

Medication Adherence in Patients with Coronary Artery Bypass Grafting

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Abstract

Background: Management of patients following coronary artery bypass graft (CABG) surgery include intake of different types of medications adherence is an important issue that affect patients' health outcome. **Aim:** To assess level of medication adherence in coronary artery bypass graft (CABG) patients. A descriptive study design was used. **Setting:** This study was carried out at the cardiac follow-up clinic in Suez Canal University Hospitals and Nasser institute hospital for research and treatment services. **Sample:** The study was implemented on 85 patients post CABG surgery. **Tools:** two tools were used: **tool I:** interview questionnaire to assess demographic data, clinical history, **tool II:** Eight-item Morisky Medication Adherence Scale to assess patient's adherence level of medications. **Results:** the study showed that the total adherence mean scores among the studied patient was high in using Antihypertensive drugs (6.56 ± 1.07), followed by anticoagulants drugs (6.51 ± 1.21), then antihyperlipidemic drugs (6.50 ± 1.20). **Conclusion:** the total adherence mean scores among the studied patient was high in using Antihypertensive drugs, followed by anticoagulants drugs, then antihyperlipidemic drug. **Recommendations:** implementing study to evaluate effect of medication adherence on quality of life in patients with CABG.

Key words: Medication adherence, Coronary Artery bypass graft.

1. Introduction:

Cardiovascular diseases are one of the leading causes of illness and death in the world. According to the World Health Organization (WHO), around 17.9 million people die annually due to cardiovascular disease worldwide, with an estimated 23 million deaths by year 2030. **(Pačarić et al., 2020).**

Coronary artery disease (CAD) is one of the major cardiovascular diseases affecting the global human population. This disease has been proven to be the major cause of death in both the developed and developing countries. CAD is an atherosclerotic disease which is inflammatory in nature, manifested by stable angina, unstable angina, myocardial infarction (MI), or sudden cardiac death. Risk factors for coronary artery disease are dyslipidemia, hypertension, and diabetes mellitus. Also Lifestyle, environmental factors, and genetic factors, habits such as diet, physical inactivity, smoking, age, and gender appear to be fundamental risk factors for cardiovascular diseases. **(Malakar et al., 2019)**

In developing countries, the prevalence of CAD is about 11.0%, while the age-adjusted prevalence is about 9.0%. In Egypt, the National Hypertension Project (NHP) reported an adjusted overall prevalence of CAD is 8.3% **(Abdou et al., 2018)**. Coronary

artery bypass grafting (CABG) is still the most commonly performed cardiac surgery procedure worldwide, representing annual volumes of approximately 200,000 isolated cases in the US and an average incidence rate of 62 per 100,000 inhabitants in western European countries **(Jan et al., 2021)**.

Many studies report poor medication adherence after CABG, with about 50% of patients failing to adhere to their prescribed drug regimens. Medication non-adherence is also a common health-care issue among other chronic disease patients, and it can lead to adverse health outcomes and excess health-care resource consumption. Non-adherent behaviors are estimated to account for 33–69% of medication-related hospitalizations and cost 100 billion dollars annually. Possible factors influencing adherence include the complexity of the treatment regimen, quality of information provided about the regimen, communication between provider and patient, patient ability to remember to take medications appropriately, concerns about adverse effects, and personal preferences and beliefs about the treatment **(Liu et al., 2018)**.

Medication adherence positively influences outcomes of quality of life, decreases functional disability, morbidity, and mortality. It is important to design

interventions that can improve medication adherence among patients undergoing CABG surgery (Lin et al., 2017).

Significance of the study:

The problem of adherence to treatment in cardiology is particularly important because of the existence of vital threat among patients as a result of their disease. Moreover, patients should take the prescribed medications lifelong to avoid relapses of the disease. Their wellbeing after surgery, the restoration of body functions, and the underestimation of the importance of maintenance therapy cause very poor adherence among patients undergoing this type of surgery.

Through working in the cardiology department, the researcher met many cases who have promising CABG operation results, but with time they got bored from taking medications. So, they started to come back again to the hospital suffering from different complications. Through different methods of communications with these patients about the problems faced them and lead to health deterioration, this study assessed medication adherence among CABG patients to predict their complications and decrease load on hospital resources.

The aim of the study:

The study aims to assess the level of medication adherence among coronary artery bypass graft (CABG) patients.

Research questions:

What is the level of medication adherence among CABG patients?

2. Subject and Methods

Study design:

A descriptive study design was used to conduct the study

The sample of the study:

The sample size was calculated to demonstrate a correlation coefficient of 0.3 or higher with 80% power and at a 95% level of confidence between the scores of medication adherence using the Open-Epi software program for sample size calculation for correlation, the required sample size was 80 participants. The total number of participants should be 85 to account for a dropout rate of about 5% (Thompson, 2012).

The total number of patients who undertook this type of surgery in Suez Canal university hospital was about 200 by the year 2019, due to the epidemic of COVID-19, the researcher had to complete the sample from Nasser Institute for Research and Treatment

as the total number of patients in Nasser institute for research and treatment is about 1200 per year.

Participants: A purposive sample of patients post CABG surgery in the study settings during the time of the study and attending follow-up visits within three months from the surgery were included in this study. The inclusion criteria involved adult patients, having CABG surgery since three months, and on medication for hypertension and dyslipidemia, conscious, and able to communicate.

Exclusion criteria for this study included Diabetic patients and those with renal impairment, liver cirrhosis, and cancer because they affect results of the study as Diabetes is a well- established risk factor for atherosclerotic coronary heart disease, and coronary heart disease has long been a leading cause of death among adult diabetics accounting for three times more than nondiabetics patients (Järvinen et al., 2019). Moreover, chronic kidney disease (CKD) is associated with an increased risk of cardiovascular disease (CVD), and have higher rates of mortality, complications, and bleeding events (Huo et al., 2021).

Study setting: The current study was carried out at the cardiac follow –up clinic in Suez

Canal university hospital in Ismailia, in addition to Nasser Institute Hospital for Research and Treatment, Egypt.

Tools of data collection:

Tool (1): A structured interview questionnaire: Which was prepared by the researcher and reviewed by a panel of five experts in Medical-Surgical and Critical Care Nursing. It consisted of two parts:

Part I: Demographic data: To assess patients' profile, it includes ten questions related to patients age, gender, educational level, job status, social status, residence, family income, number of family members.

Part II: Medical history: It was designed by the researcher taking as a reference (O'Malley, 2021). The tool covered the patient assessment history and included ten questions about details of the cardiac complications from CABG operation, duration of illness, follow- up after the operation, the number of prescribed medications, side effect of medications, smoking history, in addition to the history of concomitant diseases. The scale was translated through the process of back -to - back translation and most of the questionnaire was filled by the researcher to limit stress.

**Tool (2): Tool II: Eight-items
MORISKY Medication Adherence Scale**

This scale was developed by Morisky et al. (1986) to assess medication adherence by patients. It includes questions from one to eight and it has been translated through the process of back-to-back translation and most of it was filled by the researcher. It consists of seven items with Yes/No response, and one item on a 5-point Likert scale from never to all time.

Scoring system:

The Yes responses scored 0" and the No" scored 1" except for item 5 where scoring was reversed. Item 8 responses scored from 0 to 4. The total score of the scale ranges from 0 to 11, with scores of 7 or more indicating medium to high adherence, and equal or less than 6 indicating low adherence. High validity and reliability (**De las Cuevas and Peñate, 2015**).

Preparatory phase:

In this phase the researcher reviewed pertinent literatures of the current and past evidence related to various aspects of the problem using textbooks, scientific journals, in addition to internet periodicals and magazines. The researcher worked on the data collection tools, and once the tools were ready, they were

reviewed by experts from different branches, and then submitted to a pilot group.

Validity:

The used scales were translated through the process of back-to-back- translation, then validity was checked for all parts of the scale. The study tools were reviewed by a panel of five experts in Medical- Surgical and Critical Care Nursing to check validity.

Reliability of the Tool:

The scale high validity and reliability and the reliability of the scale was assessed by Cronbach alpha=0.807, the reliability of the used scales was evaluated by assessing their internal consistency. Tool of Arabic version of Morisky medication adherence scale was tested for reliability score using Cronbach's Alpha test was = 0.807 which indicate that the Arabic version demonstrated excellent reliability that means high reliability level according to (**De las Cuevas and Peñate, 2015**).

Pilot study

A pilot study was carried out on eight patients (10%) of the calculated sample size to

test the clarity, applicability, and feasibility of the tool, and to estimate the time needed to fill it. Necessary modifications were done according to pilot results. The pilot sample was excluded from the total sample as some modifications were done.

Field work:

The following steps were followed to collect data: Official permission obtained from the Vice Dean of Post-Graduate studies and Research manager and the head of the cardiothoracic surgery department, in addition to the head of the out- patients department. The researcher explained the aim and objectives of the study to head nurses and nursing staff in addition to patients to obtain their assistance to facilitate data collection and their oral consent to participate in the study. The researcher was available two days/ week to collect data from nine o'clock to twelve noon from the listed settings, each patient was interviewed individually for (35-45 minutes) to complete the questionnaire. The researcher introduced herself to each patient, giving a clear and brief overview of the aim of the study and its expectations Data collection started from January 2021 until September 2021.

Ethical considerations:

Before data collection, the study protocol was approved by the Research Ethics Committee at the Faculty of Nursing, Suez Canal University with approval number (2020- 9-89). The researcher met individually with each eligible patient, explaining the aim and objectives of the study and obtain their verbal consent to participate. The participants were informed about their rights to refuse or withdraw from the study at any time. Anonymity and confidentiality were secured for all participants. All information was used only for research purposes.

Statistical design:

Data collected through the questionnaire were coded, entered and analyzed using Statistical Package for the Social Sciences (SPSS version 23) (**Santoso et al., 2016**). ANOVA test was used for putting into evidence the difference between means of several groups while the T-test was used for differences between means of two groups. Correlations were used to test relationships between different variables. Linear regression was used to predict adherence and probability error of P- value was set at <0.05 for significant results, P<0.01 indicated a highly statistically significant difference between the studied patients.

3. Results

Table (1): Shows that 67.1 % of the studied patients age ranged between 50 to 60 years, 68.2 % of the studied patients were male, 62.4% of the patients were rural residents, and 71.8 % resided far from follow-up place. Also, 87.1 % of the patients were married. Moreover, 64.7 % of the studied patients lived in houses of more than 3 rooms.

Table (2): Reveals that 52.9 % of the studied patients were working among them 64.4% performing a mental work, 71.8 % had a satisfactory income, as all patients studied were covered by the health insurance.

Table (3): Among the studied sample, 67.1 % were former smokers, 81.2 % were suffering for 5 years, 90.6 % had surgery since 3 < 6 months. The mean frequency of follow up was $10.56 \pm .90$ and 43.5 % of the studied sample reported that they were suffering from side effects of medications, 81% of these side effects were mild; weakness and fatigue covered 75,7 % of these side effects with only 1.2 % reporting motor disability.

Table (4): Among the studied sample, 84.7 % reported that they adhered to their medications, and 96.5 % to the antihypertensive. Not discontinuing medication without informing their physician was reported by 92.9 % and 88.2% took their medications while travelling, and 97.6 % took

all their medications on the previous day. A high percentage of 95.3 % reported that they did not stop medications when symptoms were under control and were not annoyed about the treatment plan.

Table (5): Among the studied sample 84.7 % did not forget to take medications, and 95.3 % reported that they did miss a day for not taking the antihyperlipidemic over the past two weeks; 91.8 % didn't stop these medications without telling their doctors, 90.6% didn't forget to bring medications while travelling, 96.5 % said that they took all medications on the previous day. Also, 94.1 % didn't stop medications when symptoms were under control and 96.5 % were not annoyed of the treatment plan.

Table (6): Shows that 84.7 % of the studied patients did not forget to take medications, 95.3 % said that they took the antihyperlipidemic over the past two weeks, 91.8 % said that didn't stop medications without telling their doctors, 90.6 % didn't forget to bring medications with travelling, 97.6 % said that they took all medications the day before. Also, 94.1 % didn't stop medications when symptoms were under control and 96.5 % felt annoyed about treatment plan.

Figure (1): Illustrates that 42.4 % of the studied patients are Illiterate, 23.5 % could read and write, and also, 21.2 % had above average education with only 11.8 % with higher education and 1.2 % intermediate education.

Figure (2): Shows that 83.7%, 82.6%, and 82.6 % of the studied patients never or rarely had trouble remembering antihypertensive, anti-hyperlipidemias, and anticoagulants medications, respectively. Also, 12.8 % had trouble remembering anti-hyperlipidemia once in a while, but only 2.3% had trouble remembering three types of medications usually, and no one had trouble remembering all the prescriptions of medication all the time.

Figure (3): Illustrates that 82.4 % of the patients had medium to high level of adherence to both antihypertensives and anticoagulant drugs. Also, 82.2 % of the studied patients had medium to high level of adherence to antihyperlipidemic drugs.

Figure (4): Illustrates that 81.2 % of the patients had high level of adherence while, 18.8% of the studied patients had low level of adherence to all types of prescribed medications.

4. Discussion

The present study revealed that around two thirds of the studied patients were male, were between 50 to 60 years, were rural residents and resided far from follow-up place and lived in houses of more than three rooms. Also, the majority of the patients were married. The researcher thinks that this could be related to increase in the risk of CHD in elderly men as a result of increased levels of total cholesterol and low-density lipoprotein cholesterol (**Chia. 2018**).

In the same line (**Hajar, 2017**) who discussed Risk Factors for Coronary Artery Disease they recruited on 5,209 men and women between the ages of 30 and 62 from Framingham and Massachusetts. Found that cardiovascular disease (CVD) is a major cause of disability and premature death throughout the world. The underlying pathology of atherosclerosis develops over many years and is usually advanced by the time symptoms occur, generally in middle age. The risk of developing CAD increases with age and includes age > 55 years in men.

The current study revealed that half of the studied patients were working with two-thirds of their work needing mental effort, two-thirds of the patient's income was enough. Also, the health insurance covered treatment expenses of all the studied patients.

The present study showed that two-thirds of the studied patients were former smokers, slightly more than four-fifths of the studied patients had equal or less than 5 years duration of illness, majority of the patients had surgery < 6 months earlier. Also, fair number of the studied sample were suffering from side effects of the medication, slightly more than four-fifths of these side effects were mild; weakness and fatigue got two-thirds of these side effects with only a minority with motor disability.

The researcher thinks that the result could be related to the relation between smoking and CAD morbidity and mortality either directly or indirectly have an influence on the atherosclerotic lesion. Smoking also promotes coronary occlusion as it produces endothelial denudation and platelet adhesion to sub intimal layers, thereby increasing lipid infiltration and platelet-derived growth factors (PDGF) (Malaka. 2019).

These findings were in agreement with (Song et al., 2019) who show in his study of Global, regional, and national prevalence and risk factors for peripheral artery disease in 2015, that the majority of people with peripheral artery disease are smokers, hypertensive which are positively associated with peripheral artery disease.

According to the prevalence of risk factor of coronary artery disease risk factors in Iran (Hatmi. 2007) involving 3000 healthy adults at 18 years of age or above who were recruited with cluster random sampling. It was found that one-fifth of patients were smokers, and less than one-fifth had a positive familial heart disease, slightly less than two-thirds had a total cholesterol level above > 200 mg.

The results revealed that, the majority of the studied patients never or rarely had trouble remembering antihypertensive, antihyperlipidememia, and anticoagulants medications. Total adherences mean scores among the studied patients was poor regarding the Antihypertensive drugs, followed by anticoagulants drugs, then antihyperlipidemic drugs, as the studied patients had medium to high level of adherence to both antihypertensive and anticoagulant drugs. Also, majority of the studied patients had medium to high level of adherence to antihyperlipidemic drugs.

The current study shows that the majority of the studied patients did not forget to take medications, and the majority said that there were no days for not taking the antihyperlipidemic, anticoagulants and antihypertensive over the past two weeks, the majority said that they didn't stop these

medications without telling their doctor, the majority didn't forget to bring medications with travelling, and they took all medications yesterday. Also, the majority didn't stop medications when symptoms were under control and the majority felt hassled about treatment plan.

The researcher suggested that these results are related to the patient awareness that in the months and years following CABG, patients remain at risk for subsequent ischemic events as a result of native CHD progression and the development of vein graft atherosclerosis. Secondary therapies play a key role in the maintenance of native and graft vessel patency and in the prevention of adverse cardiovascular outcomes and may be due to relatives' motivation and support in addition to other factors such as: socioeconomic factors, factors associated with the health care team and system in place, disease-related factors, therapy-related factors, and patient-related factors (**Liu, 2018**).

The same was reported by the Multicenter, Randomized Controlled Trial with 18-Month Follow-Up in Guilan University of Medical Sciences in Iran on 217 patients six months after CABG surgery who were selected by systematic randomized

sampling. Suggested that a multifaceted intervention five consisting psycho-educational, MI, and SMS reminders can promote medication adherence in six older patients undergoing CABG, and that these effects are maintained eighteen months surgery. The increase in medication adherence also improved eight other health-related outcomes. (**Lin et al, 2017**).

Also, Bryson et al., 2008 administered a questionnaire searching for alcohol misuse in patients taking medications for cardiac risk factor modification (statins, antihypertensive, and oral hypoglycemic). They found that, among patients taking statins and antihypertensive, rates of nonadherence were associated with higher rates of alcohol use, as indicated by higher scores on the questionnaire.

(Amar et al., 2008) in their study of French ACS patients, found an association between severe cardiovascular disease and medication nonadherence.

The results showed by the work of **Al-Omran et al., 2008** on 43,154 elderly patients with atherosclerosis, demonstrated that elderly Canadian patients with no cardiac atherosclerosis, such as cardiovascular disease (CVD) or peripheral vascular disease

(PVD), were at higher risk for secondary prevention no adherence. Together, these studies point to the importance of patients' attitudes, external influences, and competing medical conditions in medication adherence and suggest that providers recognize their impact as they seek to optimize adherence behavior.

5. Conclusion:

The total adherence mean scores among the studied patient was high in using Antihypertensive drugs, followed by anticoagulants drugs, then antihyperlipidemic drug.

6. Recommendations:

In the light of the finding of the current study, further studies are recommended to apply effective nursing interventions to promoting medication adherence in patients suffering from coronary artery disease. Conduct a study to assess factors affect cardiac patients' adherence to medication.

Conduct a study to evaluate effect of educational program on adherence level among patients with CABG.

Table (1): Percentage distribution of the studied patients according to their socio-demographic characteristics (n=85)

Items	N	%
Age (Years)		
30:<40	4	4.7
40:<50	24	28.2
50:60	57	67.1
Gender		
Male	58	68.2
Female	27	31.8
Residence*		
Rural	53	62.4
Urban	32	37.6
Residence distance from follow up		
Yes	61	71.8
No	24	28.2
Marital status		
Married	74	87.1
Divorced	11	12.9
Single	0	0
Widow	0	0
Rooms		
≤3	30	35.3
>3	55	64.7

Table (2):): Percentage distribution of the studied patients regarding occupation, income and treatment expenses (n=85)

Items	NO.	%
Occupation		
Working	45	52.9
Not working	40	47.1
If work (n=45)		
Muscle effort	21	35.6
Mental effort	24	64.4
Income		
Enough	61	71.8
Not Enough	24	28.2
Treatment expenses		
Health insurance	85	100
Others	0	0

Table (3):): Percentage distribution of the studied patients regarding medical history , (n=85)

Items	NO.	%
Smoking history		
Current	4	4.7
Former	5	67.1
Ever smoking	7	
	2	28.2
	4	
Duration of illness in years		
≤5	6	81.2
	9	
>5	1	18.8
	6	
Time since surgery in months		
<3	5	5.9
3<6	7	90.6
	7	
≥6	3	3.5
Frequency of follow up		
Mean±SD	10.56±.90	
Suffering from side effects of medications		
Yes	37	43.5
No	48	56.5
If yes (n=37)		
Mild	30	81.1
Moderate	7	18.9
Type of side effects (n=37)		
Weakness and fatigue	28	75.7
Cold extremities	2	5.4
Difficulty in sleep	5	13.5
Myalgia	1	2.7
Bleeding	1	2.7
Previous operations		
Yes	27	31.8
No	58	68.2
Disability		
Yes (motor)	1	1.2
No	84	98.8

Table (4): Percentage distribution of the studied patients ' adherence to antihypertensive drugs (n=85).

Anti-hypertensive drugs	Yes		No	
	NO.	%	NO.	%
Sometimes forget to take medication	13	15.3	72	84.7
Over the past 2 weeks, were there any days you did not take medication?	3	3.5	82	96.5
Have you ever stopped taking your medication without telling your doctor because you felt worse when you took it?	6	7.1	79	92.9
When getting out home, do you sometimes forget to bring medication?	10	11.8	75	88.2
Did you take all your medication yesterday?	83	97.6	2	2.4
When you feel like your symptoms are under control, do you sometimes stop taking your medication?	4	4.7	81	95.3
Do you ever feel hassled about sticking to your treatment plan?	81	95.3	4	4.7

Table (5): Percentage distribution of the studied patients ' adherence to antihyperlipidemic drugs (n=85).

Antihyperlipidemic drugs	Yes		No	
	NO.	%	NO.	%
Sometimes forget to take medication.	13	15.3	72	84.7
Over the past 2 weeks, were there any days when you did not take medication?	4	4.7	81	95.3
Have you ever stopped taking your medication without telling your doctor because you felt worse when you took it?	7	8.2	78	91.8
When getting out of, do you sometimes forget to bring medication?	8	9.4	77	90.6
Did you take all your medication yesterday?	82	96.5	3	3.5
When you feel like your symptoms are under control, do you sometimes stop taking your medication?	5	5.9	80	94.1

Do you ever feel hassled about sticking to your treatment plan?	82	96.5	3	3.5
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Table (6): Percentage distribution of the studied patient ' adherence to anticoagulants drugs (n=85).

Anticoagulant drugs	Yes		No	
	NO.	%	NO.	%
Sometimes forget to take medication?	13	15.3	72	84.7
Over the past 2 weeks, were there any days when you did not take medication?	4	4.7	81	95.3
Have you ever stopped taking medication without telling your doctor because you felt worse when you took it?	7	8.2	78	91.8
When getting out of, do you sometimes forget to bring your medication?	8	9.4	77	90.6
Did you take all your medication yesterday?	83	97.6	2	2.4
When you feel like your symptoms are under control, do you sometimes stop taking your medication?	5	5.9	80	94.1
Do you ever feel hassled about sticking to your treatment plan?	82	96.5	3	3.5

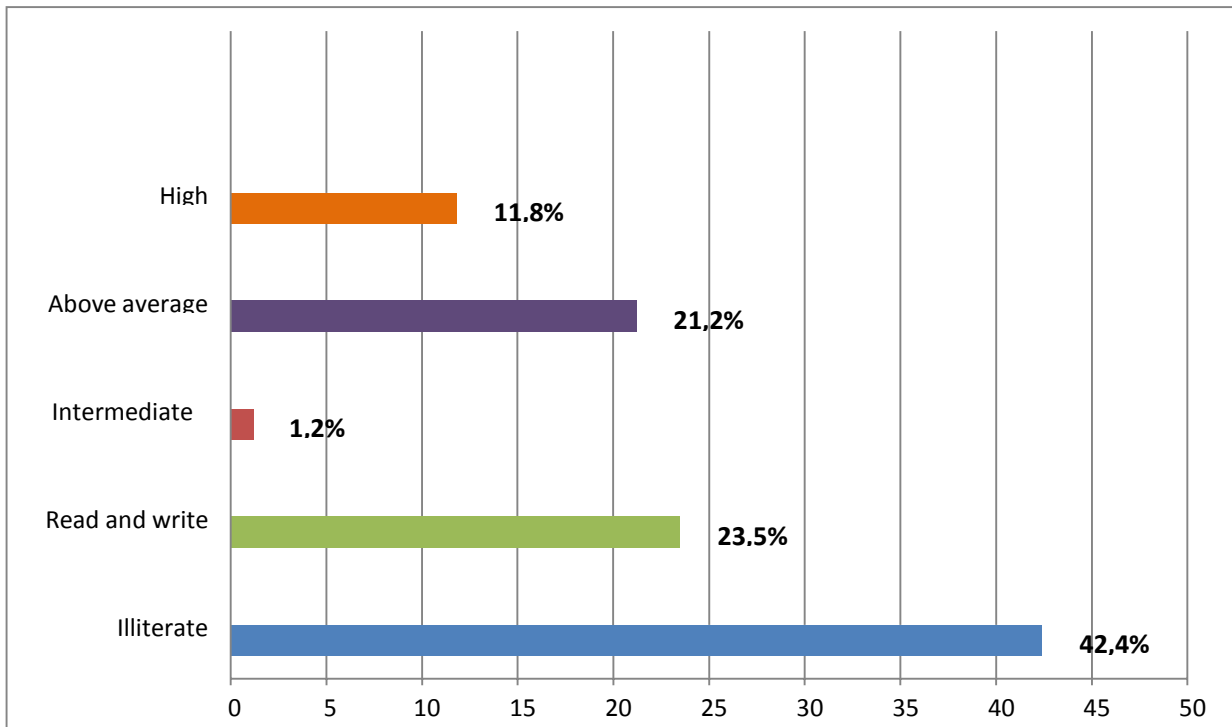


Figure 1: Percentage distribution of the studied patients according to their level of education (n=85)

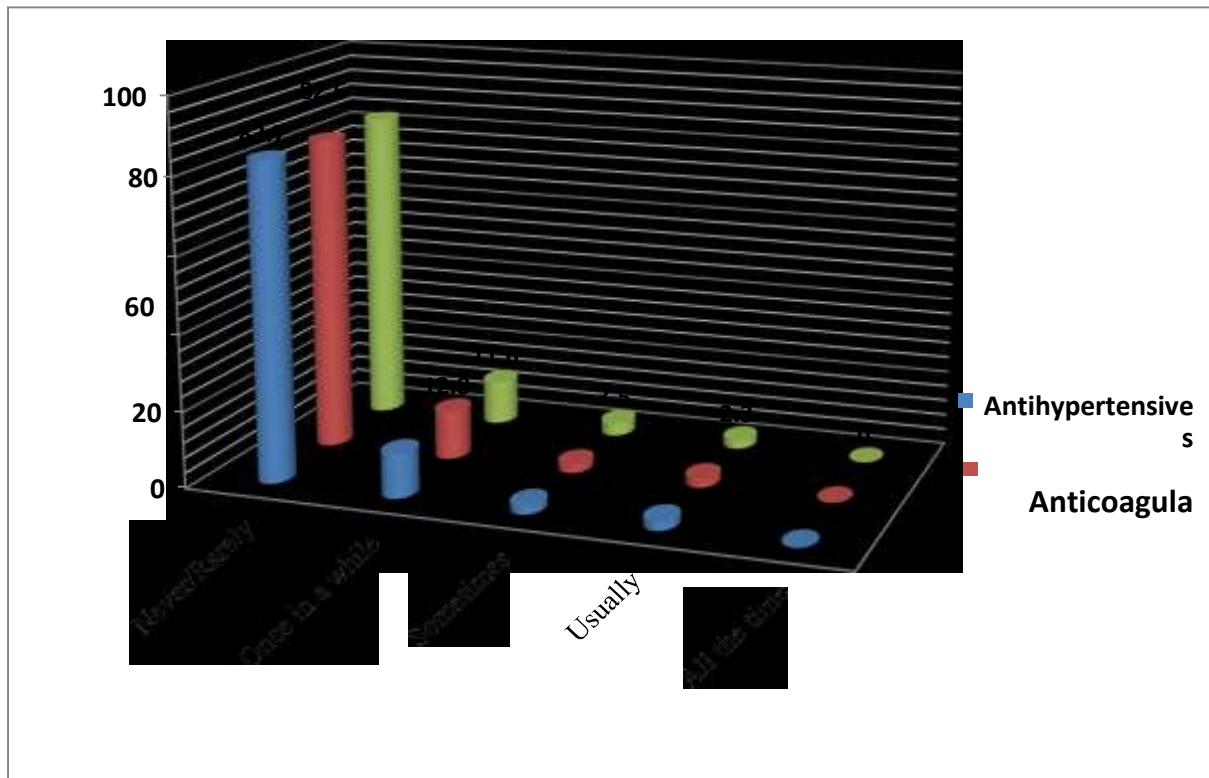


Figure 2: Percentage distribution of the studied patients according to presence of difficulty in remembering the medications (n=85)

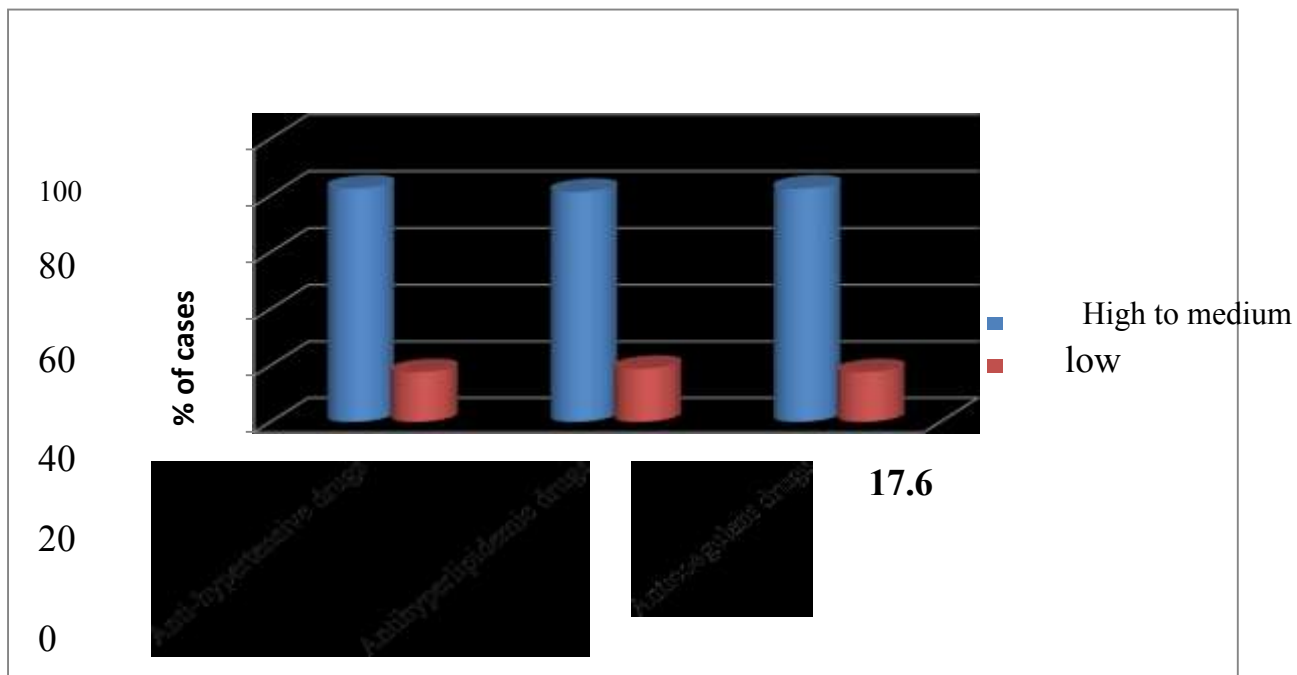


Figure 3: Distribution of the studied patients regarding their medication adherence level (n=85)

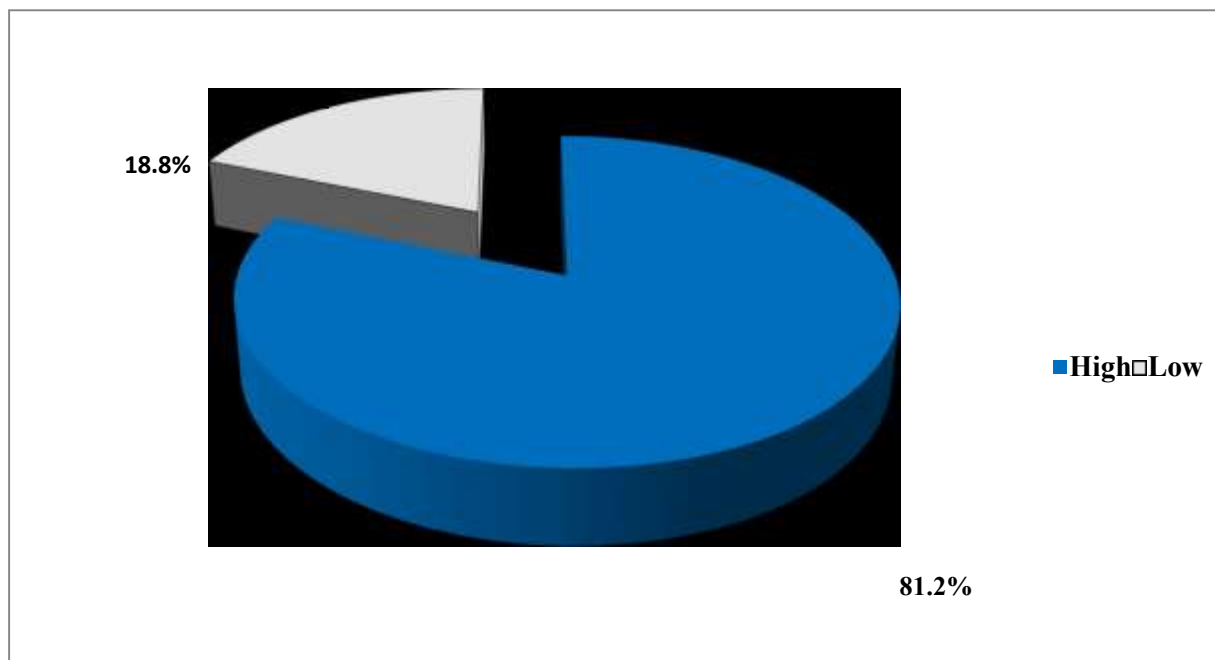


Figure 4: Distribution of the studied patients regarding to total medication adherence level (n=85)

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