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3 **Illness Perception and Adherence to Medication**  
4 **in Cardiovascular Patients at a Tertiary Hospital**  
5 **in Northern Cyprus.**

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11 **ABSTRACT**  
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**Background and Aims:** The Patients diagnosed with cardiovascular disease are strongly recommended to adopt healthier behaviors and adhere to prescribed medication. The role of patients' illness perceptions in patient care and impact on health outcomes was studied previously in a wide range of health conditions. However, among patients with cardiovascular diseases, this has not been well examined. Purpose of this study was to assess treatment adherence, illness perception, and relationship between illness perception and treatment adherence in patients with **cardiovascular disease**.

**Study design:** A cross-sectional descriptive study.

**Place and Duration of Study:** The study was conducted from November 2018 to January 2019 to all patients who admitted to the cardiology department of Near East University Hospital in North Cyprus.

**Methodology:** A survey form of three sections were used to gathered data; a socio-demographic section, Brief Illness Perception Scale, and Brief Morisky Adherence Scale. Data were analyzed using Statistical Package for Social Science (SPSS) for window version 20.0 software. P-value less than 0.05 were statistically significant.

**Results:** The patients who participated in the study involved 49 (61.2%) male and 31 (38.8%) female. The mean  $\pm$  SD age of the sampled group was  $61.16 \pm 12.60$ , with 15 (47.5%) being older than 65 years old. The Median (Max-Min) of the total **Illness Perception Questionnaire** positive perceptions shows significantly higher scores in males compared to female's illness perception 52.0 (73.0 – 20.0) Vs. 41.0 (74.0 – 18.0),  $z=-2.297$ ;  $p < 0.05$ , respectively. Also, university graduate patients had significantly higher positive perception scores compared to patients who graduated from only high schools or less 57.0 (71.0-40.0) Vs. 45.0 (74.0-20.0) and 43.0(68.0-18.0)  $df=2$ ;  $p=0.013$ , respectively.

**Conclusion:** There is a significant positive correlation between different subscales of perception scale, while higher positive perception scores were identified in adherent patients and males. It is crucial to strengthen patients' illness perceptions, with especial consideration to emotional responses besides personal, treatment control, and disease understanding. We recommend an educational intervention in order to improve adherence.

13 **Keywords:** *Cardiovascular medicine, illness perception, medication adherence, North*  
14 *Cyprus.*

15 **1. INTRODUCTION**

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17 Cardiovascular Disease (CVD) as one of the most common causes of death around the  
18 world. World and Health Organization mentioned that the percentage of death among  
19 cardiovascular patients varies from 25% to reach 45% (1).

20 To reduce the risk of more cardiac complication events, the patients should adhere to their  
21 drugs and stay away from smoking, follow a healthy diet, which includes increasing fruits  
22 and vegetable intake and decreasing fat foods. These recommendations include physical  
23 activity, keeping blood pressure under control, and controlling body weight (2).

24 Illness perceptions are among parameters that may significantly affect patient adherence  
25 since understanding the illness can help in adherence of the patient (3).

26 The definition of illness perception is the patients' beliefs about their disease. To simplify  
27 more this definition, the cognitive of the patients, which consists of five factors; identity,  
28 cause, consequences, and controlling the disease in addition to the emotional regarding the  
29 disease, more details about each factor will be discussed later (4).

30 Treatment adherence can be described as the coping strategy (problem-focused coping) of  
31 the individual to the CVD in this study. Patients might have their view about CVD, which  
32 influences their decisions to regulate the treatment adherence behaviors and thereby making  
33 the illness perception an essential factor influencing treatment adherence (5).

34 The predictive value of illness perception in explaining the adherence to secondary  
35 prevention behavior remains unclear. This information could reflect patients' knowledge of  
36 modifiable risk factors (such as smoking, lack of exercise, obesity and consumption of fatty  
37 foods) and selected coping mechanisms, which have been identified as prerequisites for  
38 behavior-changing interventions (6).

39 Several studies mentioned that the illness perception of the different diseases such as  
40 asthma or diabetes mellitus as a guideline to assess and enhance the patient's adherence to  
41 the medication (7). Adherence to medication in CVD constitutes a primary factor of treatment  
42 success as suboptimal use leads to decreased treatment efficacy and increased direct and  
43 indirect costs, mortality, and morbidity (8).

44 Few studies in the literature studied the illness perception in CVD, and the major of these  
45 studies was conducted in western and or developed countries such as the USA or Taiwan  
46 (5, 9, 10).

47 There is no study conducted in North Cyprus (NC) to assess the illness perception and  
48 medication use behavior in patients with cardiovascular diseases. The purpose of this study  
49 is to examine the relationship between illness perception and adherence among patients  
50 with CVD, one of the leading causes of mortality and morbidity worldwide and as well in  
51 North Cyprus. Clarification of this may improve the understanding of how disease control can  
52 be achieved and possible future interventions to optimize medication use in this unique  
53 patient population.

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55 **2. MATERIAL AND METHOD**

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57 **2.1 SUBJECTS AND SETTING:**

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59 A cross-sectional, descriptive study was carried in a cardiology department from November  
60 1, 2018 to December 30, 2018, at Near East University hospital (NEUH), North Cyprus.

61 All in-patients admitted to the cardiology department were screened for eligibility to be  
62 included in the study sample.

63 Inclusion criteria involved adult patients with a diagnosis of cardiovascular diseases  
64 confirmed by a cardiovascular physician and having been prescribed at least one drug for  
65 their disease for at least one month before the study. Patients were excluded if they were  
66 medically unstable, with any critical or acute episodes, and those with cognitive disabilities.

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## 68 **2.2 DATA COLLECTION AND STUDY TOOLS:**

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70 Data of the study were collected with a survey form that consists of the socio-demographical  
71 section, Brief Illness Perception Scale, and Brief Morisky Adherence Scale.

72 The researcher developed a socio-demographic information gathering form to collect  
73 information regarding the following variables: Gender, age, level of education, past medical  
74 history, days of admission, chief complain, and admission in last six months.

75 The Brief Illness Perception Questionnaire (BIPQ) was used to assess patient's awareness  
76 about their disease, this questionnaire composed of 8 items scored from zero to ten as a  
77 response scale and the last item was an open-ended question.

78 In details, the first five items measure the patients' cognitive illness. These items include  
79 consequences, timeline, personal control, treatment control, and identity.

80 The higher response to the consequences indicates that more severe consequences can  
81 follow the disease. Referring to item 2, higher response means the disease will last for more  
82 time.

83 Items three and four indicate that the disease can be controlled or cured as the response  
84 increased. While the item 5 indicate contributing more significant symptoms to CVD.

85 Item 6 and item 8 together indicate that the patients are more stress and worried about their  
86 disease, both together referred to emotional response.

87 Item 7 was referred to the understating of the disease, and item 9 was measuring the most  
88 common cause of the disease.

89 The total illness perception score was calculated by reverse score for consequences,  
90 timeline, identity, symptoms, and emotional response, and then adding this to the score of  
91 other items. The maximum total score is 80, and the minimum total score is 0. A higher  
92 score reflects a more positive view of the illness, whereas a lower score reflects threatening  
93 illness perception.

94 The Brief Morisky Medication Adherence Scale (BMMAS) was also used to measure  
95 patient's adherence to their drugs. The BMMAS is one of the standard scales used to  
96 measure patient's adherence in literature. The questionnaire is composed of 4 yes/no items.  
97 Yes=zero and no=1, the summation of the scale then is referred to as adherent if the patient  
98 gets four and nonadherent if less than 4. The internal consistency of the scale was  
99 measured using Cronbach alpha and found 0.7, which indicates a good and reliable scale.

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101 **2.3 STATISTICAL ANALYSIS:**

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103 All statistical calculations and analyses were performed with Statistical Package for Social  
104 Sciences (SPSS) 20.0 software. Frequency analysis was carried out to investigate the  
105 descriptive characteristics of the study sample.

106 For the continuous data such as Brief Illness Perception Questionnaire (IPQ), Brief Morisky  
107 Medication Adherence Scale (MMAS) scores, descriptive statistics such as arithmetic mean,  
108 standard deviation, median, minimum and maximum values were calculated.

109 To determine the statistical hypothesis testing methods, the distribution characteristics of the  
110 scale scores were investigated in terms of normality. For this purpose, the Kolmogorov-  
111 Smirnov test of normality, Shapiro-Wilk test of normality, Q-Q plots, skewness, and kurtosis  
112 values were all analyzed in each demographic characteristic.

113 Using all gathered information, non-parametric hypothesis tests were performed throughout  
114 the whole data analysis phase.

115 Mann Whitney U test was applied for the comparison of the Brief Illness Perception  
116 Questionnaire (IPQ) Brief Morisky Medication Adherence Scale (MMAS) score between two  
117 categorical variables. Kruskal Wallis test was applied for more than two variables group such  
118 as age groups or education levels to understand the significant associations of the Brief  
119 Illness Perception Questionnaire (IPQ) and Brief Morisky Medication Adherence Scale  
120 (MMAS) scores. This was due to the dependent variable having more than two independent  
121 categories.

122 Pearson correlation was performed to measure the level of correlation between illness  
123 perception subscales and Morisky scale. To assess the association between adherence  
124 level and demographic characteristics of the patients, Pearson Chi-square was performed.  
125 Detailed analysis result of each statistical method is shown in their corresponding tables  
126 throughout the text. Level of significance was accepted for p-value < 0.05 for the whole  
127 study.

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131 **3. RESULTS AND DISCUSSION**

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134 **3.1 RESULTS:**

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136 A total of 126 patients were admitted to the cardiology clinic between 1-11-2018 till 30-12-2018. Of  
137 these 121 patients matched the inclusion criteria and were invited to participate while 4 were excluded  
138 due to not being medically stable and one patient due to not being able to communicate. At the end 80  
139 patients accepted to participate and were surveyed in the study.

140 *3.1.1 Socio-demographic Characteristics:*

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142 More than half of patients were male 49 (61.2%), and 31 (38.8%) patients were female. The  
143 mean± SD age was 61.16 ± 12.60, with 15 (47.5%) patients being older than 65 years old.  
144 Regarding the patient's education level, 46 (57.5%) patients had a high school degree, and  
145 13 (16.3%) patients completed their university while only three patients (3.8 %), was capable  
146 only of reading and writing (Table 1).

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149 **Table 1.** Patient's demographic characteristics

	N (80)	%
<b>Gender</b>		
Male	49	61.2
Female	31	38.8
<b>Education</b>		
Reading and Writing	3	3.8
Elementary and middle school	18	22
High school	46	57.5
University	13	16.3
<b>Age groups</b>		
23-50	13	16.3
51-65	34	42.5
66<	33	41.3

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152 **3.1.2 Medical history of the participants:**

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154 The mean Creatinine Clearance (Cr.Cl) of the sampled group was 67.7 ml/min with SD = 31.20, the  
155 median (Min-Max) of the Cr.Cl = 73.9(0.8-143.5). The median of the drugs used for the patients was  
156 5 with one drug per patient as the minimum drugs used and 19 drugs per patient as the maximum  
157 recorded.

158 The mean total cholesterol of the patients was 119.86 mg/dl with SD = 106.6, the median and max of  
159 the total cholesterol = 134.5 and 415, respectively. The blood pressure mean of the patients was 128.7  
160 mmHg and 73.8 mmHg for systolic and diastolic, respectively. The highest blood measure recorded  
161 was 200 mmHg for systolic and 100 for diastolic mmHg.

162 The past medical history for the last six months showed that 62.5% of the patients did not come to  
163 hospital, while 7.5% of the patients entered the hospital for blood pressure follow-up. Only a patient  
164 (1.3%) was hospitalized during the previous six months for anemia, one (1.3%) for cancer, and one  
165 (1.3%) for falling (1.3%).

166 The sampled patient medical history shows the distribution of following comorbidities; Diabetes  
167 mellitus (27.5%), cholesterol 18.8%, cancer, depression were 6.3%, where anemia and osteoporosis  
168 get 1.3 % for each (Table 2). Table 3 shows the distribution of cardiovascular diseases among  
169 sampled patients.

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172 **Table 2.** Medical history of the participants

	N	%*
Diabetes Mellitus	22	27.5
Cholesterol	15	18.8
Depression	5	6.3
Cancer	8	10
Kidney disease	4	5
Osteoporosis	1	1.3
Anemia	1	1.3

173 \*The summation of percentage  $\neq$  100. More than one disease is possible.

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176

177 **Table 3.** Cardiovascular diseases among the sample

	N	%#
<b>Ischemic heart disease</b>	51	63.7
<b>HT</b>	50	62.5
<b>Atrial Fibrillation</b>	16	20
<b>Heart Failure</b>	11	13.7

178 # Summation  $\neq$  100, more than one disease is possible.

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182 **3.1.3 Patient's illness perception:**

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184 Table 4 shows patients' responses to individual items and distribution of responses among  
185 demographic groups.

186 The Median (Max - Min) of the total IPQ positive perceptions shows significantly higher scores in  
187 males compared to females illness perception 52.0 (73.0 – 20.0) Vs. 41.0 (74.0 – 18.0),  $z=-2.297$ ;  $p <$   
188  $0.05$ , respectively. Also university graduate patients had significantly higher positive perception  
189 scores compared to patients who graduated from only high schools or less 57.0 (71.0-40.0) Vs. 45.0  
190 (74.0-20.0) and 43.0(68.0-18.0)  $df=2$ ;  $p=0.013$ , respectively.

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192 Table 4. Illness perception scores among demographic groups in the CVD patients.

Illness perception scores among the CHD patients*								
	Consequences	Timeliness	Personal control	Treatment control	Identity	Concern	Coherence	Emotional
Median scores	5(0-10)	10 (0-10)	9 (0-10)	9(2-8)	3(0-10)	5(0-10)	10(0-10)	7(0-10)
<b>Gender#</b>								
Male	4 (0-10)	10(0-10)	10(0-10)	9 (2-10)	2(0-10)	3(0-10)	10(0-10)	5(0-10)
Female	5(0-10)	9(0-10)	8(3-10)	8(3-10)	6 (0-10)	7(0-10)	10(3-10)	8(0-10)
<b>Education Ω</b>								

Before High school	5(0-10)	10(0-10)	9(5-10)	9(4-10)	5(0-10)	6(0-10)	10(3-10)	7(0-10)
High school	5(0-10)	10(0-10)	8(0-10)	8.5(2-10)	4(0-10)	5(0-10)	10(0-10)	7(0-10)
University	2(0-8)	9(0-10)	10(0-10)	10(5-10)	0(0-5)	0(0-10)	10(3-10)	4(0-10)

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\* All the data presented as Median (Min-Max).

# Mann-Whitney U test was performed.

Ω Kruskal Wallis test was performed.

¥There is a statistically significant difference in median scores between gender  $p < 0.05$ .

\$ There is a statistically significant difference in median between high school and before the high school  $p < 0.05$ .

### 3.1.4 Causes of illness and coherence of disease:

Referring to the leading causes of the disease as perceived by the patients, stress was identified by 37.5% of respondents, while only 20% perceived smoking as a leading cause of their illness. Genetic and nutrition or diet were the most common causes of illness as perceived by (77.5%) and (57.5%) of the patients, respectively. The data showed that there is a significant positive correlation between different subscales of perception scale ( $p < 0.05$ ) (Table 5).

**Table 5.** Correlation between perception subscales and Morisky scale for adherence.

	Consequences	Time line	Personal control	Treatment control	Identity	Concern	Coherence	Emotional	Morisky
Consequences	1	0.066 (0.562)	0.287 (0.010)	0.312 (0.005)	0.559* (0.00)	0.407 (0.00)	0.047 (0.68)	0.190 (0.09)	0.073 (0.52)
Timeline		1	-0.029 (0.796)	0.116 (0.14)	0.09 (0.42)	0.340* (0.00)	-0.053 (0.64)	0.269 (0.01)	0.007 (0.94)
Personal control			1	0.721* (0.00)	0.289* (0.00)	0.318* (0.00)	0.195 (0.08)	0.135 (0.23)	0.071 (0.53)
Treatment control				1	0.337* (0.00)	0.37* (0.00)	0.169 (0.14)	0.134 (0.23)	0.099 (0.38)
Identity					1	0.534* (0.00)	0.160 (0.16)	0.295* (0.00)	0.153 (0.174)
Concern						1	0.051 (0.65)	0.623* (0.00)	0.223* (0.04)
Coherence							1	-0.016 (0.89)	0.177 (0.12)
Emotional								1	0.176 (0.12)

Morisky										1
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213 r; correlation coefficient. \* Significant correlation at level of significant 0.05.

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217 **3.1.5 Adherence scale:**

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219 Regarding the Morisky scale, the data showed that only 49 (61.3%) patients were identified as being  
220 adherents, and 31 patients (38.7%) were considered non-adherents.

221 The mean  $\pm$  SD of age of the patients who were adherent was not significantly higher than the mean  $\pm$   
222 SD of non-adherent patients (61.26  $\pm$ 12.24) (61.58  $\pm$ 12.95) ( $p > 0.05$ ), respectively.

223 More male patients (31, 63.3%) were identified as adherent than females patients (18, 58.1%). The  
224 highest number of adherent patients finished their high school (25, 54.3%), while only two patient  
225 who finished his middle school (2.0%) were adherent while one patient who did not go to school but  
226 knew how to read and write was identified as non-adherent (2.0%). Yet, no association between  
227 adherent level and education level groups was found statistically ( $p > 0.05$ ) (Table 6).

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229 **Table 6.** Association of adherence with demographic data

	Adherent N (%)	Non adherent N (%)	p value
<b>Gender</b>			
Male	31(63.3)	18(36.7)	>0.05
Female	18(58.1)	13(41.9)	
<b>Age</b>			
<65	26 (61.9)	16 (38.1)	>0.05
$\geq$ 65	9(52.9)	8(47.1)	
<b>Medication</b>			
1-5	17 (37.0%)	29 (63.0%)	>0.05
6-10	18 (62.1%)	11 (37.9%)	
11-	2 (40.0%)	3(60.0%)	

230

231 The data showed that the median (Max-Min) of the IPQ positive perception scores was higher in  
232 adherent patients compared to non-adherents 52.0 (73.0-20.0) Vs. 43.0(74.0-18.0) respectively but  
233 didn't reach to a significant level ( $z=-1.858$ ;  $p = 0.06$ ).

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237 **3.2 DISCUSSION**



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239 Cardiovascular diseases (CVDs) considered as the primary cause of death around the world, as 17.5  
240 million death tolls were attributed to CVDs in 2012 (6). CVDs were the predominant cause of non-  
241 communicable diseases in Cyprus, accounting for 50% of all deaths in North Cyprus in 2017.  
242  
243 According to the study findings, it is to strengthen patients' illness perceptions, especially personal  
244 control and disease understanding, as an essential strategy in educational interventions in order to  
245 increase adherence to treatment. 61% of the studied population was identified as adherent to their  
246 medications.  
247  
248 More than half of the study participants were males (61.2%) similar to studies conducted in Nepal and  
249 Taiwan, were 57% and 60.3% of the patients were males respectively, as this is attributable to the fact  
250 that the prevalence of ischemic heart diseases is more common among men than women (11).  
251  
252 The participants in this study had been diagnosed with IHD for less than five years, and the majority  
253 of them had hypertension. These findings are similar to those of the previous study conducted in  
254 Malaysia, which reported that hypertension was the primary comorbidity condition in patients with  
255 IHD (12).  
256  
257 Results from previous studies are controversial regarding non-adherence in males compared to  
258 females. In the current study, more proportion of males were adherent though the difference was not  
259 statistically significant (36.7% males vs. 41.9% females;  $P > 0.05$ ). Also, males had significantly  
260 higher positive illness perceptions score compare to female patients ( $P < 0.5$ ). This finding was  
261 consistent in other studies.  
262  
263 In our study, patients perceive cardiovascular disease as a lifelong disease that drugs can help in  
264 controlling it. This finding was similar to the finding of a study that was conducted in 2004, which  
265 showed that hypertension disease could be controlled with drugs as it is a lifelong disease (10).  
266  
267 A study was conducted in 2013; the researcher mentioned that the treatment control ranked as the  
268 highest score of BIPQ, while another study was conducted in 1999 showed that the patients with  
269 chronic disease belief that the treatment can control the disease when they are chronic. Both findings  
270 were similar to our findings in cardiovascular disease (13, 14).  
271 Significant nonadherence (39%) was seen in the current study population, though this is much less  
272 than the prevalence reported in earlier studies (15). In our sample, approximately 61.3% of the  
273 patients considered as an adherent to the drugs they used. These findings were similar to the findings  
274 that Saarti *et al.* study findings in 2015 reported 70% of the participants as adherent to their  
275 medications of cardiovascular disease (16).  
276 A study was conducted in 2017 to measure the illness perception of the patients with heart failure.  
277 Around half of the participated patients show a positive perception of their illness. These findings  
278 were comparable to illness perceptions reported among participants in the current study (17).  
279 In our study, we used the Brief Illness Perception Questionnaire (Brief IPQ), which is a continuous  
280 scale to measure the patient's knowledge about their condition, while previously Revised Illness  
281 Perception Questionnaire (IPQ\_R) was used which consists of 80 items. However, both scales were  
282 established and validated to use in cardiovascular disease patients (6, 18).  
283 More educational interventions or programs should be established to improve patient adherence and  
284 awareness for CVD.  
285 Pharmacists should work on assessing and improving patient adherence through patient educations  
286 and promote awareness of the consequences of non-adherence in CVD (19, 20).  
287 To our knowledge, this study is the first to evaluate cardiology patient's illness perception and  
288 adherence in North Cyprus. Nevertheless, this study has a few limitations. One of the main limitations  
289 is that the study was conducted in a single Centre, so the results may not be to generalize to the  
290 population. The sample size is considered as a main limitation of this study since the period of data

291 collection was only two months. Also, due to the small sample size, assumptions to carry a valid  
292 binary regression to predict the factors that affect adherence were not met.  
293 Only inpatients were included in the study; the data may not be applicable to the indigent care  
294 population who visited outpatients' clinics.  
295 However, most of the participants were uncomplicated, and the result may only reflect the illness  
296 perceptions and drug adherence in a relatively healthier cardiovascular population. Compared with  
297 previous community studies, patients had higher drug adherence in this study, possibly as a result of  
298 the sampling.  
299 Finally, another limitation of this study is that it used a self-report questionnaire to assess adherence;  
300 this method has the disadvantages of recall bias and eliciting only socially acceptable responses, and  
301 hence, it may overestimate the level of adherence.  
302

#### 303 **4. CONCLUSION** 304

305 According to our findings, it is crucial to strengthen patients' illness perceptions, with **special**  
306 consideration to emotional responses besides personal and treatment control and disease  
307 understanding. Educational interventions are necessary as an important strategy in order to  
308 improve adherence.

309 Since most of the cardiovascular patients admitted so far had a moderate level of education  
310 and are geriatrics mostly, special educations programs should be established to encourage  
311 positive perceptions, which lead to better adherence to their medicine.  
312

#### 313 **ETHICAL APPROVAL AND CONSENT** 314

315 Confidentiality was assured during the study along patient's privacy, a letter of ethical  
316 approval for this study was obtained from the Institutional Review Board (IRB) of Near East  
317 University Hospital (Ref YDU/2018/62-655) prior to study. Only Initials were used during the  
318 study and other information of address and occupation were not recorded during the  
319 interview. Research was conducted in accordance with the Declaration of Helsinki. Prior to  
320 study verbal informed consent was obtained from the patients.

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