Study the Relation of Drug –Non Adherence with Some Socio-Economic Factors among Diabetic Patients in Kirkuk City

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Abstract:

Background: Poor & non-adherence to medications are serious issues in the management of chronic diseases such as diabetes mellitus. Amounting body of evidence indicates that decreased medication adherence is associated with increased rate of hospitalization and total costs of care.

Objective: For studying the prevalence of drug non-adherence & poor/ partial adherence among adults and its associated risk factors totaling with causes.

Patients and Methods: Prospective descriptive cross sectional study was carried out in Azadi Teaching Hospital at Kirkuk Governorate of Iraq. Based on the inclusion and exclusion criteria 500 patients were enrolled into study, which had Diabetes Mellitus.

Results: Five hundred adult patients participated in this study. Estimated mean prevalence rate of drug non-adherence were: (1) self-perceived adverse effect of medicines (16.67); (2) complicated medicine regimens (7.07); (3) inadequate knowledge about medicines and diseases(1.01);(4) frightening from dependency and addiction (3.54); (5) the stigmatization (4.54); (6) drugs not present in health centers (16.67); (7) considering disease is transient and not lifelong (8.58); (8) considering the drug is not effective (18.18); (9) the cost of medications (21.71); (10) the forgetfulness (2.02).

Conclusion: The drug non-adherence is an important concern or problem in a patient management. Medication regimens should be simplified as more as possible, in particular to avoiding cutting pills or using of different dosages at a different timing. Patients should be encouraged to voice out their perceived drug adverse effects. Further worksare needed to determine the prevalence and causes of patients, non-adherence to medication in Kirkuk Governorate.

Key words: Diabetes Mellitus; Drug Adherence; Kirkuk.

Introduction:

Compliance, adherence and persistence all are terms widely used in the literatures for describing medication-taking behavior. The adherence to, or compliance with the medication regimen is usually defined as an extending to which the persons take medication as prescribed by his/ her health care providers [(1)]." The adherence has been becoming the preferred term, defined by the World Health Organization as "the extent to which a person's behavior [in] taking medication corresponds with agreed recommendations from health care provider" (World Health Organization, 2003). While the term compliance has come to be disfavor because it is suggesting that the person is passively following a doctor's orders, rather than actively collaborating in the treatment processes. The adherence, on other hand, needs person's agreement to the recommendations for treatment [(2)]. Persistence is defined as the capability of a person to take medication for an

intended course of therapy. In the case of diabetes mellitus, the appropriate course of therapy is person's life time. A person is categorized as non-adherent if he/ she either not fills a prescription or stops taking a prescription pre- maturely [3, 4]. A report by World Health Organization (WHO) in 2003 had been quoted the statement by Haynes et al that "toincreasing the effectiveness of adherence interventions may have farther greater impacts on the health of the population than any improvement in particular medical treatments. WHO estimated that the average rate of adherence to medication is around (50%) among patients suffering from Diabetes Mellitus in developed countries, and this is assumed to be lower in developing countries where there is limited access to health care and medicines [5]. Patients are generally considered adherent to their medications if their medication adherence percentage; defined as the number (No.) of pills absent in a given period (X) divided by the number of pills prescribed by the physician in that same period is equal to or greater than (80%). WHO definition for good adherence was "if the patients ideally demonstrate adherence rate of (80%) or greater", partial/poor adherence "if the patients' adherence rate is between (60-80%)", and the low/ non adherence "if the patient' adherence rate less than (60%)" [5]. One obstacle for estimating the adherence by using this method is that assuming the pills' numbers absent were actually taken by the patients. In addition, the method may be not representative of long-term adherence pattern due to white-coat adherence which may exhibit by patients; or improving medication-taking behaviors in the 5 days before and 5 days after a health care encounters [5]. Adherence is a multidimensional phenomenon which is determined by the interplay of five sets of factors, termed dimension by World Health Organization (2003) [5]:a) Social/ economic factors; b) Provider-patient/ health care system factors; c) Condition-related factors; d) Therapy-related factors; e) Patient-related factors. Insufficient medication adherence is ancient problem, that was identified over 2000 years ago by Hippocrates; that, Hippocrates' admonition to the physicians to "not only be prepared for doing what is right him/ herself, but also for making the patient cooperate" [6]. Today's ever more complicated medical regimen is ongoing public health crisis of enormous proportions. When taking different degrees from the prescribed dosing regimen medications have situation particular changes in benefits/ risks ratios; either because of diminished benefits, increased risks, or both of reasons. Numbers of studies have been demonstrated that inadequate adherence by prescribed medication regimens leading to an increase mortality and morbidity from wide variety of illness as well as increased health care fees. Low or poor level of adherence to therapeutic treatments and recommendations are reported about all diseases, all treatments, and all ages. The studies show that many social factors intervene with adherence, they involve multiple life stresses as poverties, social conflict, job losing, homelessness, fearfulness and concerns which are not addressed complex jobs and family responsibilities, and misunderstanding, languages barriers, literacy effects. A 2009 report from New England Health Care Institute revealed that medications non-adherence is the main source of an

estimated $290 billion in "otherwise avoidable medical spending" in UK per year [7]. The tremendous financial burdens of medication non-adherence stem basically from the expensive complications of diabetes Mellitus. In addition, the occurring of one complication has a pathway of leading to others in cascade-like effects. Adding to this the incremental fees of rehabilitations and lost productivities [8, 9]. Luckily, the public health crisis of medication non adherence has lastly been placed in the spot light. Intervention to improvement adherence have recently become a focus for constituency in the health care including the insurers, the employers, the Pharmaceutical companies and pharmacy benefit management companies (FBM) [10, 11]. Poor or low level of adherence to therapeutic treatments and recommendations are reported along all disease conditions, all treatments, and all ages. Only about one-half of people who are prescribed medications actually take enough doses to achieve a therapeutic effect. This often results in prescription of increased doses and the addition of more medications by clinicians caring for these patients [12]. Approximately (50%) of patients are not able to achieving full adherence, and approximately (33%) never take the prescribed medicines at all [13]. Adherence is higher for short-term, self-administering treatment, estimated at about (65% to 75%) but it falls to less than (25%) for long-term therapy. Other important reasons of non-adherence are lack of confidence in the treatment plans, lack of skills in utilizing the devices, lack of capability for adjusted medications, poor skill in self- assessment, forgetting, misunderstanding, health believes, and attitudes toward diseases and treatments [14]. The aim of this study is to establish the extending of adherence to medication regimens among patients with diabetes mellitus at Kirkuk Governorate, and to review evidences regarding adherence rates, the reasons for non-adherence and variables found to influence adherence/ non- adherence behaviors.

Patients and Methods:

It is cross sectional observational study. The study was conducted at Azadi Teaching Hospital; which was conducted over a period of fourteen months from 4th January 2017 till 3rd March 2018. Total sample consisted of 500 male and female patients. This study was carried out among patients suffering from diabetes Mellitus. Inclusion criteria were: 1- Age 20 year's andabove. 2- The medical record of those patients revealed that they had diabetes mellitus, therapy for at least three years. The medical records also showed that the patients were undergoing fixed drug therapies for at least the past six months. While, exclusion criteria were: 1-Those less than 20 years of age. 2- Newly diagnosed patients.

The patients enrolled in study were registered in the Ministry of Health (MOH) as chronic patients. Face to face interview was carried out for collecting data by using a questionnaire which consisted of three domains. The first and second domains contained questions related to patients' demographic characteristics. The third domain contained graded questions to assess adherence. Each item of third graded domain has four possible answers. Each answer has one to four points. The educational level of patients in the

sample was classified as non-schooling (which include both illiterate and non-formal education), primary school, secondary school, and post-secondary school [15]. The occupation of those patients which were included in the study classified in to: governmental, non-governmental, self-employee, student, retired, home maker and unemployed able to work or unable to work. While, income measure used, adjusted household income, is defined as total household income divided by the square root of number of individuals in each household and grouped into four quartiles: low income, (0-24%); low middle income, (25-49%); high middle income, (50-74%); high income, (75-100%) [15]. Analysis of data was carried out by usingStatistical Packages for Social Science (SPSS) version 16 was used to analyze the data obtained from questionnaire. Chi-square test (for categorical variables) was used to analyze the significant correlations between adherence and tested factors. For certain two variables, when p value is less than 0.05, there is statistically significant relationship between two variables.

Results:

1) **Rate of adherence:** Table (1) shows rate of adherence according to sociodemograghic factors, duration of disease and number of drug per day.

Table (1): Rate of adherence

Variable(n=500)		Good adherence No.& %	Poor/non adherenceNo(%)	statistics
gender	Male (n=250)	122(48.8)	128(51.2)	X^2=11.35, p=0.010
	Female (n=250)	180(72)	70(28)	
age	Less than 45	53(44.17)	67(55.83)	X^2=5.74, p=0.125
	45- 65	177(65.32)	94(34.68)	
	More than 65	72(66.05)	37(33.95)	
Educational level	Non schooling	32(29.36)	77(70.64)	X^2=9.70,p=0.023
	1ry school	132(62.56)	79(45.97)	
	2ry school	100(70.92)	41(29.07)	
	Post2ry school	38(97.44)	1(2.56)	
residence	rural	78(53.42)	224(63.38)	X^2=6.53, p=0.018
	urban	68(46.58)	130(36.73)	
occupation	Governmental employee	30(65.50)	18(37.50)	X^2=4.83, p=0.311
	Nongovernmental employee	25(73.53)	9(26.46)	
	Self-employee	30(73.17)	11(26.83)	
	student	13.(61.90)	8(38.10)	
	retired	52(49.06)	54(50.94)	
	Home maker	89.(68.46)	41(31.54)	
	Unemployed & able to work	41(67.21)	20(32.79)	
	Unemployed & unable to work	22(37.29)	37(62.71)	
No. of drug/	one	100(64.10)	56(35.89)	X^2=6.53, p=0.012
	Two& more	202(58.7) 141(41.19)		
Duration of disease	Less than 3 years	198(72.01)	77(27.99)	X^2=6.68,p=0.016
	More than 3 years	104(46.22) 111(53.78)		

2) Causes of medication non-adherence: According to this study there were numerous causes for non-adherence. These causes were categorized into the table.

Table (2): The causes of medication non-adherence.

Causes of non-adherence	No. of pt.	Percentage
Fear of adverse effect of medications	33	16.67
credence that the medication is not effective	36	18.18
Dependency and addiction	7	3.54
Thinking of diseases is not lifelong	17	8.58
Cost or fee of medications	43	21.71
Stigmatization	9	4.54
Inadequate knowledge	2	1.01
Forgetfulness	4	2.02
Drug not present in health center	33	16.67
Multiple dose and Polypharmacy	14	7.07

Discussion:

The adherence requires improvement in the self-management behaviorsand knowledge of the patients. One study suggested that morbidity and mortality of diabetes mellitus might be markedly diminished or eliminated with effective education programs that improve adherence [16].

The overall prevalence of non-adherence reported in the current study was (39.6%). This figure was lower than that reported in the north of Palestine about (66.8%) [16], or Middle East studies (57.8%) [17], and similar to those in Egypt (reporting a drug non-adherence of 37%) [18]. Reasons for variation in adherence rates: (a) should be related to variation in the instruments which are used for assessment, (b) or due to demographical variation among these states, (c) or due to variation in the definition of adherence/ non adherence.

In addition to that, there is statistical significance between gender and the rate of adherence. This study showed adherence percentage higher in females than in males by (23.8%). The reasons of this difference may be due to that females are more obsessive about the diseases or may be due to males are more eventful. A French study that used similar assessment method found no statistical difference between the two genders [19].

In the past, the effect of age on drug non-adherence had been considered inconclusive [20]. This study demonstrated there was no statistical difference in the rate of drug adherence in respect to patient ages, but there is an apparent association between young age group and poor/ partial or non-adherence. Possible explanation might be that for older person's doctors attempt to simplify medical treatment, leaving younger subjects to contend with more complicated drug regimens, which act as cofounder, another explanation may be that young adults may stop the taking their medications in order to fit in with their friends, or that they deny theirillness.

Educational level had clear effect on drug adherence. In low educational

level, there was low rate of adherence to medications and this rate increased with increasing educational level [rate of adherence = (29.365%) in non-schooling group, and (97.44%) in post-secondary group]. The results approximately are similar to those results of study had been done in Saudi Arabia (in Al-Khobar city) [21]. The results show that there is significant difference in the adherence ratein respect to educational level.

Another factor associated with drug non-adherence is the occupation of patient via different methods: (1) either through the cost/ fee of drug in these who are unemployed and unable to work and their income is low; (2) or through side effects of drugs (e.g. insulin) in those who are students, and governmental and non-governmental employees specially in those who are ahead's of departments; (3) or through both in those who are with low economic status. The side effects or frightening from potential side effects, are an additional important consideration and a clear reason for dropping a medication altogether. Even this reason, however, is more nuanced than it may seem at first. Some medications have temporary (transient) side effects that are more annoying than harmful, and subside if the patient sticks with it. Persistence on the part of the patient then relies on (1) sufficient medical knowledge to understand that the side effect is temporary and (2) a sufficient valuing of the treatment to persist through the side effect. Financial-based interventions are commonplace, particularly in the form of co-pay reductions and rebates sponsored by pharmaceutical companies. Similarly, cost or fee is typically high on the list of reasons and rightly so, especially for low income patients on expensive medications with no access to assistance program. However, there is also a group of patients for which co-pay is more of an excuse or an annoyance than a true reason for non-adherence, as they pay far greater sums forincidental items that offer no health benefits. A brief glance at international data offers further evidence that cost/ fee is not as a significant driver of non-adherence as many people assume. In Netherland, for example, benefits from a relatively wealthy well-educated population, and Dutch people bear no personal responsibility for their medication costs. All medication costs are covered by insurers and the government. In one study, however, medication non-adherence was equally problematic in the Netherlands as it was in the US and Canada [22].

The results showed that the rate of adherence is declining with increasing the duration of diseases. In other word there is inverse relationship between adherence and duration of diseases. In Jordon, only (26%) of elderly patients who initiated treatment to reduce the risk of complications maintained a high level of use 5 years later and that the greatest decline occurred during the first 6 months of treatment [23].

The results clearly showed there is an inverse relation between rate of adherence and multiple drug therapy in diabetic patients. The good adherence clearly improves in diabetic patients when the numbers of prescribed medications are reduced from two or more to one drug regimen. The rate of non-adherence among diabetic patients tends to significantly change upon changing the number of medications. So, the number of medications affects

good adherence, this might be due to use of multiple drug therapy to reduce the profound symptoms of hyperglycemia, or negative perception of patients toward insulin (e.g. leading to addiction and dependency); although one drug regimen would be better for them than many drugs. Finally, it should not be understood that multiple drug therapy means non-adherence, actually, the results showed that in multiple drug therapy, most adherent patients become poor/ partial adherent rather than non-adherents; although further studies are necessary to compare the effect of multiple daily dosing and once daily dosing frequency on rate of adherence. The reasons reported by patients in this Governorate are similar to those reported in the international literatures. While, some common reasons reported by international literatures and studies were not reported by these patients, such as satisfaction and/ or lack of social supporting. The reason for this could be that patient in Kirkuk Governorate may be afraid to complain about their doctors in order to avoid problems that might compromise their treatments. The results showed that there is statistical difference or variation between rates of good adherence in the center of Kirkuk governorate and rural area.

Conclusions:

The results highlighted the potential risk factors and causes for drug non-adherence. Patients who self-perceived adverse effects of drug, had inconvenient complex drug regimens and needed to cut pills which increased risk of drug non-adherence; other cause of this problem is cost of drug.

This study encourages the health policy makers in Kirkuk Governorate to implement strategies to reduce non-adherence rate and thus reduce national health costs. One of these strategies to reduce is to minimize the number of drugs prescribed for patients. The following recommendations could improve drug adherence: patients should be encouraged to express their concerns on drugs, in particular, their self-perceived side effects. Patients receiving treatment for diseases should receive special education to improve understanding about their drug treatment. Prescriptions should be simplified as far as possible, and the need to cut pills avoided, among those who have difficulties with drug adherence, a trained helper to pack medication and the use of medication boxes could be helpful.

References:

[1]. B Vrijiens, S De Geest, DA Hughes Wiley. *British journal of clinical pharmacology*2012:73(5), 691-705.

[2]. Adherence to long- term therapies: evidence for action. Geneva, World Health Organization,2003.

[3]. Kantor ED, Rehm CD, Haas JS, et al.*Trends in prescription drug uses among adults in United* Status from 1999-2012. JAMA 2015; 314:1818-1830.{PMC free article}[pub Med].

[4]. Urquhart J. Defining the margins for errors in patient compliance with prescribed drug regimens. Pharmacoepidemiol Drug 2009; 9:595-8.

[5]. Sabate E. Adherence to Long –Term Therapies: Evidence for action. Geneva: World Health Organization, 2003. Available from: http: // www. WHO, int / chronic_ condition / en / adherence_ repot.PDF.

[6]. Cramer JA. Relationship between medication adherence and medical outcomes. *Am J HealthSyst Pharm* 2003; 52 (Suppl.):S52-9.

[7]. Johnson E, Clark B, Downs A, et al. Colorado HEALTH institute. Medicaid expansion in Colorado,

http://www.Coloradohealthinstitute.Org/default/files/file-attachment/MK-Colorado Expansion-Report-0.pdf(2016, accessed 3 April 2017.
[8]. National Association of community Health Centers, http://nachc. Org/about-our-health-centers/(2017, accessed 22 May 2012).
[9]. Osborn CY, Mayberry LS, Wanger JA, et al. Stressors may compromise medical adherence among adults with diabetes and low socioeconomic status. *West J Nurs Res 2014*; 36: 1091-1110.
[10]. Money EB. Federally qualified health center expansion through the Affordable Care Act. *NC Med j* 2013; 74: 325-326.
[11]. World Health Organization. Diabetes facts country and regional data 2010 Available on line from:http://www.who.int/features/factfiles/diabetes/04-en.html.
[12]. Jerry A. Polypharmacy: A new Paradigm for Quality Drug Therapy in the Elderly. *ARCH* INTERN MED2004;164:1947-1950.
[13]. Alton S, March AL, Mallary L, et al. Medication adherence in and nurse practitioner Managed clinic for indigent patient J Am Assoc Nurse Pract 2015; 27:433-440.
[14]. Ahmed NS, Ramli A, Islahudin F, et al. Medication adherence in patients with type 2 diabetes mellitus treated at primary health clinics in Malaysia. Patient prefer adherence 2013, 7:525-530.
[15]. Rahonen O, Arber S, Lahelma E, Martikainen P, Silventoinen K. Understanding income inequalities in health among men and women in Britain and Finland. Int J Health Services 2000;30:27-47.
[16]. Murphy, J., Coster, G., "Issues in patient compliance", Drug, 54(6), Dec. (2007),797-800.
[17]. Al-shazly M. Health care for diabetic patients in developing countries. Public Health, 2006,114-281.
[18]. Yousseff RM, Moubarak II. Patterns and determinants of treatment compliance among hypertensive patients. Eastern Mediterranean Health Journal, 2004, 8:579-592.
[19]. Read JL, Shortell SM. Interactive games to promote behavior change in prevention and treatment. JAMA. 2011; March 29:E1-E2(online).
[20]. Calderon-Larranaga A, Diaz E, Poblador-Plou B, et al. Non adherence to hypoglycemic medications: role of mental and physical comobidity. Int J Cardiol 2016: 207:310-316.
[21]. Murphy J., Coster G., "Issues in patient compliance", Drug, 54(6), Dec. (2007),800-801.
[22]. Al-Sowielem LS., Elzubier AG., "Compliance and knowledge of diabetic patients attending PHC centers in Al-Khobar, Sudia Arabia", Eastern Mediterranean Health Journal, 4(2), (1998),301-307.
[23]. Khanna R, Pace PF, Mahabaleshwarker R, et al. Medication adherence among recipient with chronic diseases enrolled in state Medicaid program. Popul Health Manag 2012; 15: 253-260.