

ISSN: 0976-3031

*International Journal of Recent Scientific  
Research*

Impact factor: 5.114

**A STUDY ON MEDICATION ADHERENCE IN PATIENTS WITH  
DIABETES MELLITUS ALONG WITH HYPERTENSION**



**Kolla Navya Likitha., Venkateswarlu Konuru., Vemula Preeti.,  
Kolagani Sindhu and Suresh Bandari**

**Volume: 6**

**Issue: 9**

**THE PUBLICATION OF  
INTERNATIONAL JOURNAL OF RECENT SCIENTIFIC RESEARCH  
(IJRSR)**

**<http://www.recentscientific.com>  
E-mail: [recentscientific@gmail.com](mailto:recentscientific@gmail.com)**



ISSN: 0976-3031

Available Online at <http://www.recentscientific.com>

*International Journal of Recent Scientific Research*  
Vol. 6, Issue, 9, pp.6026-6030, September, 2015

**International Journal  
of Recent Scientific  
Research**

## RESEARCH ARTICLE

# A STUDY ON MEDICATION ADHERENCE IN PATIENTS WITH DIABETES MELLITUS ALONG WITH HYPERTENSION

Kolla Navya Likitha<sup>1</sup>., Venkateswarlu Konuru<sup>2\*</sup>., Vemula Preeti<sup>1</sup>., Kolagani Sindhu<sup>1</sup> and <sup>3</sup>Suresh Bandari

<sup>1,2</sup>Department of Pharmacy Practice & PharmD

<sup>3</sup>Department of Pharmaceutics, St. Peter's Institute of Pharmaceutical Sciences, Kakatiya University, Warangal, Telangana, India

### ARTICLE INFO

#### Article History:

Received 15<sup>th</sup> June, 2015  
Received in revised form 21<sup>st</sup> July, 2015  
Accepted 06<sup>th</sup> August, 2015  
Published online  
21<sup>st</sup> September, 2015

#### Key words:

Diabetes mellitus, Hypertension, Medication adherence, Morisky 8 item Medication Adherence Scale, Fasting blood sugar, Post prandial blood sugar.

### ABSTRACT

The main objective of the study was to determine whether relationship exists between medication adherence and control of disease, to also evaluate probable reasons, risk factors for development of non adherence and to determine complications developed in patients with non adherence. A Cross-sectional study was carried out at multiple centers, Warangal. Patients visiting these clinics were enquired about the questions in Morisky 8 Item scale. Based on the score patients are divided into two groups with adherence and non adherence. In patients with non adherence reasons for non adherence were assessed. We determined the level of significance statistically using unpaired T test and also relative risks were calculated among risk factors and non adherence.

**Results and conclusion:** In our study, around 1200 patients were reviewed and 449 patients were enrolled. Majority of non adherent patients fall under the age group of 25-50. Results showed that mean Fasting Blood Sugar (FBS) and Post Lunch Blood Sugar (PLBS) levels were significantly higher in patients with non adherence. Poor adherence rate was found to negatively affect FBS, PLBS and Blood pressure control. Improving adherence holds a great potential to contribute to better health outcome and more effective chronic care management.

**Copyright © Kolla Navya Likitha et al. 2015**, This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

### INTRODUCTION

As we know strict medication adherence is needed in the management of chronic diseases like Diabetes Mellitus (DM) and Hypertension (HTN). Medication adherence plays a significant role in impressive management of chronic diseases like diabetes and hypertension. Medication adherence is defined as the extent to which a person's behavior - taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider. Compliance is the most common problem for effective management of these disorders. Poor adherence to medication, leads to substantial increase in number of symptoms and complications. The main objective of our study is to identify the divergence between adherent and non adherent population, to compare the impact of adherence in clinical outcome and to identify the reasons and risk factors for development of non adherence and complications developed in those patients (Balakrishnan R et al, 2003).

According to WHO (1999), the term "Diabetes mellitus" describes a metabolic disorder of multiple etiology characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both (World Health Organization, 2014). Symptoms of diabetes include fatigue, weight loss, polyuria, polydipsia, polyphagia, blurred vision, infections, poor wound healing, lack of interest and concentration. Uncontrolled diabetes can lead to acute complications diabetic ketoacidosis, Hyperosmolar Hyperglycemic state. Uncontrolled diabetes mellitus results in chronic microvascular complications such as diabetic retinopathy, diabetic cataracts, macular edema, glaucoma, diabetic neuropathy and diabetic nephropathy and macrovascular complications Coronary artery disease, Peripheral artery disease, Cerebro vascular disease and various other complications like gastro paresis, diarrhea, uropathy / sexual dysfunction and various infections (B.M Frier et al,

\*Corresponding author: Venkateswarlu Konuru  
Department of Pharmacy Practice & PharmD

2010). Hypertension is an extremely common comorbid condition in diabetes, affecting approximately 20–60% of patients with diabetes, depending on obesity, ethnicity, and age (Diabetes Care staff, 2002).

Hypertension has been identified as a major risk factor for the development of diabetes, these patients are at a 2-3 times higher risk of developing diabetes (Grossman E et al, 2008). Hypertension is defined by persistent elevation of arterial blood pressure ( 140/90 mmHg). Symptoms of high blood pressure are usually uncommon except with hypertensive crisis which includes head ache, nose bleeding, blood spots in eyes and facial flushing. Hypertension is an important risk factor for both macro vascular and micro vascular complications in patients with diabetes. The new recommended goal should be 130-135 mmHg systolic blood pressure for most patients with type 2 diabetes. Hypertension is a risk factor for all clinical manifestations of atherosclerosis. It is an independent predisposing factor for heart failure, coronary artery disease, stroke, renal disease, and peripheral arterial disease (Fauci AS et al, 2008).

This is the first ever study assessing the reasons and the risk factors of non adherence in South Indian (Telangana) population. Through this paper, we want to explain the importance of being adherent to medication. As strict adherence may help in decreasing the complications and number of symptoms experienced by the patients.

**METHODOLOGY**

The main objective of the study is to examine the medication adherence among patients with diabetes mellitus and hypertension through Morisky medication adherence scale and to determine whether relationship exists between medication adherence and control of disease, to also evaluate probable reasons, risk factors for development of non adherence and to determine complications developed in patients with non adherence. A cross-sectional study was performed at multiple centers in Telangana region for a period of 1 year. Patients with type 2 diabetes mellitus (2-6yrs of onset) along with hypertension of both sex and age group of 25-60 years are included in the study. Patients with type1 diabetes mellitus (E10), patients newly detected with diabetes i.e less than 2 years, pregnant patients and patients who are not willing to participate were excluded from the study.

All the patients visiting these multiple centers were reviewed on daily basis, those who meet our study criteria were enrolled into the study and were asked to fill the data collection forms if they are educated. If patient is unable to fill the form, he/she interviewed based on the previously developed Morisky 8 item scale (MMAS-8) (Morisky DE et al, 2008). Demographics are collected from the patient records which include age, sex, height, weight, occupation and address of patients. Information regarding the social history like smoking and alcohol consumption, family income, family history of diabetes mellitus or hypertension and information regarding their regular physical activity are obtained from direct patient’s interview. Symptoms of diabetes mellitus and hypertension experienced by the patient in the past week of data entry and

complications of diabetes mellitus or hypertension if developed are noted. Relevant lab data (FBS, PLBS, blood pressure) were noted from the case sheet of the patient. Morisky 8 Item Medication Adherence Scale was used to assess the degree of adherence, either by giving questionnaires to patients or interviewing them if they are uneducated. Based on the score of this scale, degree of the adherence is determined and patients are divided into 2 groups, 1) Adherence, which includes patients with high adherence to medication and 2) Non adherence which includes patients with medium and low adherence to their medication. In patients with nonadherence, reasons for non adherence aforementioned by patient are noted. Later, various risk factors for development of non adherence were determined.

The Unpaired t test was performed to determine the degree of significance of FBS, PLBS and BP in adherence and non adherence groups at 95% confidence interval using SAS 9.1 version. The relative risk was estimated to determine the association between probable risk factors and the growth of non adherence without the insight of patient.

**RESULTS**

During our study period, 1200 patients were reviewed. Among them, 449 (37.4%) patients were enrolled into the subject area as per our study criteria, of which 224 (49.9%) were males and 225 (50.1%) were females. In our study, 156 (34.74%) patients were found to be adherent and 293(65.25%) were non adherent.

*Comparison of clinical outcomes in adherence and non adherence groups*

**Table 1** Comparison of clinical outcomes in adherence and nonadherence groups:

Monitoring parameter/ Adherence	Adherence 156 (34.74%)	Non adherence 293 (65.25%)	P value
<b>Blood Glucose Levels</b>			
FBS	148.58±53.59	172.7±63.6	0.0001
PLBS	219.42±70.04	252.91±75.76	0.0001
<b>Blood Pressure</b>			
Systolic BP	128.46±16.54	133.04±18.38	0.0053
Diastolic BP	77.76±9.67	80.78±10.7	0.0028

Fasting blood sugar, Post lunch blood sugar levels and blood pressure levels were noted in each patient and mean FBS in patients with adherence is 148.58±53.59 mg/dl, whereas in non adherence group it is 172.7±63.6 mg/dl, mean PLBS in patients with adherence is 219.42±70.04 mg/dl, in non adherent group being 252.9±75.76 mg/dl. This symbolizes that, at 95% confidence interval (CI) mean FBS and PLBS levels were significantly higher in patients with non adherence (P value is 0.0001)

Average systolic blood pressure in patients with adherence is 128.46±16.54 mmHg and in non adherent patients is 133.04±18.38 mmHg. Average diastolic BP is 77.76±9.67 mmHg in adherent and 80.78±10.7 mmHg in non adherent population. This brings out that, at 95% CI average systolic and diastolic blood pressure were also considerably higher (P

values are 0.0053 and 0.0028 respectively) in patients with non adherence. The details are presented in Table 1.

**Comparison of symptoms**

We also cross examined the patients if they had accomplished any symptoms of diabetes and hypertension which was not previously admitted in any study such as frequent thirst, frequent urination at night, intense hunger, tiredness, excessive sweating, weight loss, infections or poor healing of wounds. We also scrutinized the patients for symptoms of high blood pressure, such as morning headache, anxiety, confusion and facial flushing in the past 7±3 days. 17 (70.83%) patients in adherent group did not experience any symptoms; whereas only 7 (29.16%) in non adherent group did not have any symptoms. 33 (34.37%) patients experienced two symptoms in adherence group, 63( 65.62%) patients in non adherence group. Three symptoms were experienced in 35 (33.9%) adherent and 68 (66.01%) non adherent patients, four symptoms were experienced in 23(24.2%) adherent and 72(75.78%) non adherent patients. According to the data, majority of patients experienced two to four symptoms in the past one week of patient enrollment. Presence of symptoms in diabetes or hypertension or both were more common in patients with nonadherence when compared with patients with adherence. Comparison of clinical symptoms of diabetes mellitus and hypertension in adherence and non adherence groups is presented graphically in figure1.

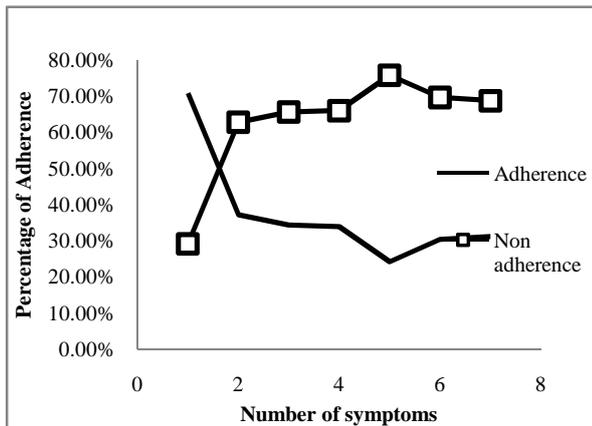


Figure1 Comparison of number of symptoms of Diabetes Mellitus (E11) and Hypertension (I15.2) in adherence and nonadherence groups

**Complications of Type II Diabetes**

In 449 patients, 262 (58.35%) patients developed complications among them 207 (79%) were non-adherent, 55 (20.99%) were adherent to the medication and no complications were refined in 187 (41.64%) patients. Granting to the information available, comorbidities are increased as the level of adherence decreases. The presence of micro vascular and macro vascular complications is common in patients with non-adherence. Prevalence of neuropathy is 14 times more in patients with non adherence 86 (93.47%) compared to that of patients with adherence 6(6.52%). Prevalence of cardiac complications is 4 times more in non-adherent 13 (81.25%) patients than adherent 3 (18.75%), prevalence of nephropathy is 3.5 times more in non adherent 14 (77.8%) when compared with adherent) 4 (22.2%) , prevalence of diabetic foot is 3 times higher in non-adherence patients 7(77.8%) when correlated with adherence

patients 2 (22.2%). Prevalence of retinopathy is 2 time aggravated in patients with non-adherence 57 (69.51%) than in adherent patients 25 (30.48%), prevalence of infections and stroke are 2 times more in patients with non adherence compared with that of patients with adherence. Distribution of complications of diabetes mellitus and hypertension in adherence and non adherence groups is represented in Table 2.

Type of complication	Total	Adherence	Non adherence	Ratio
No complication	233(49.66%)	107 (45.92%)	126 (54.07%)	1:1.18
Neuropathy	92 (20.48%)	6 (6.52%)	86 (93.47%)	1:14.3
Retinopathy	82 (18.26%)	25 (30.48%)	57 (69.51%)	1:2.28
Cardiac complications	16 (3.56%)	3 (18.75%)	13 (81.25%)	1:4.3
Nephropathy	18 (4%)	4 (22.22%)	14 (77.77%)	1:3.5
Ketoacidosis	5 (1.1%)	0 (0%)	5 (100%)	0:100
Diabetic foot	9 (2%)	2 (22.2%)	7 (77.77%)	1:3.5
Infections	32 (7.12%)	11 (34.37%)	21 (65.62%)	1:1.9
Stroke	13 (2.89%)	4 (30.76%)	9 (69.23%)	1:2.25

**Reasons for non adherence**

Among 449 patients, 293 (65.3%) patients were found to be non adherent and reasons for non adherence were resolute. The table below shows the allotments of various reasons for non adherence aforementioned by the patients are listed in table 3.

Table 2 Reasons for non adherence

Reason for non adherence	Number of patients
Did not feel better with diabetic treatment	14(2.2%)
Felt better with diabetic / Hypertension (I15.2) treatment	13(2.05%)
Not given counsel or information about treatment	77(12.18%)
Given counsel but not followed	29(4.58%)
Due to side effects (weight gain hypoglycemia, kidney diseases, heart failure, metallic taste, edema)	6(0.9%)
Busy and forgot to take medicine	174(27.53%)
Due to inconvenience of taking insulin outside or storage problem	105(16.61%)
Clinic was far and couldn't afford transport to clinic and treatment	56(8.86%)
Family problems or obligations	62(9.81%)
Missed treatment due to alcohol / smoking/employment	68(10.75%)
Others	28(4.43%)

**Risk factors for development of non adherence**

We additionally resolved various risk factors for development of non adherence without the insight of patients. We divided them into two groups based on sex, median age 45, BMI (Normal-18.5 – 24.99 and overweight 25.00), education, income, social history (smoking and alcohol consumption), family history, physical activity and insulin use which are displayed in table 4.

Relative risk (RR) was calculated between gender and adherence, males are at 1.09 the times risk of developing nonadherence. At 95% confidence interval, the relative risk of non adherence in males compared to females is between 0.95 and 1.245. The null value is 1. Since the 95% confidence interval (CI) does include the null value (RR=1), the finding is statistically nonsignificant. Our study results showed that patients with age group 25-50 are at 1.41 times higher risk of developing non adherence. At 95% confidence interval it was found to be significant (RR is 1.22 – 1.64). In our study, majority of the patients were found to be overweight. However the relative risk value between overweight and nonadherence

was 1.03 which is marginally above 1 and at 95% CI it was nonsignificant. (0.87-1.20). In our study, uneducated patients are at 1.25 times risk of developing non adherence. At 95% confidence interval RR values were 1.22 – 1.64 which is significant.

Our study revealed that, patients with income less than 5 lakhs are at a 1.68 times risk of developing of non adherence and at 95% CI it was significant. (1.26-2.23). We also included social history in our study and we came out with results that alcohol is a risk factor (RR is 1.3 and at 95% CI it is between 1.14 -1.49) and smoking is not a risk factor for development of nonadherence (RR is 1.12 and at 95% CI it is between 0.9 - 1.38). Our study results showed that patients with no family history of diabetes are 1.06 times risk of developing non adherence. At 95% confidence interval it was not significant (RR is 0.91- 1.24). Patients with no physical activity are at 1.086 times the risk of developing non adherence, which is not significant at 95% CI (0.95 – 1.25).

Relative risk (RR) was calculated between insulin users and nonadherence, insulin users are at 1.4 times the risk of developing nonadherence. At 95% confidence interval, the relative risk of non adherence in insulin users compared to insulin non users is between 1.19 and 1.66, which is statistically significant.

with non adherence, followed by cardiac complications, nephropathy, diabetic foot, retinopathy, other infections and stroke.

In previous studies, age (Paes, *AHP et al, 1997*), financial difficulties (Delamater AM, 2013), illiteracy, polypharmacy, filling of prescriptions, social support (E. Sabate, 2003), lack of rapport between patient and physician (Ciechanowski PS *et al, 2001*), lack of family support (E. Sabate, 2003) were the risk factors.

Along with the above reasons, the present study is extended and established the modifiable risk factors for non adherence aforementioned by patient like lack of patient compliance due to difficulty in diabetes mellitus administration of insulin at workplace and insulin storage, the patient’s quality of life (busy schedule and forgetfulness, alcohol consumption or smoking, family problems and obligations, low economic status), lack of awareness regarding disease and lack of proper patient counseling.

The present results showed that there is no significant difference between males and females in developing nonadherence who are equal in percent of the total study population, which is different to the reports of (Prabhushankar. S *et al 2010*).

**Table 3** Risk factors for development of non adherence

Risk Factor/ Adherence	Non Adherence	Adherence	Relative Risk at 95% CI	Comments	
<b>Sex</b>	Males (225)	153(34.076%)	72(16.03%)	<b>1.09</b>	Not significant
	Females (224)	140(31.81%)	84(18.70%)	<b>0.95 - 1.245</b>	
<b>Age</b>	25-50 (219)	162(36.08%)	57(12.69%)	<b>1.41</b>	Significant
	51-94 (230)	120(26.72%)	110(24.49%)	<b>1.22 - 1.64</b>	
<b>BMI</b>	Over weight (201)	127(28.28%)	74(16.48%)	<b>1.02</b>	Not significant
	Normal weight (149)	92(20.49%)	57(12.69%)	<b>0.87 - 1.20</b>	
<b>Education</b>	Uneducated (179)	142(31.62%)	37(8.24%)	<b>1.25</b>	Significant
	Educated (270)	171(38.08%)	99(22.04%)	<b>1.11 - 1.4</b>	
<b>Income</b>	Less than 5 lakh (385)	283(63.02%)	102(22.71%)	<b>1.68</b>	Significant
	More than 5 lakh (64)	28(6.23%)	36(8.01%)	<b>1.26 - 2.23</b>	
<b>Social History</b>	Alcoholic (148)	110 (24.49%)	38 (8.46%)	<b>1.3</b>	Significant
	Non alcoholic (301)	172 (38.30%)	129 (28.73%)	<b>1.14 - 1.49</b>	
	Smoker (36)	26(5.79%)	10(2.22%)	<b>1.12</b>	
<b>Family history</b>	Non smoker (413)	267(59.46%)	146(32.51%)	<b>0.9 - 1.38</b>	Not significant
	Yes (141)	94 (20.93%)	47(10.46%)	<b>1.06</b>	
<b>Physical activity</b>	No (249)	156 (34.74%)	93 (20.71%)	<b>0.91 - 1.24</b>	Not significant
	No (242)	164 (36.52%)	78 (17.37%)	<b>1.086</b>	
<b>Insulin</b>	Yes (207)	129 (28.73%)	78 (17.37%)	<b>0.95 - 1.25</b>	Not significant
	Insulin users (174)	114(25.38%)	60(13.36%)	<b>1.4</b>	
	Non insulin users (275)	128(28.50%)	147(32.73%)	<b>1.19 - 1.66</b>	Significant

**DISCUSSION**

As diabetes and hypertension are chronic disorders, patients have to take their medications throughout their lifetime. Thus, Medication adherence is crucial factor for impressive diabetic and hypertensive management. Compliance or adherence is the most common problem for diabetic management. Like previous studies our study also confirms that adherence to diabetic and hypertensive management results in good glycemic and blood pressure control respectively which further reduces the development of complications.

The present study concludes that the risk of complications is inversely proportional to the degree of adherence. Risk of microvascular complication, neuropathy is higher in patients

This difference might be due to less sample size and more number of male patients in their study population or most of the enrolled female patients were housewives. So, they could adhere to the instructions of healthcare provider.

Our study revealed that patients with age group 25-50 are at higher risk of developing non adherence. However, in previous reports by Curkendall, the older patients are at higher risk of developing non adherence (Curkendall SM *et al, 2013*). This is because, majority of patients in this age group was indulged in their regular professional activity, consequently making them busy which results in poor medication adherence. In our study, higher BMI was not a risk factor for developing non adherence and lower levels of education have been associated with the development of nonadherence.

Our study revealed that, patients with income less than 5 lakhs are at a risk of developing of non adherence, resembling to a study conducted by Alan M. Delamater (Delamater AM, 2013)).

Identical to a study conducted by (Jing jin *et al*, 2008) our study also exhibited similar results that alcohol intake decreases patient compliance to therapy whereas smoking is not a risk factor for development of nonadherence. The present study results also showed that, awareness about the disease was slightly better in the patients with positive family history of diabetes mellitus or hypertension, these patients are not at a risk of developing non adherence, which is similar to the study conducted by Prabhushankar and Ramya (Prabhushankar.S *et al* 2010). The present results also showed that physical activity may not improve adherence with medications to greater extent. Non adherence was found to be higher in patients using insulin. This inconvenience in taking insulin when the patient is at the workplace and storage conditions of insulin add to this result.

## CONCLUSION

Among 449 patients enrolled into the study, males and females are equally distributed and the majority of patients were nonadherent to their medications. In the present study, patients with age group of 25- 45 years are at greater risk of developing non adherence. Non adherence was found to negatively affect blood pressure and blood glucose levels.

The presence of symptoms in diabetes or hypertension or both are more common in patients with non adherence. The risk of developing complications is inversely proportional to the degree of adherence. As per our study, risk neuropathy ranks first in patients with non adherence, followed by cardiac complications, nephropathy, diabetic foot, retinopathy, other infections and stroke.

Many factors are potentially related to the development of non adherence, which includes lack of patient compliance due to difficulty in diabetes mellitus administration of insulin at workplace and insulin storage, the patient's quality of life (busy schedule and forgetfulness, alcohol consumption or smoking, family problems and obligations, low economic status), lack of awareness regarding disease and lack of proper patient counseling. Lack of education, income less than 5 lakhs, alcohol consumption and insulin usage are the risk factors for the development of non adherence.

Overall, lack of awareness on proper use of medication may be the prime factor for development of nonadherence. Thus, providing complete drug information and patient counseling is important, where a clinical pharmacist plays a crucial role. Clinical pharmacist has to counsel the patient and provide sufficient information for better patient care and therapeutic outcome.

Healthcare personnel should consider the patient's economic situation during the planning of a treatment regimen. Prescribing medication with the non invasive route of diabetes mellitus administration and simple dosage regimens may

improve patient compliance. The present results could aid for a better interventional program for patients with nonadherence and improve their quality of life.

## References

1. Balkrishnan R, Rajagopalan R, Camacho TF, Huston AS, Murray TF, Anderson TR, 2003. Predictors of medication adherence and associated health care costs in an older population with type 2 Diabetes mellitus: a longitudinal cohort study. *Clinical Therapeutics*, (25): 2958–71.
2. Definition and Diagnosis of Diabetes mellitus and Intermediate Hyperglycemia. World Health Organisation. 2014.[http://www.who.int/Diabetes/publications/Definiti on%20and%20diagnosis%20of%20Diabetes\\_new.pdf](http://www.who.int/Diabetes/publications/Definiti on%20and%20diagnosis%20of%20Diabetes_new.pdf). Accessed July 9, 2014.
3. B.M. Frier, M. Fisher. 2010, Diabetes Mellitus: Long term complications of Diabetes. In: Colledge NR, Walker BR, Ralston SH, Davidsons Principles and Practice of Medicine, Churchill Livingstone, USA: 826-834.
4. Diabetes Care staff, 2002. Treatment of Hypertension in Adults With Diabetes. *American Health Association, Diabetes Care*. (25): 71-73.
5. Grossman E, Misseli FH, 2008. Cardiovascular Diabetology: Clinical, Metabolic and Inflammatory Facets. *Advances in Cardiology*, (45): 82-106.
6. Fauci AS, Braunwald E, Kasper DL, Longo DL, Jameson JL. 2008, Disorders of cardiovascular system: Hypertensive vascular disease, *Harrisons Principles of Internal Medicine*, Mc Graw Hill, USA: 616-621.
7. Morisky DE, Alfonso Ang, Marie KW, Ward HJ, 2008. Predictive validity of a medication adherence measure in an outpatient setting. *Journal of Clinical Hypertension*, 10(5): 348-354.
8. E. Sabate. 2003, Adherence to long term therapies, time for action. Geneva: World Health Organization. 221.
9. Ciechanowski PS, Katon WJ, Russo JE, Walker EA, 2001. The patient-provider relationship: attachment theory and adherence to treatment in Diabetes. *American Journal of Psychiatry*, (158):29–35.
10. Jing Jin, Sklar GE, Vernon MSO, Shu CL, 2008. Factors affecting therapeutic compliance: A review from the patient's perspective. *Therapeutic and Clinical Risk Management*, 4(1): 269-286.
11. Prabhu Shankar.S , Ramya N, 2010. Non-Adherence To Diabetic Treatment And Its Effect On Glycemic Control, Study At A Rural Hospital Of Tiruchirappalli, Tamilnadu, India. *The Internet Journal of Health*, (13): 1.
12. Paes AHP, Bakker A, Soe-agnie CJ, 1997. Impact of dosage frequency on patient compliance. *Diabetes Care*, 20(10): 1512–1517.
13. Curkendall SM, Thomas N, Bell KF, Juneau PL, Weiss AJ, 2013. Predictors of medication adherence in patients with type 2 Diabetes mellitus. *Current medical research and opinion*, 29(10): 1275-1286.
14. Delamater AM, 2013. Improving Patient Adherence. *Clinical Diabetes*, 24 (2): 71-77.

***International Journal of Recent Scientific  
Research***

ISSN 0976-3031



9

770576

303009