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

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 ± 12.60 , with 15 (47.5%) being older than 65 years old. The Median (Max-Min) of the total IPQ 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 METHODS**

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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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129 **2.4 ETHICAL CONSIDERATIONS:**

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

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139 **3. RESULTS AND DISCUSSION**

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142 **3.1 RESULTS:**

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

148 **3.1.1 Socio-demographic Characteristics:**

149
 150 More than half of patients were male 49 (61.2%), and 31 (38.8%) patients were female. The
 151 mean± SD age was 61.16 ± 12.60, with 15 (47.5%) patients being older than 65 years old.
 152 Regarding the patient's education level, 46 (57.5%) patients had a high school degree, and
 153 13 (16.3%) patients completed their university while only three patients (3.8 %), was capable
 154 only of reading and writing (Table 1).
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157 **Table 1.** Patient's demographic characteristics

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

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160 **3.1.2 Medical history of the participants:**

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 162 The mean Creatinine Clearance (Cr.Cl) of the sampled group was 67.7 ml/min with SD = 31.20, the
 163 median (Min-Max) of the Cr.Cl = 73.9(0.8-143.5). The median of the drugs used for the patients was
 164 5 with one drug per patient as the minimum drugs used and 19 drugs per patient as the maximum
 165 recorded.

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

170 The past medical history for the last six months showed that 62.5% of the patients did not come to
 171 hospital, while 7.5% of the patients entered the hospital for blood pressure follow-up. Only a patient
 172 (1.3%) was hospitalized during the previous six months for anemia, one (1.3%) for cancer, and one
 173 (1.3%) for falling (1.3%).

174 The sampled patient medical history shows the distribution of following comorbidities; Diabetes
 175 mellitus (27.5%), cholesterol 18.8%, cancer, depression were 6.3%, where anemia and osteoporosis
 176 get 1.3 % for each (Table 2). Table 3 shows the distribution of cardiovascular diseases among
 177 sampled patients.
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180 **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

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

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

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

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

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190 **3.1.3 Patient's illness perception:**

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

194 The Median (Max - Min) of the total IPQ positive perceptions shows significantly higher scores in
195 males compared to females illness perception 52.0 (73.0 – 20.0) Vs. 41.0 (74.0 – 18.0), $z=-2.297$; $p <$
196 0.05 , respectively. Also university graduate patients had significantly higher positive perception
197 scores compared to patients who graduated from only high schools or less 57.0 (71.0-40.0) Vs. 45.0
198 (74.0-20.0) and 43.0(68.0-18.0) $df=2$; $p=0.013$, respectively.

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200 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)
Gender#								
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)
Education Ω								

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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221 r; correlation coefficient. * Significant correlation at level of significant 0.05.

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3.1.5 Adherence scale:

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

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

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

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Table 6. Association of adherence with demographic data

	Adherent N (%)	Non adherent N (%)	p value
Gender			
Male	31(63.3)	18(36.7)	>0.05
Female	18(58.1)	13(41.9)	
Age			
<65	26 (61.9)	16 (38.1)	>0.05
\geq 65	9(52.9)	8(47.1)	
Medication			
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%)	

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

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3.2 DISCUSSION

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

299 collection was only two months. Also, due to the small sample size, assumptions to carry a valid
300 binary regression to predict the factors that affect adherence were not met.
301 Only inpatients were included in the study; the data may not be applicable to the indigent care
302 population who visited outpatients' clinics.
303 However, most of the participants were uncomplicated, and the result may only reflect the illness
304 perceptions and drug adherence in a relatively healthier cardiovascular population. Compared with
305 previous community studies, patients had higher drug adherence in this study, possibly as a result of
306 the sampling.
307 Finally, another limitation of this study is that it used a self-report questionnaire to assess adherence;
308 this method has the disadvantages of recall bias and eliciting only socially acceptable responses, and
309 hence, it may overestimate the level of adherence.
310

311 **4. CONCLUSION** 312

313 According to our findings, it is crucial to strengthen patients' illness perceptions, with
314 especial consideration to emotional responses besides personal and treatment control and
315 disease understanding. Educational interventions are necessary as an important strategy in
316 order to improve adherence.

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

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