Prevalence of compliance among hypertensive patients visiting Rizgary Teaching Hospital in Erbil City

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KEYWORDS	ABSTRACT
Antihypertensive Medications, Hypertension, Medication Adherence, Morisky Scale.	**Background and Objectives:** This study assessed the adherence to antihypertensive medications among hypertensive patients, and to identify the factors affecting adherence. Hypertension requires long-term medication adherence to prevent further complications, yet maintaining consistent adherence is challenging for many individuals. **Methods:** A cross-sectional study was conducted from April to December 2024 in Rizgary Teaching hospital in Erbil City, involving 206 hypertensive patients on medication for over three months. Data were collected through a structured questionnaire covering demographics, clinical characteristics, and adherence measured by the Morisky Medication Adherence Scale (MMAS-8). Statistical analysis using SPSS version 27 evaluated associations between adherence and sociodemographic status , chronic diseases, and polypharmacy. **Results:** Out of 206 patients, 78.2% were non-adherent, 18.4% were partially adherent, and 3.4% were adherent. The study comprised 52.4% females and 47.6% males participants, with 62.1% aged 30-60. Most of the participants lived in the city center (61.2%), were unemployed (57.3%), and had a diploma or lower education (47.6%). A significant part (77.2%) had other chronic diseases, and 85% were using more than one medication. Adherence was highly linked to factors such as age, education, and polypharmacy.statistically all the socioeconomic factors were significant,but in clinical factos category only checking blood pressure regularly was significant. **Conclusion:** Adherence was observed to be low to antihypertensive medications,this non compliance was influenced by factors such as age, education, and polypharmacy. Targeted interventions focusing on patient education and healthcare are needed to enhance adherence to medications, manage hypertension and prevent complicatoions.

Introduction

Hypertension, commonly referred to as high blood pressure, is one of the most prevalent chronic conditions worldwide and a leading contributor to global morbidity and mortality due to its significant role as a major risk factor for cardiovascular diseases (CVD).[1] Cardiovascular diseases, which include heart disease and stroke, are the leading causes of death globally.[2] According to the World Health Organization (WHO), hypertension is responsible for over 7.5 million deaths annually, accounting for approximately 12.8% of all global deaths.[3] This burden is particularly acute in low- and middle-income countries, where rapid urbanization, lifestyle changes, and limited healthcare resources contribute to the increasing prevalence of hypertension.[4]

Hypertension is rapidly becoming a common health issue in iraq just like what we have seen in many developing nations.[5] The rise in hypertension prevalence is part of the ongoing epidemiological change in Iraq, characterized by a shift from infectious diseases to chronic noncommunicable diseases.[6]

Several factors contribute to the increasing rates of hypertension in Iraq, including poor dietary habits, reduced physical activity, rising obesity rates, and high levels of stress, all of which are further

compounded by the country's prolonged political instability and economic difficulties.[7] Despite the availability of various antihypertensive medications, achieving acceptable blood pressure levels on long term basis remains a significant challenge for many due to poor adherence to prescribed treatment plan.[8]

Rizgary Hospital in Erbil City is a major healthcare provider in the Kurdistan Region of Iraq, providing healthcare service to a large and diverse patient population.[9] A significant number of these patients are being treated for hypertension or its complications.[10] The effectiveness of hypertension management highly depends on patient's adherence to their prescribed medication regimens. Medication adherence is influenced by a varriety of different of factors.[11] These factors include demographic characteristics such as age, gender, education level, employment status, and residency, as well as clinical factors like polypharmacy, other chronic conditions, and the regularity of blood pressure monitoring.[11]

This study aims to assess the adherence to antihypertensive medications among hypertensive patients visiting Rizgary Hospital in Erbil City and to identify the factors affecting medication adherence. The research seeks to provide insights into the socio-demographic and clinical factors that influence adherence, with the ultimate goal of developing targeted interventions to improve hypertension management and reduce the associated health risks.

Patients and methods

This cross-sectional, questionnaire-based study assesses medication adherence among hypertensive patients visiting Rizgary Hospital in Erbil City, Iraq. It is scheduled to be conducted from April 2024 to October 2024.

The study population included 206 hypertensive patients attending the outpatient department of Rizgary Hospital during the study period. Inclusion criteria were patients aged 18 years and older, patients who have been on antihypertensive medications for more than three months, patients who consent to participate in the study. And the Exclusion criteria were patients under the age of 18, pregnant women.

Patients who have been on antihypertensive medications for less than three months, Patients with cognitive impairments or severe illnesses are prevented from completing the questionnaire.

Data was collected using a structured, face-to-face interview-based questionnaire. The questionnaire consisted of Data about age, sex, education level, employment status, and residency. Also Covering aspects such as other chronic comorbidities, history of polypharmacy, and regular blood pressure monitoring frequency. Adherence was measured using the 8-item Morisky Medication Adherence Scale (MMAS-8), a validated tool for assessing self-reported medication adherence. The MMAS-8 includes questions assessing forgetfulness, medication discontinuation due to feeling better, inconvenience, and other factors influencing adherence.

The MMAS-8 scores will classify patients into three categories: High adherence (score of 8). Medium adherence (score of 6 to <8). Low adherence (score <6).

Table (1): shows the Morisky Medication Adherence Scale (MMAS-8) items

Number	Question	Valid Response
1	Do you sometimes forget to take your medications?	Yes or No
2	Over the past two weeks, were there any days you did not take your medications?	Yes or No
3	Have you ever cut back or stopped taking your medications without telling your doctor because you felt worse when you took them?	Yes or No
4	When you travel or leave home, do you sometimes need to remember to bring along your medications?	Yes or No
5	Did you take your medications yesterday?	Yes or No
6	When you feel like your health condition is under control, do you sometimes stop	Yes or No

	taking your medications?	
7	Taking medications every day is a genuine inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?	Yes or No
8	Do you often have difficulty remembering to take all your medications?	Yes or No

Data was managed and analyzed using the Statistical Package for the Social Sciences (SPSS) software, version 27.0. Independent data entry operators entered data to ensure accuracy and minimize errors. The data is cleaned and checked for inconsistencies before analysis.

Descriptive statistics, including means, medians, and frequencies, will be used to summarize the demographic and clinical characteristics of the study population. The MMAS-8 adherence scores had been categorized into adherent, partial adherent, and non-adherent, and the distribution of these levels had been presented in frequency tables.

For inferential statistics, chi-square tests will assess the association between categorical variables (e.g., adherence levels and demographic factors).

A p-value of less than 0.05 had been considered statistically significant.

Ethical Approval

This research was approved by the Ethical committee of Kurdistan Higher Council for Medical Specialities by the issue number 1166 at the date 14.4.2024

Results

This study assessed medication adherence among 206 hypertensive patients visiting Rizgary Hospital in Erbil City to understand the factors influencing adherence to antihypertensive treatment.

The results revealed that a significant proportion of patients, 78.2% (n=161), were categorized as non-adherent, 18.4% (n=38) as partially adherent, and only 3.4% (n=7) as fully adherent to their prescribed medication regimen as shown in **Table (4).**

The gender distribution within the sample was nearly balanced, with 47.6% (n=98) males and 52.4% (n=108) females. There was a significant difference in adherence levels between males and females (p = 0.0128) illustrated in **Table (2)** and **Figure (1).** Among males, 4.1% (n=4) were fully adherent, compared to 2.8% (n=3) among females. Most non-adherent patients were female (57.8%, n=93), whereas males represented 42.2% (n=68) of the non-adherent group.

The age distribution showed that 62.1% (n=128) of the patients were aged between 30 and 60 years, 28.6% (n=59) were above 60 years, and 9.2% (n=19) were below 30 years. Age and adherence were significantly associated (p = 0.0166). The highest nonadherence rate was observed in the 30-60-year age group, where 85.9% (n=110) were non-adherent as shown in **Table (2)** and **Figure (1),** Adherence was low across all age groups, with only 1.7% (n=1) of those under 30 years, 2.3% (n=3) of those between 30 and 60 years, and 5.1% (n=3) of those over 60 years showing full adherence.

The patients' residency slightly influenced adherence (p = 0.0364). Among the participants, 61.2% (n=126)resided in the city center, while 38.8% (n=80) were from rural areas. Nonadherence was slightly higher among city residents (81.7%, n=103) than rural residents (72.5%, n=58) as indicated in **Table (2).** Partial adherence was more common in rural areas (26.2%, n=21) than in the city center (13.5%, n=17).

Table (2): Socioeconomic Factors and Adherence

Variable	Category	Frequency (Percent)	Adherent (Percent)	Partial Adherent (Percent)	Non-Adherent (Percent)	p-value
Sex	Male	98 (47.6%)	4 (4.1%)	26 (26.5%)	68 (69.4%)	0.0128
	Female	108 (52.4%)	3 (2.8%)	12 (11.1%)	93 (86.1%)	
Age	Below 30 years	19 (9.2%)	1 (5.3%)	6 (31.6%)	12 (63.2%)	0.0166
	Between 30-60 years	128 (62.1%)	3 (2.3%)	15 (11.7%)	110 (85.9%)	
	Above 60 years	59 (28.6%)	3 (5.1%)	17 (28.8%)	39 (66.1%)	
Residency	City center	126 (61.2%)	6 (4.8%)	17 (13.5%)	103 (81.7%)	0.0364
	Rural	80 (38.8%)	1 (1.3%)	21 (26.3%)	58 (72.5%)	
Employment	Employed	88 (42.7%)	1 (1.1%)	9 (10.2%)	78 (88.6%)	0.0064
	Unemployed	118 (57.3%)	6 (5.1%)	29 (24.6%)	83 (70.3%)	
Education	Illiterate	33 (16.0%)	1 (3.0%)	12 (36.4%)	20 (60.6%)	0.0019
	Diploma or lower	98 (47.6%)	5 (5.1%)	21 (21.4%)	72 (73.5%)	
	College degree or higher	75 (36.4%)	1 (1.3%)	5 (6.7%)	69 (92.0%)	

Employment status also significantly affected adherence (p = 0.0064). 57.3% (n=118) of the participants were unemployed, and 42.7% (n=88) were employed. Nonadherence was higher among the unemployed (70.3%, n=83) than among the employed (88.6%, n=78) as seen in **Table (2).** Interestingly, fully adherent patients were found frequently among the unemployed (5.1%, n=6) than the employed (1.1%, n=1).

Education level was strongly associated with adherence (p = 0.0019). 16% (n=33) of the patients were illiterate, 47.6% (n=98) had a diploma or lower, and 36.4% (n=75) had a college degree or higher. Among those with higher education, only 1.3% (n=1) were fully adherent, compared to 3.0% (n=1) among the illiterate and 5.1% (n=5) among those with a diploma or lower as shown in **Table (2)** and **Figure (1).**
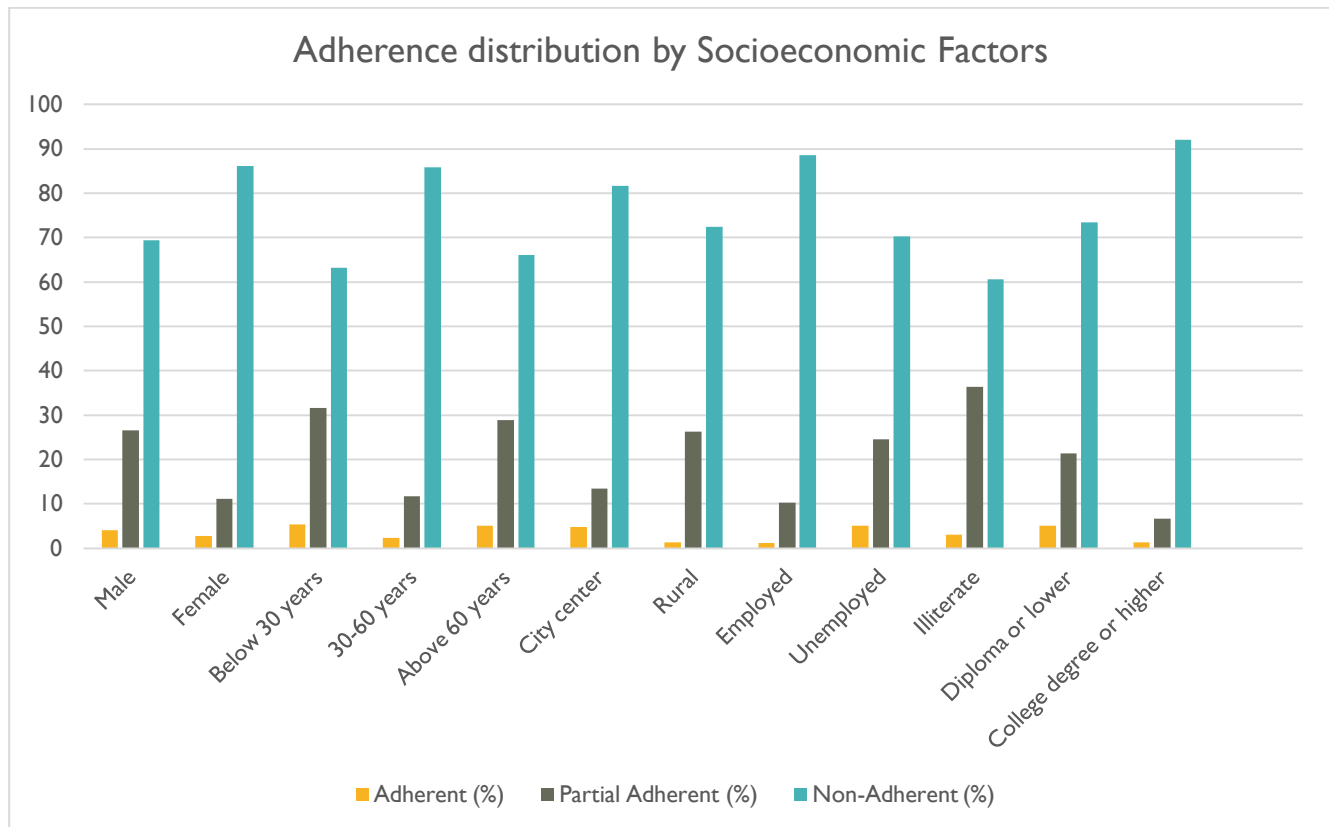
Figure (1): Represents the adherence distribution across Socioeconomic factors.

The presence of other chronic diseases did not have a statistically significant impact on adherence (p = 0.2835). However, most participants (77.2%, n=159) reported having additional chronic conditions. Among them, 76.1% (n=121)were non-adherent, and only 3.1% (n=5) were fully adherent. Polypharmacy, where 85% (n=175) of the patients were taking multiple medications, did not significantly affect adherence (p = 0.4408). Nonadherence was high in this group (77.7%, n=136), and only 2.9% (n=5)were fully adherent as seen in **Table (3)** and **Figure (2).**

Table (3): Clinical Factors and Adherence

Variable	Category	Frequency (Percent)	Adherent (Percent)	Partial Adherent (Percent)	Non-Adherent (Percent)	p-value
Other Chronic Disease	Yes	159 (77.2%)	5 (3.1%)	33 (20.8%)	121 (76.1%)	0.2835
	No	47 (22.8%)	2 (4.3%)	5 (10.6%)	40 (85.1%)	
Polypharmacy	Yes	175 (85.0%)	5 (2.9%)	34 (19.4%)	136 (77.7%)	0.4408
	No	31 (15.0%)	2 (6.5%)	4 (12.9%)	25 (80.6%)	
Checking B.P. Regularly	Yes	131 (63.6%)	3 (2.3%)	18 (13.7%)	110 (84.0%)	0.0276
	No	75 (36.4%)	4 (5.3%)	20 (26.7%)	51 (68.0%)	

Regular blood pressure monitoring did show a significant impact on adherence (p = 0.0276). 63.6% (n=131) of patients reported monitoring their blood pressure regularly, but 75.6% (n=99) of those remained non-adherent as shown both in **Table (3)** and **Figure (2).**
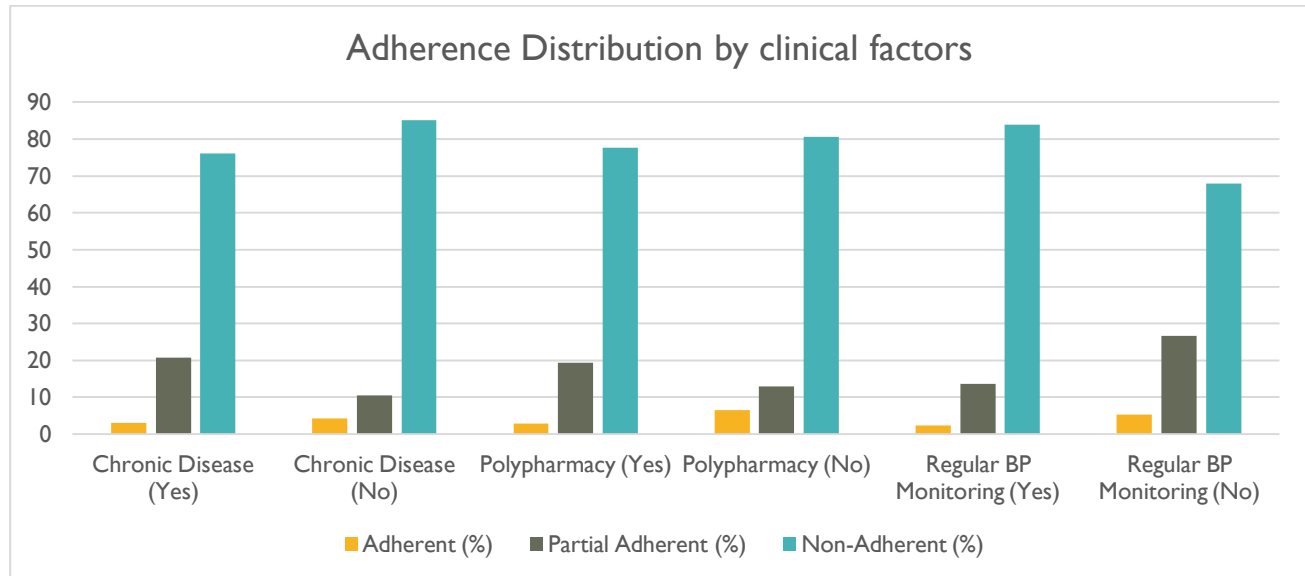

Figure (2): visually represents the adherence distribution across clinical factors.

Overall, adherence levels showed that 78.2% (n=161) were non-adherent, 18.4% (n=38) were partially adherent, and 3.4% (n=7) were fully adherent as seen in **Table (4).**

Table (4): Adherence in general among the patients

Variable	Category	Frequency (Percent)
Adherence Category	Adherent	7 (3.4%)
	Partial Adherent	38 (18.4%)
	Non-Adherent	161 (78.2%)

Discussion

The results of this study underscore a significant challenge in managing hypertension among patients at Rizgary Hospital, with a vast majority of patients (78.2%) classified as non-adherent to their prescribed antihypertensive medications, as shown in Table (4).

This finding is alarming, particularly in light of the established link between poor medication adherence and adverse cardiovascular outcomes, including increased risk of heart attack, stroke, and chronic kidney disease.[12] The findings of this study are further illustrated in Figures (1) and (2).

The high percentagr of nonadherence identified in this study suggests a need for urgent intervention to improve adherence and ultimately enhance the management of hypertension within this population.[13] Table (2) and Figure (1) show that several demographic and socioeconomic factors influence adherence.

Age, for instance, played a significant role, with patients aged between 30 and 60 years demonstrating the highest rates of nonadherence.[14] This disparity, as depicted in Figure (1), could be due to a variety

of factors, including the demands of work and family life, which may result in lower prioritization of health and medication adherence.[15]

Additionally, younger patients, particularly those under 30, might perceive their condition as less severe, leading to complacency in managing their hypertension.[16]These findings highlight the need for age-specific educational interventions emphasizing the importance of consistent medication use, regardless of perceived health status.[17]

Factors like sex, particularly Females in this study, exhibited higher percentages of nonadherence than males, as indicated in Table (2) and Figure (1).

This disparity might be due to various socio-cultural factors that place a more significant caregiving burden on women, limiting their focus on personal health.

Employment status and education level were also closely linked to adherence.[18] Unemployed patients exhibited higher rates of nonadherence, likely due to financial constraints that limit access to medications or healthcare resources.[19]

Similarly, patients with lower educational attainment were less likely to adhere to their medication regimen. This finding is represented in Table (2) and Figure (1). , which may reflect challenges in understanding the importance of adherence or navigating the healthcare system.[20] These findings are consistent with existing literature, which suggests that socioeconomic disadvantages often contribute to poorer health outcomes due to limited access to resources and support.[21]

The impact of clinical factors on adherence is also evident in Table (3) and Figure (2). The presence of comorbidities and polypharmacy further complicated adherence.[22] Patients with multiple chronic conditions often face complex and burdensome medication regimens, which can lead to confusion, forgetfulness, or intentional nonadherence.[23] Polypharmacy, prevalent in 85% of the study population, was associated with the lowest adherence rates.[24] As visualized in Figure (2).

This finding highlights the need for healthcare providers to consider the cumulative burden of medication when prescribing treatment plans.[25] Simplifying regimens where possible, using combination therapies, and providing clear, personalized patient education could mitigate the negative impact of polypharmacy on adherence.[26]

While expected to improve adherence, regular blood pressure monitoring still showed that 84.0% of patients who regularly checked their blood pressure were non-adherent. This is clearly shown in Table (3) and Figure (2). These findings highlight that even patients who engage in self-monitoring may require additional support to adhere to their medication regimens.

Overall, the data in Tables (2) and (3) and their corresponding visual representations in Figures (1) and (2) provide a comprehensive understanding of the complex interplay between socioeconomic and clinical factors in influencing medication adherence. Addressing these barriers requires a multifaceted approach that includes patient education, improved healthcare delivery, and policy interventions to reduce the treatment burden.

Improving adherence is essential for individual patient outcomes and reducing the overall burden of hypertension-related complications on the healthcare system.[27]

Recommendations for Society include Public Awareness Campaigns which Initiate educational campaigns that emphasize the risks of uncontrolled hypertension and the importance of strict medication adherence, targeting younger adults and those with busy lifestyles. Accessible Healthcare Services that Provide more accessible healthcare services, particularly in urban areas, to reduce financial and logistical barriers to medication adherence, especially for unemployed and lower-income populations. Promote Blood Pressure Monitoring by Encouraging regular self-monitoring of blood pressure as part of routine care. Provide affordable and easy-to-use home blood pressure monitors to empower patients in managing their condition. Simplify Medication Regimens through physicians or

Healthcare to prioritize simplifying medication regimens for patients with polypharmacy, using combination therapies where possible to reduce the pill burden and enhance adherence. Targeted Educational Interventions through Tailored educational interventions to different groups, mainly focusing on patients with lower educational attainment. Use simple language and culturally sensitive materials to explain the importance of medication adherence.

Conclusion

This study identified significant medication nonadherence among hypertensive patients nonadherence was associated with demographic factors like age, gender, and socioeconomic status, as well as clinical factors such as comorbidities and polypharmacy. The use of multiple chronic medications also increased nonadherence, highlighting the need for targeted interventions to improve adherence.

Conflicts of interest

The author reports no conflicts of interest.

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References

1. World Health Organization. Global status report on noncommunicable diseases 2019. W.H.O. 2020. https://www.who.int/publications/i/item/9789240001952
2. Benjamin EJ, Muntner P, Alonso A, Bittencourt MS, Callaway CW, Carson AP, et al. Heart disease and stroke statistics—2019 update: A report from the American Heart Association. Circulation. 2019;139:528-56.
3. Forouzanfar MH, Afshin A, Alexander LT, Anderson HR, Bhutta ZA, Biryukov S, et al. Global, regional, and national comparative risk assessment of 79 behavioral, environmental, occupational, and metabolic risks.Lancet. 2017;390:1345-422.
4. GBD 2019 Risk Factors Collaborators.. Global burden of 87 risk factors in 204 countries and territories, 1990–2019. Lancet. 2020;396:1223-49.
5. Alwan A. Global status report on noncommunicable diseases 2010. World Health Organ. 2011 https://www.who.int/publications/i/item/9789241564227 .
6. Mokdad AH, Jaber S, Aziz MIA, AlBuhairan F, AlGhaithi A, AlHamad NM, et al. The state of health in the Arab world, 1990–2016. Lancet. 2018;391:302-12.
7. Mansour Z. Hypertension in Iraq: A growing public health challenge. Middle East J Fam Med. 2018;16:18-22.
8. Sabate E. Adherence to long-term therapies: Evidence for action. World Health Organ. 2003 https://apps.who.int/iris/handle/10665/42682 .
9. Aziz KF. Healthcare in the Kurdistan Region of Iraq. Health Policy. 2020;124:1276-83.
10. Hameed IK, Abdulrahman NI, Al-Tawil NG. Prevalence of hypertension and its associated risk factors in the Erbil, Kurdistan Region, Iraq adult population. Saudi Med J. 2017;38:489-96.
11. Bosworth HB, Granger BB, Mendys P, Brindis R, Burkholder R, Czajkowski SM, et al. Medication adherence: A call for action. Am Heart J. 2017;174:122-34.
12. Burnier M, Egan BM. Adherence in hypertension: A review. Circ Res. 2019;124:1124-40.
13. Ross S, Walker A, MacLeod MJ, Steinke DT. Medication adherence, adherence knowledge, and skills. Eur Heart J. 2013;34:2937-46.
14. Lee GK, Wang HH, Liu K, Seah W. Medication adherence and the risk of cardiovascular disease, mortality, and stroke in the elderly population. J Hypertens. 2013;31:790-7.

15. Osterberg L, Blaschke T. Adherence to medication. N Engl J Med. 2005;353:487-97.
16. Vrijens B, Vincze G, Kristanto P, Urquhart J, Burnier M. Adherence to prescribed antihypertensive drug treatments: Longitudinal study of electronically compiled dosing histories. BMJ. 2008 May 17;336(7653):1114-7. doi: 10.1136/bmj.39553.670231.25. Epub 2008 May 14.
17. Morisky DE, Ang A, Krousel-Wood M, Ward HJ. Predictive validity of a medication adherence measure in an outpatient setting. J Clin Hypertens. 2008;10:348-54.
18. Cutler RL, Fernandez-Llimos F, Frommer M, Benrimoj C, Garcia-Cardenas V. Economic impact of medication nonadherence by disease groups: A systematic review. B.M.J. Open. 2018;8 DOI: 10.1136/bmjopen-2017-016982.
19. DiMatteo MR, Giordani PJ, Lepper HS, Croghan TW. Patient adherence: Effects of physician communication and organizational behavior. Med Care. 2002;40:794-811.
20. Kripalani S, Yao X, Haynes RB. Interventions to enhance medication adherence in chronic medical conditions: A systematic review. Arch Intern Med. 2007;167:540-50.
21. Erhun WO, Olayiwola G, Agbani EO, Omotoso NS. Factors influencing adherence to antihypertensive medication in southwestern Nigeria. J Health Popul Nutr. 2005;23:121-7.
22. Persell SD, Lloyd-Jones DM, Friesema EM, Cooper AJ, Baker DW. Factors associated with medication adherence and blood pressure control in patients with hypertension. Pharmacotherapy. 2009;29:1181-91.
23. McDonald HP, Garg AX, Haynes RB. Interventions to enhance patient adherence to medication prescriptions.JAMA. 2002;288:2868-79.
24. Wetzels GE, Nelemans PJ, Schouten JS, Prins MH. Nonadherence to antihypertensive medication: The role of adverse effects and beliefs about medication. J Hum Hypertens. 2007;21:297-304.
25. Marcum ZA, Gellad WF. Medication adherence to multidrug regimens: An overlooked aspect of medication reconciliation in elderly patients. Clin Geriatr Med. 2012;28:287-300.
26. Vrijens B, De Geest S, Hughes DA, Przemyslaw K, Demonceau J, Ruppar T, et al. A new taxonomy for describing and defining medication adherence. Br J Clin Pharmacol. 2008;66:568-76.
27. Granger BB, Sandelowski M, Tahshjain H, Swedberg K, Ekman I. Medication adherence in chronic heart failure: The influence of patient preference and physician communication. J Cardiovasc Nurs. 2005;20:288-95.