

Prevalence and predictors of medication non-adherence in some common non-communicable chronic diseases and cancers: a comparative study

Shakeel A. Mir^{1*}, Danish Shakeel²

¹Department of Clinical Pharmacology, Sher-I-Kashmir Institute of Medical Sciences, Srinagar, Kashmir, India

²Department of Computer Science and Engineering, Apex Institute of Engineering, Chandigarh University, Mohali, Punjab, India

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***Correspondence:**

Dr. Shakeel A. Mir,

Email: drshakeelahmadmir@gmail.com

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ABSTRACT

Background: Adherence is a key factor in the success of all pharmacological therapies. Medication non-adherence is an extremely common barrier to achieve positive health outcomes. The present study aims to compare medication non-adherence in some common chronic diseases and cancers and also to assess various factors influencing it.

Methods: Pre-validated questionnaires based on general medication adherence scale (GMAS) were equally distributed among 300 patients suffering from chronic illnesses and cancers. 270 patients returned completely filled questionnaires.

Results: The study population consists of 53.33% men and 46.66% women. 55.55% patients were literate. 70.37% of patients were from rural areas. 61.48% were taking 2-4 drugs. As compared to 14.81% males 18.51% of females had poor or low adherence. Only 0.74% of young patients (<30 years) had poor/low adherence as compared to 16.29% each in other age groups. Rural patients had poor adherence as compared to patients from urban areas. As compared to 31.85% illiterate patients, only 16.29% of literate patients had poor or low adherence. Adherence was better in patients taking more than one drug. Statistically, a significant correlation was found between gender, age, level of education, and area of residence. Duration of treatment, the number of drugs, and the frequency of dosage were not found significantly correlated with adherence. Patients suffering from malignancies had higher medication adherence as compared to chronic illnesses.

Conclusions: Medication non-adherence is common in patients with chronic diseases and cancers that are treated with unsupervised oral antineoplastic drugs. The complex problem of non-adherence calls for interventions at various levels.

Keywords: Medication, Adherence, Oral antineoplastics, Treatment, Cancers, Chronic diseases

INTRODUCTION

The WHO defines adherence to long term therapies as the extent to which a person's behavior-taking medication, following a diet and/or executing lifestyle changes correspond with agreed recommendations from a

healthcare provider.¹ Poor adherence to prescribed regimens leads to worsening of the disease, and increased health care costs and even death.² Medication non-adherence annually costs from US\$ 100 to US\$ 290 billion in the USA, €1.25 billion in Europe and approximately \$A7 billion in Australia.³

Poor medication adherence in chronic diseases is a worldwide problem. Approximately 50% of patients do not adhere to one of their chronic medications.¹

Recently the availability of oral anticancer drugs has increased significantly. But simultaneously concerns about adherence have become an important issue, especially with unsupervised chronic oral therapy.⁴ Although patients with cancers exhibit higher motivation towards medication adherence, adherence ranges from 16% to 100%.⁵

When the treatment is carried out without direct supervision of the medical personnel, medication adherence often becomes an issue adversely affecting the effectiveness of the therapy.⁶

There are a small number of studies on comparisons of drug non-adherence across different diseases. Most of the studies have focused on a single disease. Our study aims to compare medication non-adherence in some common chronic non-communicable diseases and malignancies and also to assess various predictors.

There are various methods to assess medication adherence. These include directly observed therapy, biological methods, and serum or urinary drug levels. Other methods include clinician reports, pill counts, rates of prescription refills, electronic medication monitors, patient diaries, and patient self-reports.⁷

METHODS

Direct methods are expensive and burdensome.⁸ We used the self-report method. Self-report measures have the benefit of being relatively simple, quick, cheap, reliable, valid, non-intrusive and easy to administer.⁷

Study design

This is a descriptive questionnaire-based study, conducted in a period of one year from March 2019 to March 2020, in SKIMS Hospital Srinagar, Kashmir. A sample size calculation was done to determine the population required for the study.

Sample size calculation

$n = pq / (E/1.96)^2$ where

n = minimum sample size, p = prevalence of non-adherence in previous studies (25%), $q = 100 - p(100 - 25) = 75$, E = margin of sample error tolerated (%) = 5% i.e 95% confidence interval,

$n = 75 \times 25 / (5/1.96)^2 = 288$

(288 was the sample size required. We randomly selected 300 patients, 150 from each group).

Study population

The study population consisted of two types of patients. Group one comprised of the patients suffering from common chronic non-communicable diseases like hypertension, rheumatoid arthritis, chronic obstructive Pulmonary Disease, bronchial asthma, parkinsonism, chronic renal disease, hyperlipidemia, and diabetes mellitus. Group two comprised of patients suffering from malignancies involving the liver, breast, colon, lung, stomach and prostate. We included only those cancer patients taking at least one oral anticancer drug. But adherence measurements included all the drugs the patient was taking concomitant to an anticancer drug. Patients attending follow up clinics were enrolled for the study.

A total of 150 patients from each group were given the questionnaire. All the 150 patients from group two returned the completely filled questionnaire. But from group one, only 130 returned the questionnaire, out of which only 120 questionnaires had been filled up completely.

Study tools

A pre-tested and validated questionnaire that was prepared in English and Urdu. It contained three sections. Section first included the questions regarding the general demographic information such as age, gender, location, and educational qualification. Section two had questions about disease and medication. Section three asked questions about medication adherence. We used the English and Urdu versions of a novel medication adherence tool known as GMAS (general medication adherence scale), after obtaining permission from the authors of the Scale.⁹ The scale categorizes adherence into poor, low, partial, good, and high.

Sampling method

Simple random sampling

Consents

The participants were informed about study objectives before data collection and questionnaires were filled only by those who were willing to fill it. Written informed consent was obtained from all the participants. The confidentiality of the participants was maintained.

Inclusion criteria

Inclusion criteria were suffering from well-established chronic non-communicable disease or cancer, taking drugs for the minimum last six months, cancer patients receiving at least one unsupervised oral anticancer drug, age above 18 years, willing to participate in the study,

ability to communicate by at least one of the means viz. speaking or writing

Exclusion criteria

Exclusion criteria were suffering from acute diseases, taking drugs for less than six months, age below 18 years, unwilling to participate in the study, unable to communicate by at least one of the means viz. speaking or writing.

Statistical tools

Analysis was done by a combination of manual calculators and free online statistics software “Vassar Stats”.

RESULTS

There were 120 patients in chronic diseases group (Group 1), with 46.7% (n=56) male and 53.3% (n=64) female. In cancer group, (Group 2) there were 150 patients, with 58.7% (n=88) male and 41.3% (n=62) female. In chronic disease group, 35.0% (n=42) were literate and 65.0% (n=78) were illiterate. In cancer group, 52.0% (n=78) were literate and 48.0% (n=72) were illiterate. In chronic disease group, 75.00% (n=90) were from rural areas and 25.00% (n=30) were from urban areas. In cancer group, 66.7% (n=100) were from rural areas and 33.3% (n=50) were from urban areas. In chronic disease group, 11.6% (n=14) patients were less than 30 years, 45.0% (n=54) 30-60 years, and 43.4% (n=52) patients above 60 years. In cancer group, 5.3% (n=8) patients were less than 30 years old, 66.7% (n=100) 30-60 years, and 28.0% (n=42) were above 60 years (Table 1).

Table 1: Demographics of the participants.

Group	Gender				Total		
	Male		Female				
	N	%	N	%			
Chronic diseases	56	46.66	64	53.33	120		
Cancers	88	58.66	62	41.33	150		
Group	Literacy				Total		
	Literate		Illiterate				
Chronic diseases	42	35.00	78	65.00	120		
Cancers	78	52.00	72	48.00	150		
Group	Residence				Total		
	Rural		Urban				
Chronic diseases	90	75.00	30	25.00	120		
Cancers	100	66.66	50	33.33	150		
Group	Age-wise distribution						Total
	<30 yrs		30-60 years		>60 years		
	No	%	No	%	No	%	
Chronic diseases	14	11.66	54	45.00	52	43.33	120
Cancers	8	5.33	100	66.66	42	28.00	150

Table 2: Pattern of disease and drug use.

Group	Duration of treatment					
	<1 year		1-4 year		>4 year	
	N	%	N	%	N	%
Chronic diseases	20	16.7	60	50.00	40	33.3
Cancers	32	21.3	98	65.33	20	13.6
Group	Number of prescribed drugs					
	One drug		2-4 drugs		>4 drugs	
	No	%	No	%	No	%
Chronic diseases	48	40.0	64	53.3	8	6.7
Cancers	20	13.4	102	68.0	28	18.6
Group	Frequency of drug administration					
	Once a day		Twice a day		Thrice a day or more	
	No	%	No	%	No	%
Chronic diseases	52	43.3	36	30.0	32	26.7
Cancers	50	33.3	52	34.87	48	32.0

In chronic disease group, 16.7% (n=20) patients were on treatment for less than one year, 50.0% (n=60) for 1-4 years, and 33.3% (n=40) for more than four years. In cancer group, 21.3% (n=32) were on treatment for less than a year, 65.33% (n=98) for 1-4 years, and 13.6% (n=20) for more than 4 years. In chronic disease group, 40.0% (n=48) patients received one drug, 53.3% (n=64) 2-4 drugs, and 6.7% (n=8) more than four drugs a day. In cancer group, 13.4% (n=20) patients received one drug, 68.0 (n=102) 2-4 drugs, and 18.6% (n=28) more than 4 drugs a day. In chronic disease group, 43.3% (n=52) were taking drugs once a day, 30.0% (n=36) twice a day, and 26.7% (n=32) thrice a day or more. In cancer group, 33.3% (n=50) were taking drug once a day, 34.87% (n=52) twice a day and 32.0% (n=48) thrice a day or more (Table 2).

In chronic disease group, as per the GMAS used, 14.8% males (n=8) had poor, 53.57% (n=30) low, 14.28% (n=8) partial, and 17.85% (n=10) good adherence. Among females, 14.06% (n=9) had poor, 45.31% (n=29) low, 18.75% (n=12) partial, 18.75% (n=12) good, and 3.12% (n=2) high adherence. In cancer group, 1.13% (n=1) male had poor, 1.13% (n=1) low, 15.90% (n=14) partial,

34.09% (n=30) good and 47.72% (n=42) high adherence. Among females, 6.45% (n=4) had poor, 12.90% (n=8) low, 16.12% (n=10) partial, 48.38% (n=30) good and 16.12% (n=10) high adherence. In chronic disease group, those less than 30 years 42.85% (n=6) had partial, 42.85% (n=6) good and 14.28% (n=2) high adherence. In 30-60 years, subgroup, 18.51% (n=10) had poor, 40.74% (n=22) low, 18.51% (n=10) partial, 22.22% (n=12) good adherence. In above 60 sub group, 21.15% (n=11) had poor, 63.46% (n=33) low, 7.69% (n=4) partial, and 7.69% (n=4) good adherence. In cancer group, those below 30 years had, 12.50% (n=1) poor, 12.50% (n=1) low, 25.00% (n=2) partial, 25.00% (n=2) good and 25.00% (n=2) high adherence. In 30-60 yr sub group, 4.00% (n=4) had poor, 8.0% (n=8) low, 14.00% (n=14) partial, 40.00% (n=40) good and 34.00% (n=34) high adherence. In above 60-year sub group, 14.28% (n=6) had partial, 47.61% (n=20) good and 38.09% (n=16) high adherence. In chronic disease group, 33.3% (n=26) illiterate had poor, 64.10% (n=50) low, 1.28% (n=1) partial, and 1.28% (n=1) good adherence. Among literate patients, 23.80% (n=10) had poor, 71.42% (n=30) low, 2.38% (n=1) partial, and 2.38% (n=1) good adherence.

Table 3: GMAS Score in different groups.

	Gender	Poor	Low	Partial	Good	High
Ch diseases	Male	8(14.28)	30(53.57)	8(14.28)	10(17.85)	0(0.00)
	female	9(14.06)	29(45.31)	12(18.75)	12(18.75)	2(3.12)
Cancers	male	1(1.13)	1(1.13)	14(15.90)	30(34.09)	42(47.72)
	female	4(6.45)	8(12.90)	10(16.12)	30(48.38)	10(16.12)
	Age	Poor	Low	Partial	Good	High
Ch diseases	<30	0(0.0)	0(0.0)	6(42.85)	6(42.85)	2(14.28)
	30-60	10(18.51)	22(40.74)	10(18.51)	12(22.22)	0(0.00)
	>60	11(21.15)	33(63.46)	4(7.69)	4(7.69)	0(0.00)
Cancers	<30	1(12.5)	1(12.5)	2(25.00)	2(25.00)	2(25.00)
	30-60	4(4.00)	8(8.00)	14(14.00)	40(40.00)	34(34.00)
	>60	0(0.00)	0(0.00)	6(14.28)	20(47.61)	16(38.09)
	Literacy	Poor	Low	Partial	Good	High
Ch disease	Illiterate	26(33.33)	50(64.10)	1(1.28)	1(1.28)	0(0.0)
	Literate	10(23.80)	30(71.42)	1(2.38)	1(2.38)	0(0.0)
Cancers	Illiterate	3(3.65)	7(8.53)	17(20.73)	35(42.68)	20(24.39)
	literate	1(1.47)	3(4.41)	10(14.70)	22(32.35)	32(47.05)
	Location	Poor	Low	Partial	Good	High
Ch Diseases	rural	25(27.77)	51(56.66)	6(6.66)	8(8.88)	0(0.0)
	urban	0(0.00)	0(0.00)	10(33.33)	18(60.00)	2(6.77)
Cancers	rural	2(2.00)	10(10.00)	8(8.00)	50(50.00)	30(30.00)
	urban	0(0.00)	0(0.00)	8(16.00)	20(40.00)	22(44.00)
	Rx Duration	Poor	Low	Partial	Good	High
Ch diseases	<1yr	5(25.00)	15(75.00)	0(0.00)	0(0.00)	0(0.00)
	1-4 yr	16(26.66)	40(66.66)	2(3.33)	2(3.33)	0(0.00)
	>4 yr	0(0.00)	0(0.00)	10(25.00)	28(70.00)	2(5.00)
Cancers	<1 yr	1(3.12)	1(3.12)	4(12.50)	16(50.00)	10(32.25)
	1-4 yr	4(4.08)	8(8.16)	10(10.20)	40(40.81)	36(36.73)
	>4yr	0(0.00)	0(0.00)	4(20.00)	10(50.00)	6(30.00)

Continued.

	Gender	Poor	Low	Partial	Good	High
	No of drugs	Poor	Low	Partial	Good	High
Ch diseases	1 drug	10(20.83)	38(79.16)	0(0.00)	0(0.00)	0(0.00)
	2-4	8(12.50)	20(31.25)	10(15.62)	26(40.62)	0(0.00)
	>4	0(0.00)	0(0.00)	3(37.5)	3(37.5)	2(25.00)
Cancers	1 drug	1(5.00)	1(5.00)	4(20.00)	6(30.00)	8(40.00)
	2-4	2(1.96)	6(3.92)	18(17.64)	40(39.21)	36(35.29)
	>4	2(7.14)	2(7.14)	6(2.14)	10(35.71)	8(28.57)
	Frequency	Poor	Low	Partial	Good	High
Ch diseases	od	10(19.23)	32(61.53)	5(9.61)	5(9.61)	0(0.00)
	bd	6(16.66)	10(27.77)	9(25.00)	9(25.00)	2(5.55)
	Tid	4(12.5)	14(43.75)	7(21.87)	7(21.87)	0(0.00)
Cancers	od	1(2.00)	1(2.00)	10(20.00)	24(48.00)	14(28.00)
	bd	3(5.76)	3(5.76)	10(19.23)	16(30.76)	20(38.46)
	tid	3(6.25)	3(6.25)	8(16.66)	16(20.83)	18(37.50)

In cancer disease group, 3.65% (n=3) illiterate patients had poor, 8.53% (n=7) low, 20.73% (n=17) partial, 42.68% (n=35) good, and 24.39% (n=20) high adherence. Among literate patients, 1.47% (n=1) had poor, 4.41% (n=3) low, 14.70% (n=10) partial and 32.35% (n=22) good and 47.05% (n=32) high adherence. In chronic disease group, 27.77% (n=25) patients from rural areas had poor, 56.66% (n=51) low, 6.66% (n=6) partial and 8.88% (n=8) good adherence. 33.33% (n=10) from urban areas had partial, 60.00% (n=18) had good and 6.77% (n=2) had high adherence. In cancer group, 2.00% (n=2) patients from rural areas had poor, 10.00% (n=10) low, 8.00% (n=8) partial, 50.00% (n=50) good and 30.00% (n=30) high adherence. Among patients from urban areas 16.00% (n=8) had partial, 40.00% (n=20) good and 44.00% (n=22) high adherence. In chronic disease group, patients with treatment duration of less than one year, 25.00% (n=5) had poor, and 75.00% (n=15) low adherence. In subgroup 1-4 years treatment duration, 26.66% (n=16) had poor, 66.66% (n=40) low, 3.33% (n=2) partial and 3.33% (n=2) good adherence. In subgroup of treatment duration of more than 4 years, 25.00% (n=10) had partial, 70.00% (n=28) good and 5.00% (n=2) high adherence. In cancer group, those with less than one year treatment, 3.12% (n=1) had poor, 3.12% (n=1) low, 12.50% (n=4) partial, 50.00% (n=16) good and 32.25% (n=10) high adherence. In 1-4-year, treatment subgroup, 4.08% (n=4) had poor, 8.16% (n=8) had low, 10.20% (n=10) partial, 40.81% (n=40) good and 36.73% (n=36) high adherence. In more than 4 years treatment sub-group, 20.00% (n=4) had partial, 50.00% (n=10) good, and 30.00% (n=6) high adherence. In chronic disease group, those taking one drug, 20.83% (n=10) had poor, and 79.16% (n=38) low adherence. Those taking 2-4 drugs, 12.50% (n=8) had poor, 31.25% (n=20) low, 15.62% (n=10) partial, and 40.62% (n=26) good adherence. In those patients taking more than 4 drugs, 37.5% (n=3) had partial, 37.5% (n=3) had good and 25.00% (n=2) had high adherence. In cancer group, those taking one drug, 5.00% (n=1) had poor, 5.00% (n=1) low, 20.00% (n=4) partial, 30.00% (n=6) good, and 40.00% (n=8) high adherence. Those taking 2-4 drugs, 1.96% (n=2) had poor, 3.92% (n=6) low, 17.64% (n=18) partial, 39.21% (n=40) good and 35.29% (n=36) high

adherence. Those taking more than 4 drugs, 7.14% (n=2) had poor, 7.14% (n=2) low, 2.14% (n=6) partial, 35.71% (n=10) good and 28.57% (n=8) high adherence. In chronic disease group, those taking the drugs once a day, 19.23% (n=10) had poor, 61.53% (n=32) low, 9.61% (n=5) partial, and 9.61% (n=5) good adherence. Those taking twice a day 16.66% (n=6) poor, 27.77% (n=10) low, 25.00% (n=9) partial, 25.00% (n=9) good, and 5.55% (n=2) high adherence. Those taking the drugs thrice a day or more, 12.5% (n=4) had poor, 43.75% (n=14) low, 21.87% (n=7) partial, and 21.87% (n=7) good adherence. In cancer group, those taking the drugs once a day, 2.00% (n=1) had poor, 2.00% (n=1) low, 20.00% (n=10) partial, 48.00% (n=24) good and 28.00% (n=14) high adherence. Those taking the drugs twice a day, 5.76% (n=3) had poor, 5.76% (n=3) low, 19.23% (n=10) partial, 30.76% (n=16) good and 38.46% (n=20) high adherence. Those taking the drugs thrice or more, 6.25% (n=3) had poor, 6.25% (n=3) low, 16.66% (n=8) partial, 20.83% (n=16) good and 37.50% (n=18) high adherence (Table 3).

Table 4: Pearson correlations.

Variable pair	Pearson (r)	Interpretation	Significance
Gender and adherence	0.391	Moderate	0.000
Age & adherence	0.627	Strong	0.000
Literacy and adherence	0.939	Very strong	0.000
Location and adherence	0.351	Moderate	0.000
Duration of treatment and adherence	0.095	Negligible	0.247
No. of drugs and adherence	0.088	Negligible	0.283
Frequency of administration and adherence	0.026	Negligible	0.752

A moderate Pearson correlation was found between adherence and gender ($r=0.391$) and adherence and area of residence of the patient ($r=0.351$). A strong correlation was found between adherence and age ($r=0.627$). A very strong correlation was found between adherence and literacy ($r=0.939$). A negligible correlation was found between adherence and duration of therapy, number of drugs, and frequency of drug administration ($r=0.095, 0.088, 0.026$) (Table 4).

DISCUSSION

Patient adherence in chronic illnesses is low. In malignancies, although oral anticancer therapies offer many advantages, yet non-adherence may be a barrier to their effective use.¹⁰ In cancer patients despite higher motivation towards medication adherence, adherence ranges from 16% to 100%.¹¹

In the present study we found that as compared to chronic diseases, patients suffering from cancers were much more adherent to medications. 74.66% of cancer patients had good or high adherence as compared to 21.66% patients suffering from chronic diseases.

We also found that females had slightly less medication adherence as compared to males. Bradi et al and Marie et al also found females less adherent.^{12,13}

We found better medication adherence in young patients. But Alina et al found very young and very old less adherent.¹⁴ Katrine et al while reviewing age-related medication adherence found a statistically significant relationship between age and medication adherence: six studies demonstrated that increased age is correlated with higher medication adherence.¹⁵ We found literate people more adherent than illiterate. Sharon et al also found higher adherence in patients living in areas with higher education rates.¹⁶

We found poor adherence in patients from rural areas. The reason can be that the rural areas are medically underserved as compared to urban areas. The literacy rate is also lower in rural areas. Michelle YM et al also report similar findings in a study on medication adherence in rural low-income adults.¹⁷ Cody et al found that overall adherence rates between urban and rural adults were not significantly different.¹⁸ We found that the prescription of a smaller number of drugs or lesser frequency of drug administration did not result in better adherence. Richard W Grant also found very high medication adherence rates in type 2 diabetes regardless of number of medicines prescribed.¹⁹

Though reducing the number of inappropriate medications is important, yet it should not be presumed that simply decreasing the number of medications will automatically improve adherence.²⁰

The validity of our findings relies primarily on the accuracy of responses. The authors tried to minimize recall bias by using a well-structured pre-validated questionnaire. Another limitation of this study is the limited sample size.

The design of the study does not ensure that the study population is representative of all patients. We also did not analyze the data on the type of cancer, type of chronic illness, type of medication, and duration of illness. Therefore, the present study is a pilot study, illustrating only a portion of reality and providing a starting point for further, more extensive studies.

CONCLUSION

We found high medication adherence in cancer patients as compared to those having chronic ailments. Statistically, a significant correlation was found between gender, age, literacy, and area of residence of the participant patients. Male, literate, young patients, and those from urban areas had higher adherence as compared to opposite groups. But adherence was not complete in any subset of the study population. Adherence is a multifactorial phenomenon and there are numerous challenges in understanding the reasons for non-adherence. To derive the maximum benefit of prescribed therapy, various interventions to improve adherence have to be designed. Typically, adherence rates of 80% or more are needed for optimal therapeutic efficacy.

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