Strong positive association was found between doctors' knowledge and practice scores revealed by Spearman rank correlation (rs=0.758, *p*-value <0.001).

Patients' characteristics and antihypertensive prescribing pattern

The socio-demographic and clinical particulars of 1900 enrolled patients in the present study are given in Table 4. The mean age of patients was 53.19±10.48 years. They received a median of 3 (range 1-4) antihypertensive drugs with majority (73.6%) being on poly-therapy. Among drugs prescribed, Beta receptor blockers (BB) were extensively prescribed antihypertensive class (48.5%) followed by angiotensin receptor blockers (38.0%), angiotensin converting enzyme inhibitors (ACEIs) (34.2%), calcium channel blockers (31.8%) and diuretics (28.8%).

Table 1: Percentage of doctors' correct answers in compliance with recommendations of ASH/ISH guidelines (2014).

Question	Correct answers No. (%)
Blood pressure value defining hypertension in an adult subject without any comorbidity	73 (76.8)
Target BP value in hypertensive patients with comorbidities of diabetes mellitus and/or chronic kidney disease	61 (64.2)
The maximum observational period for a patient recently diagnosed with stage-1 hypertension having no target organ involvement or any additional risk factor	56 (58.9)
Antihypertensive drug of choice in a non-black young patient having stage-1 hypertension without any comorbidity	66 (69.5)
Antihypertensive drug of choice in a non-black elderly (age ≥60 years) patient having stage-1 hypertension without any comorbidity	56 (58.9)
Antihypertensive drug of choice in diabetic hypertensive patients	37 (38.9)
Antihypertensive drug of choice in hypertensive patients with chronic kidney disease	78 (82.1)
Antihypertensive drug of choice in hypertensive patients with coronary heart diseases	63 (66.3)
Antihypertensive drug of choice during pregnancy	90 (94.7)
Antihypertensive drug of choice in patients with history of stroke	53 (55.8)
Antihypertensive drug of choice in patients with benign prostatic hyperplasia	82 (86.3)

*missing response=5; missing response=1

Patients' factors associated with receiving guidelines adherent prescriptions

In univariate analysis it was found that the reception of guidelines adherent prescription had statistically significant association with patients' family history of CVD and suffering from any comorbidity, heart failure, diabetes mellitus, renal disorder and hyperplasia of the prostate gland (BPH) (Table 5). However upon multivariate binary logistic regression analysis, it was found that the reception of guidelines adherent prescription had statistically significant positive association with the presence of any comorbidity (OR=2.804, *p*-value <0.001), heart failure (OR=5.101, *p*-value <0.001), CKD (OR=2.384, *p*-value <0.001) and BPH (OR=3.137, *p*-value =0.009), but it was revealed that diabetes mellitus had statistically significant negative association with guidelines adherence (OR= 0.265, *p*-value <0.001) (Table 6). Non-significant Hosmer Lemeshow test (*p*-value =0.374) was used as a basis for this model fit overall classification percentage of 74.4% from classification Table.

DISCUSSION

According to our information, this is the first study from Baluchistan, Pakistan which evaluated the doctors' knowledge, attitude and adherence with hypertension management guidelines. Based on the definition used in the current study, a total of 58.9% doctors had adequate knowledge of guidelines recommendations. In comparison, the percentage of doctors who were adequately aware about recommendations of hypertension guidelines was 73% in Malaysia,[23] 51.9% in Sudan,[26] 49.1% in Kuwait,[16] 23% in Germany[25] and 20.1% in Italy.[27] In the current study, doctors' with a mean knowledge score of 7.55 ± 1.73 on 11 points scale comparatively performed better than the German and Italian doctors with their respective mean knowledge score of 5.3 and 4.9.[25,27] However, this finding of current study is in parallel with a Malaysian study where the doctors mean knowledge score on the similar scale was 7.96 ± 1.82.[23] In the current study, specialists and consultants, doctors of age > 35 years and who were in clinical practice for >5 years had significantly greater knowledge and more guidelines adherent prescribing practices than their counterparts. Similar to our finding, increase in doctors' age, senior job titles (consultant/specialist) and increased duration of clinical practice were significantly associated with their higher adherence with hypertension guidelines in studies conducted Sudan and Japan.[26,28] Likewise, a Malaysian study also found that consultants and specialists had significantly higher knowledge about recommendations of Malaysian hypertension guidelines.[23] In current study, the overwhelming majority of consultants and specialists were from cardiology and nephrology, where their likely involvement in the management of hypertension could be one of the possible reasons for their greater awareness about guidelines recommendations. Furthermore, comparatively greater exposure to various clinical practice guidelines during their postgraduate trainings, interactions with peers in seminars and conferences and extensive clinical practice could be some of the other possible reasons for this finding. However, in contrast to our finding, an Italian study has reported that increasing doctors' age and clinical practice tenure had negative association with awareness about hypertension guidelines' recommendations.[27] On a 30 points scale, the mean attitude score of 19.67±2.49 revealed that the current study participants

had positive attitudes towards ISH guidelines (2014). Studies conducted among Malaysian and Mongolian doctors have reported similar welcoming attitudes about hypertension guidelines.[23,29] The reputation of ASH and ISH which developed these guidelines and the relevance of these guidelines in all regions of the world irrespective of population or resources[22] could be some of the possible reasons for the doctors' welcoming attitudes towards these guidelines.

Upon evaluating 1900 prescriptions written by 95 doctors enrolled in the current study, a total of 72.9% were judged guidelines adherent. In MVBLR analysis, the presence of any comorbidity, heart failure, CKD and BPH had statistically significant positive, whereas diabetes mellitus had statistically significant negative association with receiving guidelines adherent prescriptions. In the current study, the percentage of guidelines adherent prescriptions was comparatively higher than that reported by studies conducted in Saudi Arabia (53%),[30] South Africa (56.6%)[31] and Malaysia (67.1%).[23] This finding can be partly explained by a very high prevalence of a concurrent comorbidity (90%) in the current study participants. It has been previously reported that the concurrent clinical conditions of overlapping aetiologies, pathogenesis and management like hypertension, cardiovascular and CKD increases the likelihood of receiving guidelines adherent prescriptions.[23,32,33] Furthermore, as hypertensive patients with heart failure, CKD and BPH were treated by consultants and specialists of the respective fields, their greater familiarity about guidelines recommendations observed in the current study is the other possible reason for writing guidelines adherent prescriptions to hypertensive patients with comorbidities. In the current study, the presence of diabetes mellitus emerged as significant risk factor for receiving guidelines divergent prescriptions. While evaluating the doctors' awareness about recommendations of ASH/ISH guidelines (2014), it was observed that only 38.9% doctors correctly identified ACEIs as guidelines'

Table 2: Doctors' responses towards ASH/ISH guidelines (2014).

Statement	Strongly agree No. (%)	Agree No. (%)	Undecided No. (%)	Disagree No. (%)	Strongly disagree No. (%)
I have trust in the developing committee and recommendations of ASH/ISH guidelines (2014))	9 (9.5)	73 (76.8)	10 (10.5)	-	3 (3.2)
ASH/ISH guidelines (2014) are helpful for doctors	7 (7.4)	72 (75.8)	15 (15.8)	1 (1.1)	-
Doctors' adherence with ASH/ISH guidelines (2014) would produce desired patients' outcomes*	3 (3.2)	62 (65.3)	23 (24.2)	1 (1.1)	1 (1.1)
ASH/ISH guidelines (2014) are motivated by desire to cut cost	4 (4.2)	45 (47.4)	36 (37.9)	9 (9.5)	1 (1.1)
ASH/ISH guidelines (2014) decrease doctors' autonomy**	7 (7.4)	27 (28.4)	27 (28.4)	32 (33.7)	1 (1.1)
ASH/ISH guidelines (2014) are too rigid to apply in clinical practice	6 (6.3)	34 (35.8)	22 (23.2)	31 (32.6)	2 (2.1)

ASH, American Society of Hypertension; ISH, International Society of Hypertension
*missing response=5; missing response=1

Table 3: Doctors characteristics' and differences in knowledge, attitude and practice scores.

Variables	No. (%)	Knowledge score		Attitude score		Practice score	
		Mean rank	*p*-value	Mean rank	*p*-value	Mean rank	*p*-value
Gender							
Female	33 (34.7)	50.85	0.455	51.44	0.370	42.61	0.162
Male	62 (65.3)	46.48		46.17		50.87	
Age (years)							
≤ 35	76 (80.0)	43.25	0.001	47.82	0.895	42.18	<0.001
> 35	19 (20.0)	67.00		48.74		71.29	
Ethnicity							
Pashtun	38 (40)	44.68	0.311	45.00	0.645	44.30	0.562
Baloch	33 (34.7)	46.68		48.97		50.39	
Other	24 (25.3)	55.06		51.42		50.56	
Designation							
HMO	25	29.42	<0.001	36.78	0.009	33.36	0.001
MO	26	47.62		43.81		44.88	
Consultants and specialists	44	58.78		56.85		58.16	
Place of graduation							
Balochistan	72 (75.8)	48.88	0.345	47.35	0.452	41.62	0.163
Other provinces	23 (24.2)	53.78		51.67		49.88	
Duration of practice (years)							
<2	44 (46.3)	38.67	0.004	43.86	0.025	36.94	0.001
2-5	19 (20.0)	50.21		57.89		54.47	
>5	32 (33.7)	59.52		55.81		59.39	

HMO, house medical officer; MO, medical officer

Table 4: Patients' socio-demographic and clinical characteristics.

Variable	No. (%)
Gender	
Female	741 (39.0)
Male	1159 (61.0)
Age (years)	
20-40	261 (13.7)
41-60	1212 (63.8)
> 60	427 (22.5)
Smoking	
Non-smokers	1689 (88.9)
Active + ex-smokers	211 (11.1)
Alcohol consumption	
Non-drinkers	1896 (98.8)
Active + ex-drinkers	4 (0.2)
Family history of cardiovascular diseases	
No	1520 (80.0)
Yes	380 (20.0)
Pregnancy	
No	1843 (97.0)
Yes	57 (3.0)
Comorbidity	
No	190 (10.0)
Yes	1710 (90.0)
Number of comorbidities	
0	190 (10.0)
1	944 (49.7)
2	689 (36.3)
3	77 (4.1)
Type of comorbidities	
Coronary heart diseases	804 (42.3)
Heart failure	147 (7.7)
Left ventricular hypertrophy	13 (0.7)
Diabetes mellitus	486 (25.6)
Chronic kidney diseases	367 (19.3)
Cerebrovascular diseases	26 (1.4)
Peripheral vascular diseases	15 (0.8)
Dyslipidaemia	72 (3.8)
Benign prostate hyperplasia	77 (4.1)
Asthma	111 (5.8)
Chronic obstructive pulmonary disease	55 (2.9)
Others	347 (18.3)

preferred agents for treating hypertension in diabetic patients. This poor familiarity about guidelines' preferred antihypertensive agents in diabetic hypertensive patients could be one of the possible reasons for prescribing guidelines divergent prescriptions in this group of patients. Upon sub-analysis of antihypertensive prescribing pattern in diabetic hypertension patients, we observed that the extensively prescribed drugs to these patients' are BB (45.7%), followed by ACEIs (47.3%). Similar underutilization of ACEIs and over-prescription of guidelines discouraged BB to diabetic hypertensive patients have been observed in studies conducted elsewhere.[23,34] The current finding of statistically significant strong positive correlation between the doctors' knowledge and guidelines adherent practice scores is in compliance with Cabana *et al.* and Pathman *et al.* models[17,18] and studies conducted elsewhere,[23,35] which state that doctors' greater awareness about guidelines recommendations leads to their adoption and adherence in clinical practice.

CONCLUSION

The doctors had positive attitudes towards ASH/ISH guidelines (2014), however, only 58.9% doctors were adequately aware of these guidelines recommendations. A fair number of patients (72.9%) received guidelines adherent prescriptions. It was found that doctors' with specialization, consultants, doctors having aged >35 years and those were in clinical practice for >5 years had significantly greater awareness about guidelines recommendations and more guidelines adherent practices. The doctors' poor

Table 5: Univariate analysis of patients' factors associated with receiving guidelines adherent prescriptions.

Variable	Guidelines adherent prescription No (%) No	Yes	OR (95%CI)	*p*-value
Gender				
Female	208 (28.1)	533 (71.9)	Referent	
Male	307 (26.5)	852 (73.5)	1.083 (0.88-1.332)	0.449
Age (years)				
20-40	69 (24.6)	192 (73.6)	Referent	
41-60	316 (26.1)	896 (73.9)	1.019 (0.752-1.380)	0.903
> 60	130 (30.4)	297 (69.6)	0.821 (0.582-1.158)	0.261
Smoking				
Non-smokers	447 (26.5)	1242 (73.5)	Referent	
Active + ex-smokers	68 (32.2)	143 (67.8)	0.757 (0.556-1.030)	0.077
Any comorbidity				
No	85 (44.7)	105 (55.3)	Referent	
Yes	430 (25.1)	1280 (74.9)	2.410 (1.774-3.273)	<0.001
Ischemic heart disease				
No	282 (25.7)	814 (74.3)	Referent	
Yes	233 (29.0)	571 (71.0)	0.849 (0.692-1.041)	0.116
Heart failure				
No	506 (28.9)	1247 (71.0)	Referent	
Yes	9 (6.1)	138 (93.9)	6.222 (3.145-12.308)	<0.001
Left ventricular hypertrophy				
No	510 (27.0)	1377 (73.0)	Referent	
Yes	5 (38.5)	8 (61.5)	0.593 (0.193-1.820)	0.361
Diabetes mellitus				
No	293 (20.7)	1121 (79.7)	Referent	
Yes	222 (45.7)	264 (54.3)	0.311 (0.249-0.387)	<0.001
Chronic kidney disease				
No	460 (30.0)	1073 (70.0)	Referent	
Yes	55 (15.0)	312 (85.0)	2.432 (1.790-3.305)	<0.001
Cerebrovascular disease				
No	504 (69.6)	1370 (73.1)	Referent	
Yes	11 (42.3)	15 (57.7)	0.502 (0.229-1.100)	0.085
Dyslipidaemia				
No	492 (26.9)	1336 (73.1)	Referent	
Yes	23 (31.9)	49 (68.1)	0.785 (0.473-1.301)	0.347
Peripheral vascular disease				
No	513 (27.2)	1372 (72.8)	Referent	
Yes	2 (13.3)	13 (86.7)	2.430 (0.547-10.807)	0.243
Benign prostatic hyperplasia				
No	509 (27.9)	1314 (72.1)	Referent	
Yes	6 (7.8)	71 (92.2)	4.584 (1.980-10.613)	<0.001
Asthma				
No	484 (27.1)	1305 (72.9)	Referent	
Yes	31 (27.9)	80 (72.1)	0.957 (0.624-1.668)	0.841
Chronic obstructive pulmonary disease				
No	504 (27.3)	1341 (72.7)	Referent	
Yes	11 (20.0)	44 (80.0)	1.503 (0.770-2.934)	0.232
Other diseases				
No	414 (26.7)	1139 (73.3)	Referent	
Yes	101 (29.1)	244 (70.9)	0.885 (0.684-1.145)	0.354

CI, confidence interval; OR, odds ratio

Table 6: Multivariate analysis of factors associated with receiving guidelines adherent prescriptions.

Variable	B	SE	OR (95%CI)	*p*-value
Family history of cardiovascular disease	-0.210	0.133	0.811 (0.625-1.052)	0.115
Comorbidity	1.031	0.169	2.804 (2.013-3.905)	<0.001
Heart failure	1.629	0.354	5.101 (2.548-20.214)	<0.001
Diabetes mellitus	-1.327	0.122	0.265 (0.209-0.337)	<0.001
Chronic kidney disease	0.869	0.165	2.384 (1.724-3.297)	<0.001
Benign prostatic hyperplasia	1.143	0.436	3.137 (1.336-7.366)	0.009

B, beta; CI, confidence interval; OR, odds ratio, SE, standard error

performance in selecting guidelines recommended ACEIs for treating diabetic hypertensive patients reflected in their clinical practice. Failure to prescribe guidelines recommended ACEIs in diabetic hypertensive patients' needs attention and urgent corrective measures. Multidimensional interventions like continued medical education, using reminder tools about guidelines recommended therapy and inclusion of clinical pharmacists in collaborative practice may be helpful in promoting doctors adherence to hypertension guidelines. Medical and house medical officers, doctors of age < 35 years and those who are in clinical practice <5 years should be the preferred target population of these interventions.

As doctors self-reporting practices are subjective to bias, where they overestimate their adherence to guidelines and at instances don't practice what they report,[36] therefore, evaluating the doctors adherence to guidelines by noting their actual prescribing practices in a high number of patients is the major strength of the current study. Moreover, a detailed investigation of patients' medical record was done to find any justification to the guidelines adherence. The major limitations of present study are evaluation of only pharmacological management of hypertension and lack of information on association between guidelines adherence and hypertension control.

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Ethics approval

This study was approved by the Research and Ethics committee of Faculty of Pharmacy and Health Sciences University of Baluchistan, Quetta. Written informed consent form was also taken from the enrolled doctors.

CONFLICT OF INTEREST

The authors declared no competing interests.

Authors' contribution

This study was conceptualized and designed by NA and MK. MK collected and entered the data. MK and NA analysed the data. NA and MK wrote the manuscript. All the authors reviewed the manuscript critically.

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