



## Medication adherence of diabetic and hypertensive patients attending primary health care centers: Cross-sectional study in Morocco

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### Original Article

#### Abstract

**BACKGROUND:** Medication adherence is a key factor in controlling chronic diseases, particularly diabetes and high blood pressure. We aimed to describe the level of medication adherence of patients with diabetes or high blood pressure in urban and rural areas in Morocco and to identify the factors associated with medication non-adherence.

**METHODS:** A cross-sectional study was conducted from August 1, 2019 to January 30, 2020, among participants recruited from primary health centers in Morocco. The Girard questionnaire was used to measure medication adherence, and bivariate and multivariate analyses were done using SPSS software.

**RESULTS:** A total of 502 patients were recruited with a majority of women (70.5%). According to the Girard questionnaire, a minority of our patients had a good adherence to medication (11.8%), less than half had a low adherence (38.4%), and half were non-adherent (50%). The factors associated with medication non-adherence for patients with diabetes were: living in rural areas, being overweight, taking antidiabetic oral drugs, and suffering from dyslipidemia. Concerning the patients with high blood pressure, medication non-adherence was higher among patients with dyslipidemia, overweight patients, and those who benefited from a free treatment. For patients suffering from both, the associated factors of non-adherence were taking oral drugs, a multi-therapy of anti-hypertensive drugs, and shorter diabetes duration.

**CONCLUSION:** This study highlighted several matters concerning medication adherence among patients with chronic diseases. Healthcare professionals should encourage and help their patients to take their medications.

**KEYWORDS:** Medication Adherence; Chronic Diseases; Diabetes Mellitus; Hypertension; Morocco

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### Introduction

Diabetes and high blood pressure are well-known public health problems at the

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international and national levels. Both of them are important risk factors for coronary artery disease (CAD) and cerebrovascular disease. In Morocco, the prevalence of diabetes in the adult population is estimated at 12.4% and is responsible for 24020 deaths per year, while the prevalence of hypertension (HTN) is estimated at 27.5% (6.6 million persons), and the deaths caused by high blood pressure are

estimated at 32260 persons per year.<sup>1</sup>

Chronic diseases are the main causes of morbidity and mortality in the world. Their prevalence has been increasing and they are combined with a serious economic burden of all healthcare costs. They can lead to hospitalizations, numerous disabilities, negative psychological impacts, low quality of life (QOL), and even deaths. On the other hand, this management is very challenging; once a patient is diagnosed with a chronic illness, in general, a lifelong treatment starts, and follow-up strategies must be involved. Patients have considerable responsibilities in terms of medication adherence, making significant lifestyle changes, monitoring themselves, and preserving or improving their QOL.<sup>2,3</sup>

Therapeutic adherence includes three essential aspects. Firstly, adherence to drug treatment is most frequently studied. It is defined by the World Health Organization (WHO) as "the degree to which the person's behavior corresponds to the agreed recommendations from a health care provider". Secondly, there is the adherence to medical monitoring which is the patient's ability to attend appointments for prescription and control of treatment. Lastly, there is the adherence to lifestyle and dietetic rules which plays a major role in the management of chronic pathologies.<sup>4</sup> In developed countries, the average of adherence to therapies is estimated at 50% in chronic diseases, such as diabetes and high blood pressure, and the percentages are considerably lower in developing countries.<sup>5</sup>

Non-adherence to therapies for diabetes and high blood pressure can be responsible for numerous complications, such as retinopathy, nephropathy, neuropathy, ischemic heart disease (IHD), cerebrovascular disease, or chronic arterial occlusion.<sup>6</sup> It can have also a considerable impact on the pharmacological and economic levels which should not be overlooked. For diabetes and high blood pressure, it has been proved that good

adherence to pharmacological treatment was associated with a significant reduction in hospitalizations and health care costs.<sup>4</sup>

Two studies have assessed medication adherence among patients with chronic diseases in Morocco. Naour *et al.*<sup>7</sup> and El Aassri *et al.*<sup>8</sup> both found low levels of adherence, highlighting significant challenges in managing chronic conditions. They were done in urban areas and at the University Hospital Center. None of them has explored the level of medication adherence in rural areas or at the primary health care centers.<sup>7,8</sup> Improving therapeutic adherence in all aspects is the crucial element to dealing with chronic diseases and staving off the individual, collective, social health, and economic consequences. This study aimed to describe the medication adherence level of patients with diabetes and HTN attending the primary health care centers in Morocco and to identify factors associated with medication non-adherence.

## Methods

A cross-sectional study was conducted in 33 primary health care centers in the Marrakesh-Safi region, Morocco, during six months from August 1, 2019 to January 30, 2020. Patients aged above 18 years old with a confirmed diagnosis of diabetes, either type 1 or 2, based on hemoglobin A1C (HbA1C)  $\geq 6.5\%$ , fasting plasma glucose  $\geq 126$  mg/dl, or plasma glucose measured 2 hours after an oral glucose tolerance test  $\geq 200$  mg/dl<sup>9</sup> and patients with a confirmed diagnosis of high blood pressure (blood pressure more than 140/90 mmHg) according to international criteria were included.<sup>10</sup> Patients must have been diagnosed for at least one year.

Patients with secondary arterial HTN and patients with other types of diabetes like secondary diabetes and gestational diabetes were not included.

Participants were recruited from general medicine consultations at primary health

centers using a two-stage sampling. Firstly, using purposive sampling, we selected 33 primary health centers. Secondly, we adopted an accidental sampling for the patient's requirement. We recruited 10 to 15 participants for each center.

The sample size was calculated using the formula of cross-sectional studies, considering a prevalence of medication adherence among patients with chronic diseases of 50%,<sup>11</sup> for a 95% confidence interval (CI) level and 5% margin of error. A minimal sample size of 384 persons was obtained.

Data were collected over six months from August 1, 2019 to January 30, 2020. Data collection was performed by four medical students trained for this purpose. They used a hetero-administered questionnaire which was developed following the literature review.<sup>12</sup> The questionnaire included four parts.

The medication adherence level was evaluated by the Girard questionnaire. It is a validated measurement tool that contains six questions to score the patient's medication adherence: good adherence (score = 6), low adherence (score = 4 or 5), and non-adherence (score  $\leq 3$ ).<sup>13</sup>

The second part of the questionnaire consisted of sociodemographic data (age, gender, housing, marital status, social coverage) and medical characteristics such as the mean duration of the pathology, the insulin therapy, and the number of pills taken per a day. Physical activity was assessed using the global physical activity questionnaire; it contains 16 questions and collects information on physical activity in three settings (activity at work, daily movements, and recreational activities).<sup>14</sup>

Authorizations were obtained from the Regional Directorate of Health, the Ministry of Health, and the Social Protection of Morocco. Verbal consent was obtained from all the participants. They were informed about the purpose of the study and had the right to refuse to participate at any moment. Patients

were assured of the anonymity of their data. Thus, identifying information, such as the name, the address, and the telephone number, was not collected.

All collected data were sorted, coded, and entered using Microsoft Excel 2016. They were analyzed using the SPSS software (version 21, IBM Corporation, Armonk, NY, USA). Descriptive statistics included percentages and frequencies and were calculated for categorical variables. We used the mean and standard deviation (SD) for continuous variables. Bivariate analysis was used to determine factors associated with medication non-adherence. For the comparison of percentages, we used the chi-squared test or Fisher's exact test. For the comparison of means, we used the Student's t-test when the conditions were applicable. Otherwise, we used the Mann-Whitney non-parametric test. Then, for patients with diabetes, variables with P-value  $\leq 0.2$  in this bivariate analysis were included in the logistic regression analysis by using the backward stepwise (likelihood ratio) method to identify independent predictor factors of non-adherence to medication.

## Results

**Sociodemographic and medical characteristics of the participants:** A total of 502 patients participated in this study including 323 patients with diabetes (64.3%), 110 patients with essential arterial HTN (22%), and 69 patients with diabetes and high blood pressure (13.7%). The mean age was  $60.00 \pm 13.11$  years with a sex-ratio (female/male) of 2.39. The sociodemographic characteristics showed that among the patients, the majority were married 326 (64.9%). Moreover, a total of 378 were unemployed (75.2%) (Supplementary material 1).

**Medication adherence rate:** According to the Girard questionnaire, the prevalence of good medication adherence among all patients was low.

**Table 1. Medication adherence rate in the Marrakesh-Safi region, Morocco**

	All patients (n = 502)	Diabetes (n = 323)	High blood pressure (n = 110)	Diabetes and high blood pressure (n = 69)
	CI 95%			
Good adherence	12.1 (09.3-15.0)	11.8 (08.3-15.3)	09.1 (03.7-14.5)	19.0 (09.6-28.1)
Low adherence	38.4 (34.2-42.7)	43.0 (37.6-48.4)	33.6 (24.8-42.5)	24.6 (14.5-34.8)
No adherence	50.0 (45.0-53.8)	45.2 (39.8-50.6)	57.3 (48.0-66.5)	56.5 (44.8-68.2)

OR: Odds ratio; CI: Confidence interval

Indeed, we had 38 (11.8%, 95% CI: 08.3-15.3) cases of good adherence among patients with diabetes, 10 (9.1%, 95% CI: 03.7-14.5) cases of good adherence among patients with HTN, and 13 (19%, 95% CI: 09.6-28.1) cases of good adherence among patients with diabetes and HTN (Table 1).

**Factors associated with medication non-adherence:** We compared the patients' background characteristics after splitting up the subjects into two groups which were the adherent and the non-adherent patients (including low and non-adherent).

The analysis of sociodemographic and medical characteristics among patients with diabetes showed that medication non-adherence was higher for patients who lived in rural areas compared to those who lived in urban ones (54.1% versus 35.1%). This difference was statistically significant ( $P < 0.001$ ). A low level of physical activity was associated with medication non-adherence ( $P = 0.09$ ). Taking oral antidiabetic drugs was associated with medication non-adherence ( $P = 0.010$ ). Overweight or obese patients reported lower medication adherence than those with a normal body mass index (BMI) ( $P = 0.026$ ). Multiple therapies and antidiabetic drugs were associated with medication non-adherence ( $P = 0.02$ ). Moreover, shorter duration of diabetes was associated with medication non-adherence ( $P = 0.025$ ).

For patients suffering from high blood pressure, medication non-adherence was higher for patients with dyslipidemia compared to those without it (81.8% vs. 51.1%) ( $P = 0.008$ ). Patients who benefited from free treatment from primary health centers were less adherent than those who did not

(60.6% vs. 27.3%) ( $P = 0.036$ ). Overweight or obese patients had lower medication adherence ( $P = 0.001$ ).

For patients suffering from diabetes and high blood pressure, medication non-adherence was higher for patients who were taking antidiabetic oral drugs compared to those who were taking insulin therapy ( $P = 0.020$ ). Patients taking anti-hypertensive monotherapy had better medication adherence than patients taking multi-therapy ( $P = 0.012$ ) (Supplementary material 2).

#### *Multivariate analysis for patients with diabetes:*

Logistic regression results of patients with diabetes showed four factors that were associated with medication non-adherence: living in urban areas ( $P = 0.001$ ), overweight ( $P = 0.03$ ) or obesity ( $P = 0.03$ ), dyslipidemia ( $P = 0.03$ ), and taking antidiabetic oral drugs ( $P = 0.02$ ) (Table 2).

## Discussion

This study aims to describe the medication adherence level of patients with diabetes and HTN attending the primary health care centers in Morocco and to identify factors associated with medication non-adherence. The main findings showed that medication adherence was low among all patients whether they were diabetic, hypertensive, or suffering from both. We found 12.1% good medication adherence, 38.4% low adherence, and 50% non-adherence according to the Girard questionnaire. Medication adherence is a dynamic phenomenon. It is influenced by many factors including the disease, treatment, patients' characteristics, healthcare professionals' attitudes, and health system organization.<sup>15</sup>

**Table 2. Logistic regression for predicting factors of medication non-adherence in patients with diabetes**

Factors	OR	95% CI	P (adjusted)
Residency			
Rural/semi-urban	Ref		
Urban	0.41	0.25-0.68	0.001
Physical activity			
Intermediate/high	Ref		
Low	1.75	0.98-3.12	0.050
BMI			
Normal	Ref		
Overweight	1.88	1.03-3.42	0.030
Obese	2.13	1.13-3.99	0.010
Dyslipidemia			
No	Ref		
Yes	2.31	1.04-5.12	0.030
Smoking status			
No	Ref		
Yes	1.88	0.74-4.78	0.180
Insulin therapy			
No	Ref		
Yes	0.57	0.35-0.93	0.020
Number of antidiabetic prescribed medications			
Monotherapy	Ref		
Multi-therapy	1.59	0.97-2.58	0.060

OR: Odds ratio; CI: Confidence interval; BMI: Body mass index

For patients with diabetes, a minority of participants reported good medication adherence (11.8%). Our results conform with other studies conducted in a similar context such as Benin and Tunisia, which are low-income countries too.<sup>16,17</sup> On the contrary, a higher medication adherence proportion has been found in high-income countries such as Saudi Arabia (35.7%) which has a similar cultural background as Morocco.<sup>18</sup> The study conducted in Saudi Arabia did not include terminally ill patients and only 36.3% of participants were illiterate compared to 53.3% in our study, which may explain these differences.

Our results showed that more than half of patients with HTN were non-adherent (57.3%). This is in line with the results of studies conducted in Togo and Ivory Coast, which reported a respective percentage of 52.3% and 55% of non-adherence.<sup>19,20</sup> However, these results are not in agreement with two studies

conducted in Cameroon and Lebanon as they found a lower non-medication adherence level than our study.<sup>21,22</sup> These discrepancies could be explained by the difference in methodological aspects such as measurement tools.

The present study also examined the factors associated with medication non-adherence for patients with diabetes which were: living in rural areas, taking oral drugs, being overweight or obese, and suffering from dyslipidemia.

To begin with, for the rural residency, the general population has difficulties accessing health care services. The general population also has a low educational level which induces a low literacy level. These elements are significant factors to explain the low medication adherence in these areas.<sup>23</sup>

Concerning taking oral drugs, it has been shown that it was a factor associated with non-medication adherence in Saudi Arabia as well as in our study.<sup>18</sup> By cons, insulin therapy was related to good medication adherence in

both countries. It could be explained by a good understanding of insulin's usefulness and its vitality for type 1 diabetes or the patients' fear of its risks. Hence, it is taken more seriously by patients with diabetes.<sup>24</sup>

For patients with diabetes and HTN, non-medication adherence was associated with a high number of pills taken per day as well as the mean duration of diabetes. First of all, patients who take a lower number of pills are less likely to forget to take them. This is in accordance with other studies conducted in Italy and Lebanon.<sup>8,25,26</sup>

On another note, the longer a chronic disease would have been diagnosed, the more the patient would adhere to the treatment. Indeed, patients go through five stages to accept a chronic disease according to the Kubler-Ross Cycle.<sup>27</sup>

There are several recommendations to improve medication adherence among patients with chronic diseases. Using digital interventions such as sending short text messages and voice messages has been proven as an effective procedure to remind patients to take their medications. These techniques can be motivational to change patients' behavior.<sup>28</sup> In addition, the therapeutic education has significant effects on improving medication adherence. Organizing monthly therapeutic education sessions helps patients to adopt and follow a healthy lifestyle not only on medication adherence but also on physical activity and dietary recommendations.<sup>29</sup>

This study presents some limitations. It does not include patients from the private sector which leads to socioeconomic distribution that is different from the general population and may limit some comparisons. Nevertheless, this is the first study describing the medication adherence level in urban and rural areas in the Marrakesh-Safi region on a large sample size (n = 502). Additionally, different factors associated with non-medication adherence based on patients' sociodemographic and medical characteristics

have been identified through the bivariate analysis, including living in rural areas, being overweight, taking antidiabetic oral drugs, and suffering from dyslipidemia for patients with diabetes. Concerning the patients with high blood pressure, medication non-adherence was higher among patients with dyslipidemia, overweight patients, and those who benefited from a free treatment. For patients suffering from both, the associated factors of non-adherence were: taking oral drugs, a multi-therapy of anti-hypertensive drugs, and shorter diabetes duration. These factors can be valuable and helpful for setting up different actions to improve medication adherence in chronic diseases in low-income countries.

Future studies can explore the effects of educational interventions on medication adherence within diverse economic settings. Furthermore, longitudinal studies are required to help determine the long-term effectiveness of adherence interventions among patients with chronic disease.

### Conclusion

This study has highlighted several matters concerning drug adherence in patients with diabetes, patients with HTN, and those with both diabetes and HTN. The medication adherence level among our patients was low and was affected by multifarious factors. Healthcare professionals should encourage and help their patients to take their medications. Medication adherence is crucial to providing and improving the health care for chronic diseases.

### Conflict of Interests

Authors have no conflict of interests.

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### References

1. National Agency for Statistics and Demography. National Survey on Risk Factors for Noncommunicable Diseases (2015). Senegal: National Agency for Statistics and Demography; 2016 [Online]. [cited 2016 Dec 02]; Available from: URL: <https://anads.ansd.sn/index.php/catalog/127>. [In French].
2. Jüngst C, Gräber S, Simons S, Wedemeyer H, Lammert F. Medication adherence among patients with chronic diseases: a survey-based study in pharmacies. *Qjm*. 2019; 112(7): 505-12.
3. Raghupathi W, Raghupathi V. An Empirical Study of Chronic Diseases in the United States: A Visual Analytics Approach. *Int J Environ Res Public Health*. 2018; 15(3): 431.
4. Scheen AJ, Giet D. [Non compliance to medical therapy; causes, consequences, solutions]. *Rev Med Liege*. 2010; 65(5-6): 239-45.
5. Yuvaraj K, Gokul S, Sivaranjini K, Manikandanesan S, Murali S, Surendran G, et al. Prevalence of medication adherence and its associated factors among patients with noncommunicable disease in rural Puducherry, South India - A facility-based cross-sectional study. *J Family Med Prim Care*. 2019; 8(2): 701-5.
6. Khouri Y, Steigerwalt SP, Alsamara M, McCullough PA. What is the ideal blood pressure goal for patients with stage III or higher chronic kidney disease? *Curr Cardiol Rep*. 2011; 13(6): 492-501.
7. Naour O, Benmalek R, Nouamou I, Zahidi H, Benouna E, Habbal R. Evaluation of Therapeutic Adherence among Moroccan Hypertensive Patients: About 1482 Cases. *Jour Clin Med Res*. 2020; 01(2): 1-9.
8. El Aassri H, El Mghari G, El Ansari N. [Type 2 diabetic patients with hypertension: do they prefer treating diabetes or hypertension?]. *Pan Afr Med J*. 2014; 17: 193.
9. Genuth SM, Palmer JP, Nathan DM. Classification and Diagnosis of Diabetes. In: Cowie CC, Casagrande SS, Menke A, Cissell MA, Eberhardt MS, Meigs JB, et al., editors. *Diabetes in America*. Bethesda (MD): National Institute of Diabetes and Digestive and Kidney Diseases (US); 2018.
10. Gelfer M, Dawes M, Kaczorowski J, Padwal R, Cloutier L. Diagnosing hypertension: Evidence supporting the 2015 recommendations of the Canadian Hypertension Education Program. *Can Fam Physician*. 2015; 61(11): 957-61.
11. Anon. Poor adherence to long-term treatment of chronic diseases is a worldwide problem. 2003. *Rev Panam Salud Publica*. 2003; 14(3): 218-21.
12. Ntyonga-Pono MP. Adherence to antidiabetic therapy in diabetic patients in Gabon: Preliminary data. *Médecine des Maladies Métaboliques*. 2015; 9(2): 198-202. [In French].
13. Girerd X, Hanon O, Anagnostopoulos K, Ciupek C, Mourad J, Consoli S. Evaluation de l'observance du traitement antihypertenseur par un questionnaire: mise au point et utilisation dans un service spécialisé. *Presse Med (1893)*. 2001; 30(21): 1044-8.
14. Armstrong T, Bull F. Development of the world health organization global physical activity questionnaire (GPAQ). *J Public Health*. 2006; 14: 66-70.
15. Basu S, Garg S, Sharma N, Singh MM. Improving the assessment of medication adherence: Challenges and considerations with a focus on low-resource settings. *Tzu Chi Med J*. 2019; 31(2): 73-80.
16. Wanvoegbe F, Agbodande K, Alassani A, Aviansou A, Gninkoun J, Amoussou-Guenou D, et al. Evaluation de l'observance thérapeutique chez les diabétiques au Bénin. *Med Afr noire (En ligne)*. 2018; 355-61.
17. Bchir MS, Kechida M, Klii R, Hammami S, Khochtali I. Observance thérapeutique et estime de soi au cours des maladies chroniques: y'a-t-il une corrélation? *Rev Med Interne*. 2018; 39: A243-A4.
18. Alqarni AM, Alrahbeni T, Qarni AA, Qarni HMA. Adherence to diabetes medication among diabetic patients in the Bisha governorate of Saudi Arabia - a cross-sectional survey. *Patient Prefer Adherence*. 2019; 13: 63-71.
19. Pio M, Baragou S, Afassinou Y, Pessinaba S, Atta B, Ehlan K, et al. Observance thérapeutique de l'hypertension artérielle et ses facteurs dans le service de cardiologie du CHU Tokoin de Lomé. *Pan Afr Med J*. 2013; 14(1): 48.
20. Konin C, Adoh MA, Coulibaly IM, Kramoh E, Safou M, N'guetta R, et al. L'observance thérapeutique et ses facteurs chez l'hypertendu noir africain. *Arch Mal Coeur Vaiss*. 2007; 100(8): 630-4.
21. Essomba NE, Hamadou B, Koum DCK, Atemkeng A, Coppieters Y. Facteurs de Non Observance au Traitement Anti Hypertenseur chez les Adultes à Douala. *Health Sci Dis*. 2017; 18(3).
22. Yassine M, Al-Hajje A, Awada S, Rachidi S, Zein S, Bawab W, et al. Evaluation of medication adherence in Lebanese hypertensive patients. *J Epidemiol Glob*

- Health. 2016; 6(3): 157-67.
23. Rahmawati R, Bajorek B. Factors affecting self-reported medication adherence and hypertension knowledge: A cross-sectional study in rural villages, Yogyakarta Province, Indonesia. *Chronic Illn.* 2018; 14(3): 212-27.
24. Mariye T, Girmay A, Birhanu T, Tasew H, Teklay G, Baraki Z, et al. Adherence to insulin therapy and associated factors among patients with diabetes mellitus in public hospitals of Central Zone of Tigray, Ethiopia, 2018: a cross-sectional study. *Pan Afr Med J.* 2019; 33: 309.
25. Ayoub D, Mroueh L, El-Hajj M, Awada S, Rachidi S, Zein S, et al. Evaluation of antidiabetic medication adherence in the Lebanese population: development of the Lebanese Diabetes Medication Adherence Scale. *Int J Pharm Pract.* 2019; 27(5): 468-76.
26. Napolitano F, Napolitano P, Angelillo IF, Group CW. Medication adherence among patients with chronic conditions in Italy. *Eur J Public Health.* 2016; 26(1): 48-52.
27. Stroebe M, Schut H, Boerner K. Cautioning Health-Care Professionals. *Omega (Westport).* 2017; 74(4): 455-73.
28. Kassavou A, Houghton V, Edwards S, Brimicombe J, Wilson E, Griffin S, et al. Acceptability of the Medication Adherence for Patients Support intervention to improve adherence to patients prescribed medications for hypertension or comorbidities, as an adjunct to primary care: A qualitative study. *J Health Psychol.* 2021; 26(1): 168-80.
29. Tam HL, Wong EML, Cheung K. Effectiveness of Educational Interventions on Adherence to Lifestyle Modifications Among Hypertensive Patients: An Integrative Review. *Int J Environ Res Public Health.* 2020; 17(7): 2513.