

**ORIGINAL PAPER**

## **The Effect of Sociodemographic Features and Beliefs about Medicines on Adherence to Chronic Kidney Disease Treatment**

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### **Abstract**

**Background:** Several studies have shown that non-adherence is a common and increasing problem regarding those with chronic illnesses, including chronic kidney disease (CKD) patients undergoing hemodialysis (HD).

**Objective:** The present study aimed to investigate the influence of sociodemographic features as well as beliefs about medicines on adherence to medication treatment among HD patients.

**Methodology:** A sample of 168 individuals was recruited from six General Hospitals in the broader area of Athens, consisting of patients undergoing in - centre HD. Measurements were conducted with the following instruments: the Medication Adherence Rating Scale (MARS) and the Beliefs about Medicines Questionnaire (BMQ).

**Results:** Medication adherence was associated positively with family ( $r= 0.24$ ,  $p= 0.00$ ) and work status ( $r= 0.26$ ,  $p= 0.00$ ) as well as BMQ - concern ( $r= 0.19$ ,  $p= 0.02$ ).

**Conclusions:** The present study demonstrates the importance of sociodemographic characteristics in understanding medication adherence in HD patients as well as the contribution of beliefs about medicines.

**Key Words:** Adherence, Medication, Hemodialysis, Chronic Kidney Disease.

### **Introduction**

Patients suffering from Chronic Kidney Disease (CKD) have to cope with many adversities, e.g. physical symptoms, limitations in food and fluid intake, changes in their body image, work and economic status, social roles, activity levels, self - image, health status and normal routines, while their control over treatment cannot always be predicted (Mavromates, 2005; Theofilou, 2011; Theofilou, 2012; Theofilou, 2012a; Theofilou, in press; Theofilou, Synodinou & Panagiotaki, in press a). Such constraints are expected to affect the patients' life and physical as well as social functioning, leading them to reconsider their personal and professional goals within the context of living with a chronic illness (Mavromates, 2005; Theofilou, 2011a; Theofilou, 2012; Theofilou, 2012a; Theofilou, in press; Theofilou et al., in press a).

Effective CKD control requires regular preventive medication and a response to that

medication. Poor receptiveness to CKD medication can be related to individual variability in the dose needed to achieve a response, as well as to low-adherent behaviour in relation to the CKD medication regimen. In a systematic review of 19 studies, which evaluated medication adherence among patients receiving dialysis, rates of medication non-adherence (evaluated with self-report, structured interview and predialysis serum phosphorus levels) ranged from 3% to 80% (mean 67%) (Schmid, Hartmann & Schiffl, 2009).

The concept of adherence has been developed from the concept of compliance, but opinions about the definitions of adherence and compliance differ (Horne, 2006). Compliance and adherence can be viewed as synonyms or as different concepts (Haynes, Ackloo, Sahota, McDonald & Yao, 2005). The increased use of the term adherence may be due to the sometimes passive and controlling undertone in the concept of compliance. Adherence emphasises the need for agreement and can

be defined as the extent to which the patient's behaviour matches the agreed recommendations from the prescriber and the prescription (World Health Organization, 2003).

Many factors have been found to influence medication adherence, and those associated with non-adherent behaviour can be organised into five interacting domains: socioeconomic factors; therapy-related factors; patient-related factors; condition-related factors; and health care system factors (Bame, Petersen & Wray, 1993; Christensen & Smith, 1995; Leggat, Orzol, Hulbert-Shearon et al., 1998; Kammerer, Garry, Hartigan, Carter & Erlich, 2007; Russell, Knowles & Peace, 2007). In the present study, the focus is on patient-related factors - i.e., gender, age, education as well as beliefs about medicines.

In patients with chronic illness and CKD, adherence to medication regimens has been found to correlate with beliefs about medicines (Horne & Weinman, 1999). A theoretical framework has been developed to explain how beliefs about medicine can influence patients' decisions about taking medicines (Horne, 1997). Adherent behaviour is likely to be associated with personal beliefs about the specific prescribed medication. Beliefs about the *necessity* of the medication for controlling illness are balanced against *concerns* about the possible negative effects of medication (Horne, Weinman & Hankins, 1999). Adherent behaviour depends on which of the two predominates - beliefs in the necessity of the medication or concerns about possible danger (Horne & Weinman, 1999).

The purpose of this study is to determine which sociodemographic and psychological factors contribute to medication adherence by CKD patients.

## Method

### Participants

A sample of 168 patients was recruited from six General Hospitals in the broader area of Athens, undergoing in - centre hemodialysis (HD). Selection criteria included:

1. > 18 years of age
2. Ability of communication in Greek
3. Diagnosed with CKD

4. Dialysis treatment at least for a year
5. Satisfying level of cooperation and perceived ability

The rate of response was very high, reaching 99%. Thus, the total sample includes almost all patients of these six units, consisting of 105 males (62.5%) and 63 females (37.5%), with a mean age of 62.4 years  $\pm$  13.5. Participants were Greek adults having signed a consent form for participation. All subjects had been informed of their rights to refuse or discontinue participation in the study according to the ethical standards of the Helsinki Declaration. Ethical permission for the study was obtained from the scientific committees of the participating hospitals. Full descriptive data of the sample are presented in table 1.

### Procedure

Measurements were conducted with the following instruments:

1) The inventory Medication Adherence Report Scale (MARS) is a 5-item self-report scale for assessment of non-adherent behaviour (e.g., 'I forgot to take them' and 'I alter the dose'). The items are rated on a 5-point Likert scale, ranging from 1 = 'always' to 5 = 'never' (range 5 to 25). Lower scores indicate lower levels of adherent behaviour (Horne & Hankins, 2004).

2) The *Beliefs about Medicines Questionnaire* (BMQ) consists of two five-item scales assessing patients' beliefs about the necessity of prescribed medication for controlling their disease and their concerns about potential adverse consequences of taking it. Respondents indicate their degree of agreement with each statement on a five-point Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree. Scores obtained for individual items within both scales are summed.

Thus, total scores for the Necessity and Concerns Scales range from 5 to 25. Higher scores indicate stronger beliefs (Horne et al., 1999). A necessity - concerns differential is calculated as the difference between the necessity and the concerns scales, with a possible range of -20 to +20. This differential can be thought of as the cost - benefit analysis for each patient, for whom

costs (concerns) are weighed against their perceived benefits (necessity beliefs) (Horne et al., 1999).

### Statistical analysis

Kolmogorov - Smirnov test was performed in order to check whether the values of the sample would fall within a normal distribution. Next, the analyses performed aimed to investigate the relation between medication adherence and sociodemographic variables as well as beliefs about medicines. Thus, correlation analysis was performed using Pearson's rho. Hierarchical regression analyses were also used to assess the above association. Initially, simple correlation was examined among variables referring to medication adherence, sociodemographic features and beliefs about medicines in HD patients. Further, a regression analysis model was constructed using medication adherence as dependent variable. Independent variables included sociodemographic characteristics as well as medication beliefs. A p - value of 0.05 or less was considered to indicate statistical significance. The nominal variables of gender, education, marital status and work status, in order to be included in the analyses, were recoded in the below categories:

- a. Gender (males, value 1), (females, value 2)
- b. Education (primary, value 1), (secondary, value 2), (university, value 3)
- c. Marital status (single, value 1), (married, value 2), (divorced, value 3), (widowed, value 4)
- d. Work status (employee, value 1), (freelancer, value 2), (households, value 3), (pensioner, value 4)

All analyses were performed with the Statistical Package for the Social Sciences (SPSS 13.0 for Windows).

### Results

The values of the total cohort were found to pass the normality distribution test.

Investigating the relation between medication adherence and sociodemographic variables as well as beliefs about medicines, *medication adherence* was associated positively with *family* ( $r= 0.24$ ,  $p= 0.00$ ) and *work status* ( $r= 0.26$ ,  $p= 0.00$ ) and *BMQ - concern* scale ( $r= 0.19$ ,  $p= 0.02$ ) (table 2).

A hierarchical regression analysis was also performed in order to investigate the aforementioned association in the total sample of HD patients.

Specifically, the variables of *gender* and *age* were found to have a negative effect on patients' *medication adherence*.

On the other hand, *work status* was found to have a positive effect. Regarding beliefs about medicines, *BMQ - necessity* scale was related in a negative way to *medication adherence* while *BMQ - concern* scale was related positively (table 3).

### Discussion

The present study shows strong associations of medication adherence with sociodemographic factors as well as beliefs about medicines in CKD patients.

Regarding the relation between sociodemographic dimensions and the variable of medication adherence in the total sample, it seems that gender, age, marital and work status are predictors of adherence to medication treatment.

As far as gender is concerned, the results of this study correspond to previous studies showing that higher prevalence of adherence is observed among men (Ciechanowski, Katon, Russo & Walker, 2001; Barsky, Peekna & Borus, 2001; Jiang, Hasselblad, Krishnan & O'connor, 2002; Barnes, Gott, Payne, Parker, Seamark, Gariballa & Small, 2006; Evangelista, Moser, Westlake, Pike, Ter Galstanyan & Dracup, 2008; Holzapfel, Muller-Tasch, Wild, Junger, Zugck, Remppis, Herzog & Lowe, 2008).

This finding could be explained by the fact that women are more prone to stress and to develop mental health conditions.

**Table 2. Correlations between sociodemographic variables, beliefs about medicines and medication adherence in the total sample.**

	Sociodemographic variables					BMQ scales	
	MARS	Gender	Age	Education	Family status	Work status	BMQ - necessity
Medication adherence	0.15	0.09	0.08	0.25	0.26	-0.12	0.19

MARS, Medication Adherence Rating Scale; BMQ, Beliefs about Medicines Questionnaire

\*\*p<0.01; \*p<0.05; N=168.

**Table 3. Hierarchical Regression Analysis: sociodemographic variables and beliefs about medicines affecting medication adherence in the total sample.**

Dependent Variable	Independent variables	Beta	p-value
Medication adherence	Gender	-0.19	0.03*
	Age	-0.23	0.02
	Education	0.07	0.38
	Family status	0.00	0.96
	Work status	0.60	0.00
	BMQ - necessity	-0.48	0.00
	BMQ - concern	0.51	0.00

BMQ, Beliefs about Medicines Questionnaire

\*\*p<0.01; \*p<0.05; N=168.

Thus, emotional disorders like depression can be associated with non - adherence to drug therapy (Stilley, Sereika, Muldoon, Ryan & Dunbar-Jacob, 2004; Bosworth, Voils, Potter & Steffens, 2008; Julian, Yelin, Yazdany, Panopalis, Trupin, Criswell & Katz, 2009; Gimenes - Turcatto, Zanetti & Haas - Vanderlei, 2009; Song, Moser & Lennie, 2009). Regarding age, findings are controversial. Specifically, while some investigators have found older patients to have better adherence, others have shown younger patients to be more successful adherers (Granger, Ekman, Granger, Ostergren, Olofsson, Michelson, McMurray, Yusuf S, Pfeffer & Swedberg, 2009). Monane et al. (1994) and Evangelista et al. (2003) found old age to be independently associated with better adherence, and reported that older participants (.85 and .65 years old, respectively) had 'no difficulty' in adhering to medications when compared with younger patients. In contrast, in a study of heart failure patients over 85 years of age, DeGeest et al. (2003) found that the elderly were less able to perform self care behaviours and were less adherent to a medication regimen. In our study younger patients are presented more adherent in comparison to older patients. This could be explained by the fact that in advanced age the use of amount of pills is greater than in youth, causing in this way non - adherence (Magacho, Ribeiro, Chaoubah & Bastos, 2011). Moreira et al. (2008) observed that the average number of daily pills ( $\geq 4$  pills per day) in older patients and the more advanced stages of CKD were statistically associated with non-adherence to drug therapy.

Concerning marital status, patients who are widowed seem to adhere better than the married, singles and the divorced. This is a finding which is in agreement with other studies' results (Adisa, Fakeye & Fasanmade, 2011).

In contrast to the results of this study, in the literature widowhood is associated with a higher rate of voluntary dialysis withdrawal as well as a lower quality of life (Mavromates, 2005; Theofilou, 2012; Theofilou, 2012a; Theofilou, in press; Theofilou et al., in press a). Further, the finding that pensioners and housewives are more adherent to medication treatment is similar to other studies elsewhere (Talam, Gatongi, Rotich & Kimaiyo, 2008). The results established that being away from

home contributed to poor timing of taking drugs among the patients. Several studies have shown that being away from home, being too busy and forgetting are closely interrelated (Platt, Tippy & Turk, 1994; Orrell & Word, 2001). Studies elsewhere have shown that chronic disease patients, like HIV/AIDS patients, have difficulties in taking drugs in public and carrying drugs around thereby adversely affecting adherence (Grierson, Bartos, De Visser & McDonald, 2000). Factors that were found to be significantly associated with poor adherence among HIV/AIDS patients was time of working ( $\chi^2= 6.2180$ ,  $p= 0.013$ ). This implied that busy working schedules contributed to poor adherence to medications (Grierson, Bartos, De Visser & McDonald, 2000). It was also found that 87 (57.4%) of females and 36 (61.0%) of males who had secondary or post secondary education failed to take drugs on time scheduled. This implied that patients with higher education were most likely busy with their professional activities. Due to their professional status in the society it could have been difficult for them to go for drug refills and to take medication in public (Grierson, Bartos, De Visser & McDonald, 2000).

As far as beliefs about medicines is concerned, the present study indicates that CKD patients who are presented more adherent to medication treatment have lower scores on the BMQ - necessity scale and higher scores on the BMQ - concern scale. Further investigation is needed regarding this point because earlier studies have shown that when beliefs in the necessity of medication are stronger than concerns, the adherent behaviour will increase (Emilssona, Berndtssona, Lftvallb, Millqvistb, Lundgren, Johanssond & Brinke, 2011). The most adherent individuals are those who accept the necessity of medication and have low concerns about potential adverse consequences (Menckeberg, Bouvy & Bracke, 2008; Tibaldi, Clatworthy, Torchio, Argentero, Munizza & Horne, 2009). Horne, Cooper, Gellaitry, Date, and Fisher (2007) conducted similar research among patients recruited from an outpatient HIV clinic who were debating whether to accept or decline initiation of HAART (highly active retroviral therapy) pharmacotherapy (Horne, PharmS, Cooper, Gellaitry, Date, PharmS & Fisher, 2007). Those who declined HAART had low scores on the BMQ - necessity scale and high scores on the BMQ -

concern scale. This study was unique in that it was a longitudinal study and patients were contacted at 12 months after baseline. At follow-up, HIV patients who had scored low on the necessity scale and high on the 26 concern scale at baseline reported low adherence 12 months later (Horne et al., 2007). Limitations in our study warrant mention. First, there is a need for future research to use prospective and longitudinal study designs to examine the interaction between adherence with medication and sociodemographic features as well as beliefs about medicines in patients with CKD.

Another methodological issue relates to the sample representativeness. Studies on the broader CKD population and recruiting even larger samples to enable effective multi-group analysis should be pursued in future research.

Further, measuring medication adherence in the CKD population can be impacted by numerous other factors besides medications (such as adherence to diet or fluid intake and dialysis), residual renal function, dialytic age, comorbid conditions, nutritional status or type of dialysis treatment and cognitive impairment. In future studies, the above variables should be examined using in this way consistent and standardized measures of compliance.

Also, medication adherence can be affected by personality traits. According to McCrae's and Costa's "Model of the person", personality traits (understood as underlying tendencies) may explain a person's thoughts, feelings and actions. The association between personality traits and medication adherence may therefore be indirect - i.e., the associations between these characteristics and beliefs about medicines may be of importance to adherent behaviour. The impact of personality traits on beliefs about medicines as well as on treatment adherence could be investigated in this study. Perhaps, the possible correlations may explain the relations that were found between BMQ scales and CKD medication treatment.

Despite its limitations, the present study demonstrates the significance of sociodemographic and psychological factors in understanding medication adherence of patients with CKD. It is important for renal health professionals to identify and attempt to remove their patients' barriers to medication self-management and optimal medication adherence. Staff in the dialysis unit can impact patient satisfaction with care and include

patients as active team members in order to identify barriers to medication adherence and to create individualized care plans for patients.

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