

Rate of Compliance among Patients with Diabetes Mellitus and Hypertension

معدل الانضباط الدوائي بين المرضى ذوي الأمراض المزمنة

Waleed M. Sweileh^{*}, Ola Aker^{}, & Saed Hamooz^{**}.**

^{}College of Pharmacy. An-Najah National University.*

*^{**}Ministry of Health. Nablus Palestine.*

E-mail: waleedsweileh@yahoo.com

Received: (29/12/2003), Accepted: (31/10/2004)

Abstract:

The purpose of this study is to measure the rate of compliance of patients with chronic diseases (diabetes mellitus and hypertension) who attend the clinics of the ministry of health (MOH) in northern Palestine. Three hundred and twenty one (321) patients are personally interviewed using graded questionnaire to assess their compliance. The results has shown that there is 6.5% non-compliance, 52.4% poor/partial compliance and 42.1% good compliance among the tested sample. The percentage of noncompliance is correlated with the percentage of illiteracy and lack of drug and disease knowledge among the tested sample. Gender and place of living are not influential while age, education, and type of disease are influential on patient's rate of compliance. Diabetic patients have better overall rate of compliance than hypertensive patients. These results should encourage the health authorities in Palestine to implement techniques that would monitor and enhance the patient's compliance. This would ultimately reduce national health costs and increase the patient's desired therapeutic outcome.

ملخص:

هدف هذه الدراسة هو قياس مدى الأنضباط الدوائي لدى المرضى المصابين بالأمراض المزمنة المسجلين في عيادات وزارة الصحة الفلسطينية في شمال فلسطين. تمت معاينة ٣٢١ مريضاً باستخدام استبيان مدرج لقياس الأنضباط الدوائي. النتائج أشارت الى أن هناك ٦.٥% عدم أنضباط، ٥٢.٤% أنضباط ضعيف و ٤٢.١% أنضباط دوائي جيد. نسبة عدم الأنضباط الدوائي لة علاقة مع نسبة الأمية، عدم الوعي الصحي والدوائي في العينة التي تمت

دراساتها. مكان الإقامة وجنس المريض ليس لهما تأثير على نسبة الأنضباط الدوائي في حين أن العمر ومستوى التعليم ونوع المرض لهما تأثير على مدى الأنضباط الدوائي. مرضى السكري كان لديهم نسبة أنضباط دوائي أعلى من مرضى ارتفاع ضغط الدم. هذه الدراسة يجب أن تشجع المسؤولين في وزارة الصحة على تبني أساليب تؤدي إلى تحسين الأنضباط الدوائي حيث سيؤدي ذلك إلى تخفيف الأعباء الاقتصادية وتحسين النتائج العلاجية للمرضى.

Introduction and Aims:

Patient compliance or adherence is defined as the extent to which a person's behavior coincides with health-related advice ⁽¹⁾. There are several types of noncompliance. Therapeutic or medication non-compliance which includes failure to have the prescription dispensed or renewed, omission of doses, errors of dosage, incorrect administration, errors in the time and frequency of administration, and premature discontinuation of the drug regimen. A second type of noncompliance is dietary noncompliance in which the patient fails to follow the diet recommendations. A third type is the appointment noncompliance in which the patient fails to show up at the clinics for the scheduled check up. The consequences of medication non-compliance may not only be dangerous for patient's health, but also dramatically increase the financial costs of public health services ⁽²⁻⁵⁾.

Few studies about patient compliance in Arab countries have been published. Two studies have been conducted in Saudi Arabia. The first study is about compliance and knowledge of hypertensive patients in Al-Khobar city. ⁽⁶⁾ The second study, which is carried out at Al-Manhal primary health care center, aimed at identifying determinants of compliance among diabetic patients attending that clinic ⁽⁷⁾. A third study has been conducted in Sudan on hypertensive patients ⁽⁸⁾.

There are many reasons why patients fail to follow medical advice ⁽⁹⁾. Patient dissatisfaction with the doctor, poor doctor-patient relationship, lack of doctor's concern, distrust with doctor's advice, or long waiting times to obtain appointments increase the risk of noncompliance ⁽¹⁰⁾. Multiple drug therapy (polytherapy) and multiple frequency dosing also increase the risk of noncompliance ⁽¹¹⁻¹³⁾. Patients with chronic disorders, particularly

asymptomatic conditions, such as hypertension and hyper-cholesterolemia are more likely to be non-compliers^(14, 15).

There are several methods used to measure compliance. Indirect methods, like self reports and interviews with patient, are the simplest and most common methods for measuring compliance⁽¹⁶⁾. Pill counts method is also used to assess compliance in medical drug trials, by measuring the difference between the number of doses initially dispensed and the number remaining in the container⁽¹⁷⁾. The achievement of treatment goals might also be used to assess compliance, especially when the drug therapy is associated with a successful outcome like normal blood pressure, or blood glucose levels. Computerized compliance monitors are the most recent and reliable methods, like the Medication Event Monitoring System (MEMS). The system consists of microprocessor placed in the cap of the medication container, every time the patient removes the cap, the time and date are recorded. Direct methods like measuring drug concentration or biological markers in the patients' biological fluids, could also be used to assess compliance⁽¹⁸⁾. Of the various methods used to assess compliance, none is without disadvantages⁽¹⁹⁾.

The objectives of this study are: (1) to investigate the degree of compliance among patients with diabetes mellitus and hypertension who attend the clinics of MOH in Northern Palestine, (2) to investigate the risk factors for non-compliance and finally, and (3) to compare the degree of compliance between hypertension and diabetes mellitus patients.

Method and Design of the Study:

The population of this study consists of patients with chronic diseases (diabetes mellitus and hypertension) in the clinics of MOH in Northern Palestine. The study was conducted all through the year 2002. The sample has consisted of 321 male and female patients with at least five years of history of hypertension, diabetes mellitus, or other chronic diseases and who have been undergoing a fixed drug therapy for at least the last six months. The patients studied have been registered in the MOH as chronic patients and they have got their medication from the MOH on regular basis. The

compliance has been assessed during a personal interview using a 10-item graded questionnaire. Each item has four possible answers. Each answer has 1 to 4 points. Patients collecting more than 75% of the points are considered in the good compliance category. Patients collecting less than 50% of the points are considered in the noncompliance group, and finally, patients collecting between 50 and 75% of the points are considered in the poor /partial compliance group. The questionnaire tests therapeutic compliance, appointment compliance and dietary compliance. This categorization is tested and validated by the French researcher, Girerd X. ⁽¹⁶⁾. Statistical Packages for Social Science (SPSS) are used to analyze the data obtained from the questionnaires. Chi-square test and contingency coefficient test are used to analyze the significant correlations between compliance and several factors. For any two variables, when p value is less than 0.05, there is a statistically significant relationship between the two variables.

Results:

1. Rate of Compliance:

Patient’s compliance is classified into three classes as described in the method section. Results of patient’s rate of compliance are shown in table one (Table 1). The percentage of noncompliance (6.5%) is similar to the percentage of illiterate patients in the sample (6.2%) and to the percentage of the patients who do not know the clinical purpose of their medication (6.8%), suggesting a relationship between these variables.

Table 1: *Results of the rate of compliance among the patients in the tested sample.(n = 321 patients). Data are expressed as per cent +/- SD*

| Category | Number of patients in the category | Percentage |
|-------------------------|---|-------------------|
| Good compliance | 135 | 42.1 (+/-4.81) |
| Poor/Partial compliance | 165 | 51.4 (+/- 3.09) |
| Noncompliance | 21 | 6.5 (+/- 4.63) |

2. Factors affecting the Rate of Compliance:

The factors tested are the personal factors (age, gender, place of living and educational level) and type of disease (hypertension versus diabetes mellitus).

A. Personal Factors:

Gender:

Table 2 shows the rate of compliance among males and females in the tested sample. The results show that there is no significant relationship between gender and the rate of compliance based on the contingency test results.

Table 2: Rate of compliance among males and females in the tested sample. Contingency coefficient is 0.042, and approximate significance is 0.756. ($n = 321$ patients). Data are expressed as per cent +/- SD

| Gender | N (% of Noncompliance) | N (% of Poor Compliance) | N (% of Good Compliance) |
|--------|------------------------|--------------------------|--------------------------|
| Male | 15 (7.4 +/- 1.01) | 108 (52.3 +/- 2.18) | 83 (40.3 +/- 3.2) |
| Female | 7 (5.8 +/- 0.21) | 58 (50.6 +/- 4.9) | 49 (43.6 +/-3.71) |

Age:

Table 3 shows the rate of compliance among different age groups. The results show that there is a significant relationship between age and the rate of compliance based on the contingency test results. Elderly people tend to have impaired memory or physically disabled that might hinder their ability to take their medications as prescribed. Based on this, family members need to watch more carefully drug consumption of the elderly patients with chronic diseases.

Table 3: rate of compliance among different age groups in the tested sample. Contingency coefficient is 0.271, and approximate significance is 0.000. (n = 321 patients). Data are expressed as per cent +/- SD

| Age Category | N (% of Noncompliance) | N (% of Poor Compliance) | N (% of Good Compliance) |
|--------------|------------------------|--------------------------|--------------------------|
| Less than 40 | 0.0 (0.0 +/- 0.0) | 16 (42.1 +/- 4.29) | 22 (57.9% +/- 6.02) |
| 40-60 | 4 (3.5 +/- 0.09) | 48 (41.7 +/- 3.90) | 63 (54.8 +/- 4.21) |
| More than 60 | 17 (10.1 +/- 1.02) | 101 (60 +/- 4.84) | 50 (29.8 +/- 3.92) |

Education:

Table 4 shows the rate of compliance among the different educational level groups. The results show that there is a significant relationship between educational level and the rate of compliance based on the contingency test results. This indicates that illiterate patients do not appreciate the importance of drug compliance on therapeutic outcome. This might be due to lack of drug awareness among certain categories of Palestinian patients.

Table 4: Rate of compliance among patients with different educational levels. Contingency coefficient is 0.322, and approximate Significance is 0.000. (n = 321). Data are expressed as per cent +/- SD

| Level of Education | N (% of Noncompliance) | N (% of Poor Compliance) | N (% of Good Compliance) |
|--------------------|------------------------|--------------------------|--------------------------|
| Illiterate & basic | 19 (9.5 +/- 1.1) | 122 (61 +/- 2.86) | 59 (29.5 +/-2.90) |
| Middle | 1 (1.3% +/- 1.01) | 30 (38.5 +/- 1.28) | 120 (60.3 +/- 4.12) |
| High | 1 (2.3% +/- 0.92) | 13 (30.2 +/- 2.53) | 29 (67.4 +/- 4.54) |

Place of Residence:

Table 5 shows the rate of compliance with respect to place of residence. The results show that there is no significant relationship between place of residence and the rate of compliance based on the contingency test results.

Table 5: Rate of compliance with respect to place of living in the tested sample. Contingency coefficient is 0.150, and approximate significance is 0.115. (n = 321 patients). Data are expressed as per cent +/- SD

| Place of residence | N (% of Noncompliance) | N (% of Poor Compliance) | N (% of Good Compliance) |
|--------------------|------------------------|--------------------------|--------------------------|
| City | 12 (6.2 +/- 3.11) | 92 (47.2 +/- 2.87) | 91 (46.7 +/- 4.11) |
| Village | 8 (8.2 (+/- 3.19) | 59 (60.8 (+/-4.01) | 30 (31 (+/- 4.19) |
| Camp | 1 (3.4 +/- 2.90) | 14 (48.3 +/- 5.08) | 14 (48.3 +/-6.98) |

*B. Type of Disease:**Rate of Compliance in Hypertensive versus Diabetic Patients*

Table 6 shows the rate of compliance with respect to the type of disease. The results show that there is a significant difference in the rate of compliance with respect to the type of disease based on the contingency test results.

Table 6: *Rate of compliance with respect to the type of the disease. The contingency coefficient is 0.241, and the approximate significance is 0.003. (n = 321 patients). Data are expressed as per cent +/- SD*

| Type of disease | N (% Noncompliance) | N (% Poor/Partial Compliance) | N (% Good Compliance) |
|-----------------|---------------------|-------------------------------|-----------------------|
| DM 122 | 3 (2.4 +/-3.18) | 68 (55.9 +/-5.57) | 51 (41.7 +/-2.91) |
| HTN 157 | 22 (14.3 (+/- 2.91) | 77 (49.1 +/-4.51) | 57 (36.6 +/-3.20) |

Discussion:

The results has shown that 6.5% of the patients with chronic diabetes mellitus and hypertension who attend the clinics of the Palestinian MOH belong to the noncompliance category, 51.4% belong to the poor/partial compliance category, and 42.1% belong to the good compliance category. Our data show that 6.2% of the tested sample is illiterate patients and approximately 6.5% of the patients do not know the clinical purpose of their medications. Testing individual questionnaires have shown that illiterate patients have the least compliance score suggesting that there is a strong correlation between noncompliance on one hand and illiteracy and drug education on the other.

Unfortunately, there is no published data yet regarding drug compliance in Palestine in order to compare with these results. However, similar results for compliance assessment have been found by different researchers in different countries. A French study that used similar assessment method

found 8% of the tested patients are noncompliant, 53% have minor noncompliance, and 39% have good compliance⁽¹⁶⁾.

Our results have shown that compliance is affected by age and education but not by place of residence or gender. The age factor is obvious. With increasing age, the degree of compliance decreases for several reasons. For example, most of the elderly have memory problems related to age or due to dementia or Alzheimer's disease. Furthermore, most elderly patients have vision and hearing problems that might increase the potential of mistakes in taking medications. Another problem with elderly is that most of them have several diseases and take several drugs at the same time which might be confusing to most elderly patient. These general characteristics are common among elderly in most societies and that is why similar findings were made by in other countries by other researchers^(20, 21).

The effect of the education factor on the degree of compliance was not surprising. More educated people tend to appreciate and understand the consequences of non-compliance. Thus the degree of compliance increases with increasing level of education among patients. Illiterate patients can not read or distinguish their medications which increases the risk of errors and noncompliance. Illiteracy might negatively affect patients' medical knowledge.

A comparison between hypertensive and diabetic patients shows that diabetic patients have better compliance than hypertensive patients. The degree of general compliance among patients with hypertension is (36.6%), while the degree of general compliance among diabetic patients is (41.7%). This difference among the two types of diseases may be attributed to the nature of the disease. For example, hypertension is asymptomatic disease while diabetes is not. Also, hypertensive patients tend to be elderly and thus less educated while diabetic patients are usually younger (83% of diabetic patients in the tested sample were above 40 years old, while 99% of hypertensive patients were above 40 years old. Although the differences in percentages are not very large, the above argument regarding differences between diabetic and hypertensive patients should be considered as a possible explanation.

Conclusions:

This study is the first to investigate the degree of compliance among chronic patients with diabetes mellitus and hypertension attending the clinics of the MOH. This study should encourage the health policy makers in Palestine to implement strategies to reduce non-compliance and thus to reduce national health costs. One kind of strategies that could be implemented is the development of better patient education and communication. Increasing the number of pharmacists in MOH clinics would be of great help. Every clinic should at least have one pharmacist devoted to review and follow up the patient's drug profile. Finally, although this study is the first of its type in Palestine, it has some limitations. (1) This study investigated only patients in the clinics of MOH who obtain their medication for free, so it does not investigate the association between cost of drugs and compliance. (2) The study used only one method to assess compliance. The study used self-report questionnaire to assess compliance, which is a traditional method and less sensitive than modern electronic methods. Further studies are needed.

References:

1. Murphy, J., Coster, G. “Issues in Patient Compliance”. *Drugs*. Dec; **54**(6); (1997), 797-800.
2. McGuigan, Ka., Sokol, M., Yao, J., Haynes, J., Qian, Q., Boscarino, J. and Epstein, R., “The value of compliance: evidence from two patient cohorts”, *Value in Health*, Vol.4, Issue.2, (2000), 55.
3. Col, N., Fanale, JE., Kronholm, P. “The role of medication noncompliance and adverse drug reactions in hospitalizations of the elderly”, *Arch Intern Med*, Vol.150, Issue.4, (1990); 841-845.
4. Nuesch, R., Schroeder, K., Dieterle, T., Martina, B., and Battegay, E., “Relationship between insufficient response to hypertensive treatment and poor compliance with treatment: a prospective case-control study”, *British Medical Journal*, Vol.323, (2001), 142-146.

5. Clark, WF., Forwell, L. (2000), "Patient compliance with drug therapy for diabetic nephropathy", *Canadian Medical Association Journal*, Vol.162, (2000), 1553.
6. Al-Sowielem, L.S., Elzubier, A.G. "Compliance and knowledge of hypertensive patients attending PHC centers in Al-Khobar, Saudi Arabia", *Eastern Mediterranean Health Journal*, Vol. 4, Issue2, (1998), 301-307.
7. Khattab, M.S., Abolotouh, M.A., Khan, M.Y., Humaidi, M.A. and Al-Khaldi, Y.M. "Compliance and control of diabetes in a family practice setting, Saudi Arabia", **Eastern Mediterranean Health Journal**, Vol.5, Issue. 4, (1999), 755-765.
8. Elzubier, A.G., Husain, A.A., Suleiman, I.A., Hamid, Z.A., (2000), "Drug compliance among hypertensive patients in Kassala, eastern Sudan.", *East Meditrranian Health Journal*, Vol.6, Issue1, (2000),100-105.
9. Pineiro, F., Gil, V., Donis, M., Orozco, D., Pastor, R., Merino, J., (1997), "Factors involved in noncompliance with pharmacological treatment in arterial hypertension", *Aten Primaria*, Vol.15, Issue20, (1997), 180-184.
10. Falvo, D., Woehlke, P., Deichmann, J. "Relationship of physician behavior to patient compliance", *Patient Counseling Health Education*, 4thQuart, Vol.2, Issue.4, (1980), 185-188.
11. AH Paes, A Bakker, CJ Soe-Agnie "Impact of dosage frequency on patient compliance". *Diabetes Care*, Vol.20, Issue.10, (1997), 1512-1517.
12. Claxton, AJ., Cramer, J., Pierce, C. "A systematic review of the association between dose regimens and medication compliance", *Clinical Therapy*, Aug. Vol.23, Issue 8, (2001), 1296-1310.
13. Cameron, C. (1996), "Patient compliance: recognition of factors involved and suggestions for promoting compliance with therapeutic

- regimens”, *Journal of Advanced Nursing*, Vol.24, Issue2, (1996), 244-250.
14. Tiina, S., Lahdenper, Helvi A.Kyngos. “Compliance and its evaluation in patients with hypertension”, *Journal of Clinical Nursing*, Vol.9, Issue6, (2000), 826-833.
 15. Kiortsis, DN., Giral, P., Bruckert, E., and Turpin, G. (2000), “Factors associated with low compliance with lipid-lowering drugs in hyperlipidemic patients”, *Journal of Clinical Pharmacy and Therapeutics*, Vol.25, Issue6, (2000), 445-451.
 16. Girerd, X., Hanon, O., Anagnostopoulos, K., Ciupek, C., Mourad, JJ., and Consoli, S., “Assessment of antihypertensive compliance using a self-administered questionnaire: development and use in a hypertension clinic”, *Pressed Medicine*, Vol.30, Issue21, (2001), 1044-1048.
 17. Rudd, P. Byyny, RL., Zachary, V., LoVerde, ME., Mitchell, WD., Titus, c. and Marshall, G., “Pill count measures of compliance in a drug trial: variability and suitability”, *American Journal of Hypertension*, Vol.1, Issue3-part 1, (1998), 309-312.
 18. Liu, H., Kaplan, AH., Wenger, NS. (2002). Measuring patient adherence. *Ann Intern Med* Jul 2; **137**(1), (2002), 72-3.
 19. Gil, V., Pineda, M., Martnez, JL., Belda, J., Santos, ML. and Merino, J. (1994), ”Validity of six indirect methods to assess treatment compliance in arterial hypertension”, *Med Clin (Barc)*, Vol.102, Issue. 14, 532-536.
 20. Norell, SE. “Memory and medication compliance”, *Journal of Clinical Hospital Pharmacy*, Vol.10, Issue1, (1985), 107-109.
 21. Steiner, JF., Prochazka, AV., “The assessment of refill compliance using pharmacy records: methods, validity and applications”, *Journal Of Clinical Epidemiology*, Vol. **50**, (1997), 105-116.