

A Community Based Study on Assessment of Medication Adherence in Patients with Chronic Diseases

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ABSTRACT

Medication adherence is defined by the World Health Organization as "the degree to which the person's behaviour corresponds with the agreed recommendations from a health care provider. According to WHO there are multiple factors leading to poor medication adherence, normally classified as socio-economic factors, therapy related factors, patient related factors, condition related factors and health system/ healthcare team related factors. The present study aimed to assess medication adherence among patients with chronic diseases. And it also reviews various barriers for non-adherence. A prospective observational study was conducted for a period of 6 months in the community of Mangaluru. A validated Morisky medication adherence questionnaire (MMAS-8) for assessing medication adherence was prepared and the survey was conducted. This study covered 207 participants who were under treatment for chronic diseases. Out of 207 patients the number of males participated were found to be 126(61%) and females were 81(39%). Study revealed that 91(43.97%) are low adherent while 68 (32.85%) are moderately adherent and 48 (23.18%) are highly adherent to their prescribed therapy. In this study, the most common reasons associated with non-adherence were found to be age, forgetfulness, co-morbidity, patient felt better and pill burden (polypharmacy). From the data, out of 207 only 91 have received counselling and 82 of them fell under medium & high category, which means counselling is progressive & it improves adherence. The effectiveness of a treatment depends on both the efficacy of a medication and patient adherence to the therapeutic regimen. Patients, healthcare providers and health care systems, all have a role to improve medication adherence.

Key words: Medication Adherence, Chronic Diseases, Morisky scale, Barriers, patient counselling, Non- Adherence

INTRODUCTION

According to World Health Organization, Medication Adherence is defined as "the degree to which the person's behavior corresponds with the agreed recommendations from a health care provider. The WHO in its 2003 report about medication adherence conveys that "increasing the effectiveness of adherence interventions may have an eminent impact in influencing the health of population than

any improvement in specific medical treatment." [1] Despite increased awareness, poor adherence to treatments for chronic diseases remains global problem. Adherence briefly signifies initiation of pharmacotherapy, implementation of the prescribed regimen and the discontinuation of pharmacotherapy.

According to WHO there are multifaceted reasons leading to medication non-adherence and normally classified as

therapy related, patient related, condition related and healthcare team related factors. So assessment of adherence is inevitable to both researchers and clinicians. [1] The primary objective of our study is to assess the medication adherence in patients with chronic diseases in community and secondary objective is to assess the prevalence of patient non adherence to medications using Morisky scale and identify the common factors contributing towards non-adherence. To measure adherence no gold-standard scales are available, other than that many self report scale are present. The most frequently used tool for assessment of chronic diseases is Morisky scale. Assessment of Adherence to medication is a mainstay of patient care and also inevitable for achieving clinical goals. There are both subjective and objective methods for measuring adherence. Here we opted a subjective assessment.

CHRONIC DISEASES AND ADHERENCE:-

Chronic diseases are long-lasting conditions in life that can usually be controlled but not cured. According to the Centers for Disease Control, chronic disease is the leading cause of death and disability in the United States, accounting for 70% of all deaths. Data from the World Health Organization reveal that chronic conditions are crucial causes of premature death worldwide, even in places where infectious disease are spanning. A positive aspect is that, by effective patient counselling rational medical management, structured monitoring to identify novel issues, chronic diseases and their repercussions can often be averted or managed effectively. [2]

Poor medication adherence or non-adherence leads to untoward consequences for the patients, provider, physician and also to the health care system. The reasons for most of adherence related issues are intentional, while remaining are unintentional due to the heedless approach of patients towards the chronic disease treatment and ignorance to the suggestions

made by physician. Compared to acute conditions, non-adherence is common in chronic conditions. In the current scenario, only a health care provider with superlative clinical knowledge can resolve out this problem from worsening furthermore. [3,4]

FACTORS INFLUENCING NON-ADHERENCE

Medication non-adherence can happen commonly in all patients undergoing treatment. The numerous barriers to the effective use of medications include poor communication between the patient and physician, inappropriate and deficient knowledge on drugs, fear about adverse effects and long-term therapy, polypharmacy, cost and access barriers. [5,6]

Several studies suggest that non-adherence varies between individuals, across time and type of diseases. Age is a variant with a huge impact on adherence. Other major reason for non-adherence which is unintentional is forgetfulness. Means to alarm the patient on particular timing for administration of drugs is mandatory. To overcome the patient fears, myths and concerns about adverse drug reaction is by imparting knowledge and educating them regarding common side effects of drugs and chronic therapies and also counseling the patient on the need for treatments are the professional obligations of a pharmacist. [7]

METHODOLOGY

Study Design: Prospective & Observational

Study Site: Population in Mangalore

Study Duration: 6 months (August 2018 – January 2019)

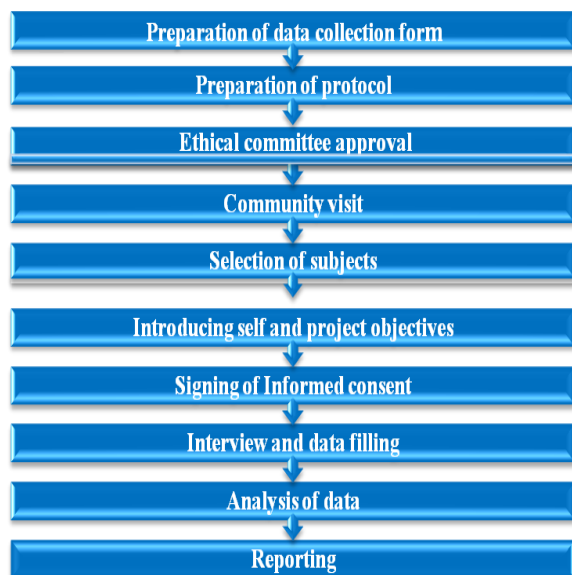
Sample size: 207

Ethical Clearance: Ethical clearance was obtained from the Institutional Ethics Committee (IEC) of Srinivas Institute of Medical Science and Research Centre (SIMC&RC), Mangaluru.

Based on study criteria an informed consent form was obtained from the patients before the interview.

Inclusion Criteria: All the patients taking medications for chronic diseases during the period of study. Patients with age greater than 18 years **Exclusion Criteria:** Patients below the age of 18 years Female patients of either pregnant or lactating category. **Source of Data Collection:** Information provided by the patients and prescription orders. **Study method:** Morisky medication adherence scale -8(MMAS-8) questionnaire was used for data collection and scoring. It is a 4 item questionnaire which highly reliable and valid. Each 'NO' answer will be scored with 0 point and a 'YES' is allocated with 1 point. Hence a score >2 is low adherence, 1-2 is moderate adherence and 0 is highly adherent.

Operational modality:



STATISTICAL ANALYSIS

Microsoft excel 2013 was used for data analysis and Statistical package for social science(SPSS 21.0) software was used for reporting of results.

RESULTS

Patient Demographic Details:

A total of 207 patients were enrolled in the study, out of which 126(61%) were male and 81(39%) were female. Patients whose age was greater than 18 were included in the study. From the collected data 4(1.93%) were between the age group

of 18-25 years, 18(8.7%) were between the age group of 26-39 years, 80 (38.6%) patients were between the age group of 40-60 years ,86(41.5%) patients were between 61-80 years of age and 19(9.2%)patients were more than 80 years of age. Out of 207, majority 86(41.5%) were in the age group of 61-80 years and 80(38.6%) were in the age group of 40-60 years. About 195(94.2%) of the patients were married and (5.8%) were single and widowed. All the patients enrolled were literate and out of which most of the patients had secondary level education i.e. 103(49.75%), 68(32.85%) had college level education and 36(17.39%) were found to have primary level education. Majority of the patients was found to be unemployed i.e. 113(54.58%) and 94(45.41%) were found to be employed respectively.

Table 1:- Demographic details of the patients

Characteristics		Number of patients % (n=207)
Gender	Male	126(61%)
	Female	81(39%)
Age	18-25	4(1.93%)
	26-39	18(8.7%)
	40-60	80 (38.6%)
	61-80	86(41.5%)
	>80	19(9.2%)
Level of education	Primary	36(17.39%)
	Secondary	103(49.75%),
	College level	68(32.85%)
Occupation	Employed	94(45.41%)
	Unemployed	113(54.58%)
Marital status	Single	6(2.89%)
	Married	195(94.2%)
	Widowed	6(2.89%)

From the data received, hypertension is one of the common diseases among the whole population. Type 2 Diabetes mellitus is the second most common disease occurring in the community followed by rest of the diseases like Hyperlipidemia, Asthma, CKD,COPD,RA etc.

Table 2:-Disease wise distribution of the population(without comorbidity)

Disease	No.of patients
Hypertension	59
T2DM	39
Hyperlipidaemia	5
Asthma	1

Count of patients with co-morbidities:

Table 3 shows various co-morbid conditions observed among the total population 103(49.75%) patients are living with more than one or two disease conditions. The most commonly observed conditions are HTN and T2DM. From both the tables, it was clear that a total of 153(73.91%) were suffering from hypertension, 127(61.35%) were diagnosed to have T2DM, 34(16.42%) were suffering from Hyperlipidemia, 5(2.41%) of them were having Asthma, 4(1.93%) were diagnosed with CKD, 3(1.44%) were suffering from COPD and 2(0.96%) of them were suffering from RA.

Table 3:- Distribution of comorbidities among the population.

Co-morbid conditions	No. of patients
HTN, T2DM	62
HTN,T2DM,Hyperlipidaemia	15
HTN,Hyperlipidaemia	8
T2DM,Hyperlipidaemia	6
HTN,Asthma	3
HTN,COPD,CKD,T2DM	1
CKD,HTN,T2DM	1
COPD,HTN	1
RA,HTN	1
RA,CKD	1
T2DM,RA	1
T2DM ,Asthma	1
CKD,HTN	1
T2DM,COPD,HTN	1

HTN: Hypertension, T2DM: Type2Diabetis mellitus, CKD:Chronic kidney disease, COPD:Chronic obstructive pulmonary disease, RA:Rheumatoid arthritis

Morisky Medication Adherence Scale -8 Score Analysis (MMAS-8):

Based on the 8 item questionnaire used for the interview, scores were distributed according to the points received for each question. Based on the scores the people were categorized into Low adherence (>2-) LA, Medium adherence (1-2)MA and High adherence(0)HA.

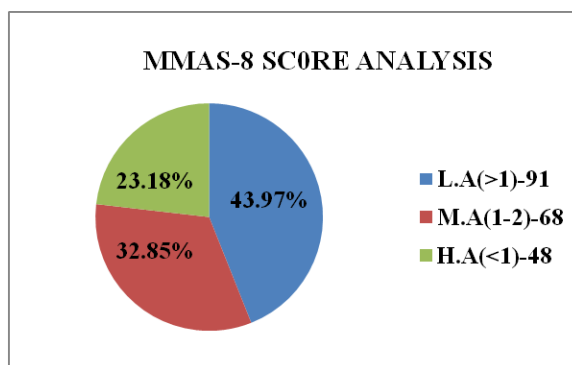


Figure 1: Distribution of MMAS-8 score.

Comparison of age group and Score:

Non- adherence is seen commonly in the age group between 61-80(34.29%) and high adherence is rarely a common factor in all age groups. Low adherence and medium adherence is most prevalent.

Table 4:- Distribution of age group and score.

Age	SCORE					
	>2(Low adherence)		1-2(Medium adherence)		0(High adherence)	
	Count	%	Count	%	Count	%
18-25	1	1.1%	1	1.5%	2	4.2%
26-39	9	9.9%	7	10.3%	2	4.2%
40-60	36	39.6%	20	29.4%	24	50.0%
61-80	36	39.6%	35	51.5%	15	31.2%
>80	9	9.9%	5	7.4%	5	10.4%
Total	91	100.0%	68	100.0%	48	100.0%

Various reasons for Non-adherence:

Age:

It has been found that age was a contributing factor towards non-adherence, i.e. mostly geriatric population has the highest number of low adherence. Data reveals that 45(21.73%) are low adherent and 40(19.32%) are moderately adherent in geriatric population.

Forgetfulness:

The data obtained from the study showed that 78(37.68%) of the study participants were non- adherent due to forgetfulness.

Co-morbidity:

71(34.78%) of the study population had co-morbidity as a reason for non- adherence.

Pill burden:

63(30.43%) were non-adherent due to the reason of pill burden.

High cost of treatment:

55(26.57%) were non-adherent due to high cost of the treatment.

81(39.13%) were non-adherent because they felt better.

Felt better:

Table 5: Reasons for non-Adherence

	SCORE					
	>2(Low adherence)		1-2(Medium adherence)		0(High adherence)	
	Count	%	Count	%	Count	%
Age	36	39.6%	35	51.5%	15	31.2%
Forgetfulness	54	59.3%	24	35.3%	0	0.0%
Co-morbidity	44	48.4%	27	39.7%	1	2.1%
Pillburden	58	63.7%	5	7.4%	0	0.0%
High cost of treatment	50	54.9%	5	7.4%	1	2.1%
Felt better	41	45%	40	58.82%	0	0.0%

Out of 207 participants, only 91 had received counseling (43.96%). Out of which 46(50.54%) were highly adherent and 36(39.56%) comes under moderately adherent. From the data, 82(90.1%) who did not receive counseling comes under the low adherent group, This means that lack of counselling regarding the therapy was a reason for low adherence in those group. Other group which received counselling had moderate adherence 36(39.56%) and high adherence 46(50.54%).

Table 6: Relation between patients who received counseling and Score

Received counseling	SCORE					
	>2(Low adherence)		1-2(Medium adherence)		0(High adherence)	
	Count	%	Count	%	Count	%
Yes	9	9.9%	36	52.9%	46	95.8%
No	82	90.1%	32	47.1%	2	4.2%
Total	91	100.0%	68	100.0%	48	100.0%

Patient’s knowledge about adherence:

Out of the total participants, only 63(30.43%) of the population had information regarding the importance of adherence. Rest 144(69.56%) did not had information regarding the importance of adherence. And out of them 78(37.68%) fell under low adherence.

Problems reported by patients consuming Telmisartan and metformin:

A total of 153 patients were diagnosed to have hypertension and out of that, 92(44.44%) patients were taking telmisartan. Dizziness 31(38.04%), Pain/numbness 40(47.82%) and Headache 42(53.26%) were found to be the major side effects associated with the patients who were taking telmisartan. Most of the patients who were having problems while taking medication had low adherence, which meant that problems due to drug was also affecting the adherence. A total of 127 patients were found to be suffering from Diabetes mellitus and out of that 80(38.64%) were consuming Metformin. The most common problem

reported by patients who are consuming metformin is fatigue and weakness i.e. 73(91.25%). From that 35(43.75%) were low adherent and 24(30%) were moderately adherent, which meant that non-adherence is high in number. So the side effects of the drug were also found to be affecting the adherence of the patients.

DISCUSSION

Adherence to the suggested pharmacotherapy is a critical facet of medical treatment, particularly in case of treatment of chronic diseases. The treatment of chronic illnesses generally includes the long-term use of medications. 207 patients, who were under treatment for chronic diseases were selected, based on eligibility criteria and the medication adherence was assessed using the validated MMAS-8 item questionnaire. The study done by Yoshiko Tominaga on “Possible association of personality traits representing harm avoidance and self-directedness with medication adherence in Japanese patients

with T2DM used the same scale for measuring adherence. [8,9] According to the scale, adherence is categorized into low, medium and high based on the scores >2, 1-2, and 0 respectively. Our study also used self-reported questions for identifying the reasons for non-adherence. Our study showed that the number of low adherence is highest in number, i.e.; 91(43.97%) are low adherent to prescribed therapy while 68(32.85%) are moderately adherent and only 48(23.18%) of them are highly adherent. The study done by Renugaet al revealed a similar finding. The various factors affecting the medication adherence were also analysed. [10]

The demographic data of the patients revealed that the number of males 126 (61%) were more than that of females 81(39%). As per our study results, non-adherence is more among male patients compared to female patients. The study conducted by Neus pages-puigdemontet al., “patient’s Perspective of Medication Adherence in Chronic Conditions: A Qualitative study” also supports this data. [11]

Our study included patients with different age groups, more number of patients was found under category of 61-80 age group. Non-adherence is common among the same age group 71(34.3%) and also in the age group between 40-60% (27.05%). An article on “Study of medication compliance in geriatric patients with chronic illnesses at a tertiary care hospital” by R.Shruthi et al also supported that medication non-compliance is common in geriatric patients due to the fact that people in this category think that taking medication as a routine would aggravate the condition and may lead to disability or death. The risk of non-adherence becomes high when reasons are multifactorial and predisposing factors intersects, such as cognitive impairment and the use diverse medications for multiple chronic conditions in the elderly. [12]

The study focussed medication adherence among chronic diseases which

mainly consists of Hypertension, Diabetes mellitus, Hyperlipidemia, COPD, Asthma, RA and CKD. Data was collected across various hometown region situated in Mangaluru community. The results revealed that patients with hypertension were found in more number and which was followed by diabetes second in number. There have been variations in results obtained regarding adherence towards medication. Out of 153 patients with hypertension, 123 were non-adherent to their prescribed medication. Adherence issues are common in patients taking antihypertensive therapy and they are also associated with cardiovascular comorbidities. [13]

A total 127 were having problem of diabetes and out of which 103 were not adherent to their medications. Poor medication adherence may have consequences that contrast the benefits in patients, the provider, the physician, and the sustainability of the healthcare system. The study done by Lee-Kai Lin et al indicates that medication adherence is vital in the early stage of diabetes in order to augment the efficacy of therapy and minimising healthcare cost. [4] A long-term glycemic control is essential for preventing microvascular and macrovascular complications, which result in substantial medical resource utilization and unintended expenses.

Hyperlipidemia is another condition where medication non-adherence is observed. Certain studies support that non-adherence to hyperlipidemia medications remains as a frequent and indispensable public health issue that contributes to detrimental health outcomes. [14]

There are various reasons which contribute to medication non-adherence. From our study, we found that the most contributing reasons behind the non-adherence is forgetfulness(37.68%), comorbidity (37.78%), pill burden(30.43%), cost of treatment (26.57%), feeling better (39.13%) and age (34.29%) respectively. [15,16]

The study reveals that variables associated with non-adherence were age, medication knowledge and co-morbidities. Focusing particular age groups and health conditions for improving medication knowledge would effectively ameliorate adherence. [17] Factors that adversely affect the adherence were age, gender, marital status, level of education, forgetfulness knowledge, co-morbidity and substance abuse. [18] Our study also revealed that the reason associated with non-adherence were forgetfulness (37.68%), comorbidity (37.78%) and lack of knowledge regarding the information on adherence (30.43%). Various studies inspecting the reasons for non-adherence suggests that forgetfulness, lack of information as a reason for non-adherence. [19]

As per the study results, counseling has an impact on adherence. Patients with a poor knowledge of their disease and interpretation of medication regimen, personal repercussions of non-adherence were more likely to evade medications. Patients should be educated about the benefits of treatment and consequences of non-adherence to prescribed therapy. Counselling should be tailored in such a manner to address a patient's specific diseases and definitive treatment. [20]

Chronic disease medications included in this study were analysed, and the data showed that for Hypertension (Temisartan) and for Diabetes (Metformin) is the most commonly prescribed drug. Patients who were taking Telmisartan experienced mainly problems of dizziness, pain, numbness and headache. The patients taking Metformin had mainly problems of fatigue and weakness. [21]

Drug-related side effects have a negative correlation with the medication adherence. This is possible because the patients who experienced side effects may fear that they will recur and become reluctant to continue the culprit medication. Our study participants also had certain side effects while using the drugs such as Telmisartan and Metformin. The adherence

level were also low with the patients who experienced side effects while using those drugs. [21,22]

CONCLUSION

Medication non-adherence creates higher risk in patients with chronic disease conditions comparative to other patients. Broadening the sources to provide awareness on adherence may have a greater positive impact on patient's health and quality of life. This study provides a deeper and wider understanding of adherence in patients with chronic diseases. Various reasons behind non-adherence were identified through this study. The intended effectiveness of a treatment depends on both the efficacy of a medication and patient adherence to the therapeutic regimen which is both psychological and behavioral. Patients, healthcare providers and health care systems have corresponding role in revamping medication adherence. Understanding the various adherence tools available and perceiving how they are structurally positioned to meet an individual patient's preferences can have a commendable impact on adherence. Pill cards, medications boxes, alarms, reminders are few means to enhance the degree of adherence.

BIBLIOGRAPHY

1. Marie TB, Jennifer KB. Medication Adherence: WHO Cares. MayoClin. 2011; 86(4): 1-10.
2. Josip C and Marcel L. From Morisky to Hill-Bone; self reports scales for measuring adherence to medication. Pubmed. 2014; 38(1):55-62.
3. Willam H P and Robert R H. Poor medication adherence in type 2 diabetes: recognizing the scope of the problem and its key contributors. Dovepress Journal. 2016; 22(10):1299-1307.
4. Lin L K, Sun Y Heng B H. Medication adherence and glycemic control among newly diagnosed diabetes patients. BMJ Open Diab ResCare. 2017; 30(5): 1-8.
5. Przemyslaw K, Pawel L and Michal M. Determinants of patient adherence: a review

- of systematic review. *Frontiers in pharmacology*. 2013; 4(91): 1-16.
6. Papatya K and FatemaH. Knowledge, Attitude and Practice regarding diabetes mellitus among non-diabetic and diabetic study participants in Bangladesh.BMC public health.2017; 17(36): 1-10.
 7. Alvin B O. Evaluation of medication adherence in chronic disease at a federally qualified health centre 2017;8(9):113-120
 8. Selma B, Hulya F K. Evaluation of medication adherence in hypertensive patients and influential factors,PJMS.2018; 34(4):959-963.
 9. Yoshiko T, Tohru A , Tomohisa H et al. *Journal of Pharmaceutical Health Care and Sciences*. 2018;16(7): 1-7.
 10. Renuga E, Ramakrishnan S R, Vanitha R et al. Impact of continuous patient counselling on knowledge, attitude, and practices and medication adherence of diabetic patients attending outpatient pharmacy services, *Asian J Pharm ClinRes*.Dec 2016; 9(1): 364-369.
 11. Pages-Puigdemont N, Mangues M A,Masip M et al. Patient's perspective of medication adherence in chronic conditions; A Qualitative study .*AdvTher.*. 2016;33(10): 1740-1754.
 12. Shruthi R, Jyothi R, Pundarikaksha H P, et al. A study of medication compliance in geriatric patients with chronic illnesses at a tertiary care hospital. *Journal of clinical and diagnostic research*.2016;10(12):40-43.
 13. Vrijens B, Antoniou S, Burnier M, et al. Current Situation of Medication Adherence in Hypertension. *Frontiers in pharmacology*. 2017;4(8) : 1-8.
 14. Justin G, James E. Improving medication adherence in hypercholesterolemia: challenges and solutions, *Vascular Health and Risk Management* dovepress. 2014; 10(8):615-625.
 15. WaiY L and Paula F. Medication adherence measures. Anoverview. Hindawi Publishing Corporation Bio MedResearch International. 2015; 21(7):1-12
 16. Abegaz T .Non adherence to antihypertensive drugs, A systematic review and meta analysis. 2016; 96(4): 1-9
 17. Hayden B, B Barbara N , Jan Lisk ,Leah L Z , Caroline A, Anne C B. The importance of cholesterol medication adherence: the need for behavioral change intervention programs dovepress. 2018; 12(10):341-348.
 18. Khan M U, Shah S and Hameed T.Barriers to and determinants of medication adherence among hypertensive patients attended national health service hospital ,Sunderland, *J Pharm Bioallied Sci*.2014 ;6(2):104-108.
 19. Nur SA, Azuana R, Farida I, et al. Medication adherence in patients with type 2 diabetes mellitus treated at primary health clinics in Malaysia, Dovepress. 2013;7(6) :525-530.
 20. Jimmy B and Jose J. Patient Medication Adherence: Measures in Daily Practice, *Oman Medical Journal*. 2011;26(3) :155-159.
 21. Michael T, Jenny J, Kristi R,et al. The impact of pharmacist face-to-face counseling to improve medication adherence among patients initiating statin therapy. Dovepress. 2012; 6(10):323-329.
 22. Wasem A, Mark L, Dean E,et al. Socioeconomic Status and Nonadherence to Antihypertensive Drugs:A Systematic Review and Meta-Analysis. *Science direct*. 2014; 17(10): 288-296.
 23. Hyekyung J, Yeonhee K and Sandy J R. Factors affecting medication adherence in elderly people, Dovepress. 2016;10(6): 2117-2125.
 24. David D S, Sean D, James E A,et al. Seeing the Person, Not the Illness: Promoting Diabetes Medication Adherence Through Patient-Centered Collaboration. *American Diabetes Association*. 2017; 35(12):35-42.
 25. Spertus JA, Masoudi FA, Reid KJ et al, Impact of medication therapy discontinuation on mortality after myocardial infarction. *Arch Intern Med*. 2006; 166(8):1842-1847
 26. Manel T, Sabina G, Leah L , et al., Espacomp Medication Adherence Reporting Guideline .*Annals of Internal Medicine*. 2018; 10(1):1-5.
 27. Ana L H, Igor L, Mitja K. Criterion validity of 8-item Morisky Medication Adherence Scale in patients with asthma. *Plos one*. 2017; 12(11):1-10.
 28. Sokol M C and Pages P N. Patient's perspective of medication adherence in chronic conditions; A qualitative study based .*Pubmed*.2016;33(10):1740-1754.
 29. Akinbosoye O E, Improving medication adherence and health care outcomes in a commercial population through a

- community pharmacy. Population health management. 2016; 11(19): 454-461
30. Donald E M and Adam LC, Neil C. Validated adherence scales used in a measurement-guided medication management approach to target and tailor a medication adherence intervention. A randomized controlled trial, *BMJ open*. 2016; 6:1-9.
 31. Michael A F, Margaret R, Stedman J, et al. Primary Medication Non-Adherence: Analysis of Electronic Prescriptions. *National journal*. 2010; 25(4):284-290.
 32. Kirsi K, Marja A and Helena L. Barriers and facilitators to medication adherence: a qualitative study with general practitioners. *BMJ open*. 2017; 21(8): 1-8.
 33. Chetna AS, Nalini K, Sushant H, et al. Evaluation of Knowledge, Attitude and Medication Adherence among Asthmatics Outpatients in Tertiary Care Teaching Hospital-A Questionnaire Based Study. *Journal of Young Pharmacists*. 2016; 8(1) :39-43.
 34. Hayden B, Barbara N , Jan Lisk ,et al. The importance of cholesterol medication adherence: the need for behavioral change intervention programs *dovepress*. 2018; 12(10):341-348.
 35. Jensen M L, Jorgensen M E, Hansen E H,et al. Long-term patterns of adherence to medication therapy among patients with type 2 diabetes mellitus in Denmark: The importance of initiation. *Plos one*. 2017; 12(6): 1-15.
 36. Michael P, Chris L B and John S R. Medication adherence ,its importance in cardiovascular outcomes. *AHA journals*. 2009 ;(10):3028-3035
 37. WaiY L and Paula F. Medication adherence measures. An overview. *Hindawi Publishing Corporation BioMed Research International*. 2015; 21(7):1-12
 38. Wasem A, Mark L, Dean E,et al. Socioeconomic Status and Nonadherence to Antihypertensive Drugs: A Systematic Review and Meta-Analysis. *Science direct*. 2014; 17(10): 288-296.
 39. Geraldine L B, Florent D, Sophie B, et al. Improving Patient's Primary Medication Adherence The Value of Pharmaceutical Counseling. *Medicine*. 2015; 94(11):1-7.
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