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Patients' illness schemata of hypertension: the role of beliefs for the choice of treatment

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The aims of this study were (1) to investigate what are the illness perceptions of hypertensive patients and their relationship with beliefs about specific medicines, and (2) to identify different illness schemata and how they relate to the choice of medication. This was a cross-sectional study in which 191 Portuguese patients (59% females), with a hypertension diagnosis, aged over 18 years old, were recruited from a hospital clinic in the Lisbon Metropolitan area. The questionnaire included measures of choice of medication, beliefs about specific medicines (BMQ-Specific), illness perception (Brief-IPQ), and socio-demographic information. The results indicated that the components of the illness perceptions were associated with patients' beliefs about necessity and concerns about medication. Patients seem to differ in their choice of medication (generic or brand names) according to the three illness schemata identified. Patients with more negative illness schemata were more likely to choose a brand medicine, whereas patients with a more positive perception of hypertension were more likely to choose a generic medicine. Our findings support the argument that illness perceptions and beliefs about medicines play a role in influencing patients' preferences of medicines for the treatment of hypertension.

Keywords: illness perceptions; hypertension; choice of medication; beliefs about generic medicines

Introduction

Hypertension is a major public health problem and is one of the major causes of worldwide morbidity and mortality. According to the World Health Organization (WHO Publications – Cardiovascular Diseases, 2001, 2002), currently hypertension affects about 600 million people worldwide. In Portugal, a recent study with 5023 adults indicated a prevalence of hypertension of about 42% (Macedo et al., 2005), and the guidelines for treatment and management are based on the European Society of Hypertension (ESH) and the European Society of Cardiology (ESH & ESC, 2007).

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Hypertension has been identified as one of the most prevalent risk factors for the development of coronary artery disease, stroke, peripheral vascular disease, renal failure, and congestive heart failure (Nasilowska-Barud & Kowalik, 2004; Volpe & Dedhiya, 2006). Despite improvements in its detection and treatment since the 1970s, several studies have shown that 60–75% of treated hypertensive patients do not reach the recommended target blood pressure of 150/90 mmHg (Inkster, Donnan, MacDonald, Sullivan, & Fahey, 2006). Hypertension is a chronic illness with serious economic and clinical consequences, and the asymptomatic nature of this condition contributes to the challenge of persistent medication use (Polónia, Ramalhinho, Martins, & Saavedra 2006; Viswanathan & Lambert, 2005). It has been estimated that approximately 50% of the hypertensive population does not take the prescribed medication (Dubiel, Cwynar, Januszewicz, & Grodzicki, 2005). Several factors such as lack of association of symptoms to hypertension, the complexity of the therapy prescribed, possible side-effects, or economical factors may contribute for non-compliance. These factors may be better conceptualised as patients' illness perceptions. Some studies have investigated the perception that hypertensive patients have about their illness and treatment (Heijmans & Ridder, 1998; Horne, Clatworthy, Polmear, & Weinman, 2001). A number of studies (e.g. Petrie & Weinman, 2006) have shown that when patients are diagnosed with an illness they generally develop an organised pattern of beliefs about their condition. Meyer, Leventhal, and Gutmann (1985) proposed the common-sense model of illness representations to understand the processes by which people make sense of illness. The representation is viewed as a schema that is formed, activated, and modified in response to a range of influences, such as the nature of the symptoms, prior knowledge, and information from experts (e.g. general practitioners) and lay people (Petrie, Jago, & Devich, 2007). It has been shown that when patients hold generally negative illness perceptions about their illness, for instance, a large number of symptoms associated with the condition, more severe consequences, and longer timeline beliefs, these perceptions may be important determinants of behaviour and outcomes, such as treatment adherence and functional recovery (Petrie & Weinman, 2006; Petrie et al., 2007). According to Peres, Magna, and Viana (2003) patients have a belief system distorted in relation to hypertension, which is associated with a partial knowledge about various aspects of hypertension. In spite of hypertension being known as an asymptomatic health problem, most of the people with such diagnosis are convinced that they experience very specific symptoms associated to changes in blood pressure (Ross, Walker, & MacLeado, 2004). The same authors referred that the illness representations of hypertensive patients indicated strong perceptions of chronicity, although not related to compliance to medication. Some studies suggested that beliefs about the illness and medication are influential in patients' decisions about whether or not to take the prescribed medication (Horne & Weinman, 1999). The first prospective follow-up study to assess the role of patients' beliefs about hypertension and its treatment on subsequent adherence and quality of life indicated that the patients' perceptions of their illness did explain a significant proportion of the variance between clinical disease severity and disability (Horne et al., 2001). In addition, such beliefs and attitudes about hypertension and treatment, patients' knowledge about medicines, and socio-demographic factors, may affect treatment adherence (Krousel-Wood, Thomas, Muntner, & Morisky, 2004; Petrie & Weinman, 2006).

Recent studies have shown that hypertensive patients use information about symptoms to regulate the type of decisions they make in adhering to treatment (Gamez, Roales-Nieto, & Sagarduy, 2006). Patients' acceptance of medical advice and information

may be influenced by their subjective beliefs about their health condition. Therefore, it is essential that these beliefs should be taken into account when giving health advice or medical treatment (Patel & Taylor, 2002). Healthcare professionals have both private and professional beliefs about medicines (Ogden, 2004), and it is likely that a mixture of these beliefs affects how and what information about medicines is communicated between themselves and the patient. This may decrease the possibility of achieving concordance in relation to sharing treatment decisions (Weiss & Britten, 2003) which is an important factor associated with adherence (Clifford, Barber, Elliot, Hartley, & Horne, 2006). According to Petrie and Weinman (2006) there is accumulating evidence that the lack of motivation to comply with the treatment often arises from mistaken beliefs about its *necessity* or from *concerns* about the potential adverse effects. Previous research has also shown that patients develop beliefs about the necessity of a specific medication for maintaining their health status (Horne & Weinman, 1999). A recent study suggested that hypertensive patients perceived medications to be necessary, but a substantial proportion had concerns about taking medicines (Ross et al., 2004). In general, these findings indicated that the beliefs about medicines may influence attitudes and beliefs about treatment for particular illnesses (Horne & Weinman, 1999). These authors also indicated that little is known about how patients make decisions concerning medicines or about their preferences for one drug or another. It is likely that the choice of medicines can be determined by the patients' perception about their disease, including its severity, benefits, and barriers to treatment. Thus we can assume that the patients' models of hypertension and their beliefs about medicines will all have an important role in decisions about the type of treatment.

In this sense, the aims of this study were: (1) to investigate what are the illness perceptions of hypertensive patients and their relationship with beliefs about specific medicines, and (2) to identify different illness schemata and how they relate to the choice of medication (generic *versus* brand).

Method

Design and participants

This study was cross-sectional. The participants were an opportunistic sample of Portuguese patients with a diagnosis of hypertension of at least 3 years duration. Patients were all aged 18 years old or over and recruited from a specialist cardiology outpatient clinic from the National Health Service, in the Lisbon Metropolitan area. Other inclusion criteria were being able to read, having their rate of blood pressure under control and keeping their regular appointments over the last year. For confidentiality reasons it was not possible to have access to personal and clinical data other than age and level of education.

Procedure

Patients who met the inclusion criteria, they were invited to participate by the clinic nurse before their appointment with the cardiologist. Each participant was invited to complete an anonymous questionnaire administered by a research assistant. Participation was voluntary. The participants who declined to participate did not provide any data, which meant it was not possible to compare decliners with the study participants.

Measures

Choice of medicines

Participants were asked what medicines they would choose if they were given a choice. This was assessed with a dichotomous variable (generic or brand).

Beliefs about specific medicines questionnaire (BMQ-specific) – (Horne, Weinman, & Hankins, 1999)

The BMQ-specific has two factors: *necessity* (5 statements – 1;3;4;8;10) and *concerns* (5 statements – 2;5;6;7;9) and has been shown to have satisfactory psychometric properties (in the present study, $\alpha=0.81$ and 0.74 , respectively). Higher scores mean higher agreement with the necessity of treatment, and higher concerns about taking their medication. Responses to each statement were scored on a five-point *Likert* scale (from 1 = strongly disagree to 5 = strongly agree).

Brief illness perception questionnaire (Brief-IPQ, translated version) – (Broadbent, Petrie, Main, & Weinman, 2006)

The Brief – IPQ has eight items. Five items assess cognitive illness representations: consequences (Item 1), timeline (Item 2), personal control (Item 3), treatment control (Item 4), and identity (Item 5); two items assess emotional representations: concern (Item 6) and emotions (Item 8); and one item assesses illness comprehensibility (Item 7). All the items are rated using 0–10 response scale. The items 3, 4, and 7 were reversed. Higher scores mean a more negative illness perception. The causal attributions were not included in the present study.

Socio-demographic information

Age, gender, and level of education.

For analysis purposes, the level of education was measured according to the national education plan in Portugal: Basic (1st level – 4 years, 2nd level – 6 years, 3rd level – 9 years), Secondary – 12 years; and University – Licenciatura (BSc), Mestrado (MSc), Doutoramento (PhD).

Analysis

The data analysis was performed using the SPSS software for Windows (version 15; SPSS Inc, Chicago, IL). Pearson correlations were used to investigate possible relationships between illness perceptions and beliefs about medicines. To reduce the probability of a type II error, post hoc power calculations were performed using Gpower 3.0 (Faul, Erdfelder, Lang, & Buchner, 2007) to detect a medium *effect size* to a significance level of $p < 0.05$, for each used test (Table 1). A cluster analysis was performed in order to identify groups of patients that share a similar pattern of illness perceptions and whether these profiles influenced their choice of treatment. Associations between patterns of illness perceptions or schemata, and choice of treatment were assessed by Pearson χ^2 tests. Statistical results were considered statistically significant for $p < 0.05$. Odds ratio for the generic vs. brand medicine and its interaction with the illness schemata was assessed by a Log-linear with ordinal row effects.

Table 1. *Post hoc* power calculations with a medium effect size for $p < 0.05$ (GPower).

Statistic test	<i>N</i>	Effect size	Power (%)
χ^2	171	$w = 0.30$	99
Pearson correlations	191	$r = 0.30$	99
<i>t</i> -test	191	$d = 0.50$	92
One-way Anova	191	$f = 0.25$	88

Table 2. Correlations between beliefs about medicines and illness perceptions ($N = 191$).

	Necessity	Concern
Consequences	0.376***	0.409***
Timeline	0.358***	0.278**
Personal control	-0.325**	-0.103
Treatment control	-0.299**	-0.142
Identity	0.377***	0.428***
Concern	0.293**	0.303**
Illness comprehensibility	-0.075	-0.055
Emotions	0.323**	0.437***

Note: ** $p < 0.01$; *** $p < 0.001$.

Results

Sample characteristics

The total sample was composed of 241 Portuguese (50 declined to participate), giving a response rate of 79%. The final sample was composed of 191 individuals: 112 females (59%), with a mean age of 62 years old ($SD = 11.4$; range = 36–84). Concerning level of education, 50% ($N = 96$) of the participants had completed primary education, 13% ($N = 25$), 12% ($N = 23$), and 13% ($N = 25$) had completed 6, 9, and 12 years of formal education, respectively, and 12% ($N = 22$) had completed University degrees.

Correlations between BMQ specific and illness perceptions

In general, patients perceived medication to be necessary [mean = 3.91 (0.68)] and show a moderate level of concern about their medicines [mean = 3.36 (0.77)]. Pearson correlations indicated that the components of the illness perceptions were associated with participants beliefs about necessity and concerns about medication (Table 2). A greater belief in the necessity and concern about treatment was associated with a more negative perception of hypertension in terms of consequences, chronic timeline, more symptoms, greater concern and a more negative emotional representation. A greater belief in personal and treatment control was positively associated with the necessity of treatment and it was not associated with concern about taking medicines (Table 2).

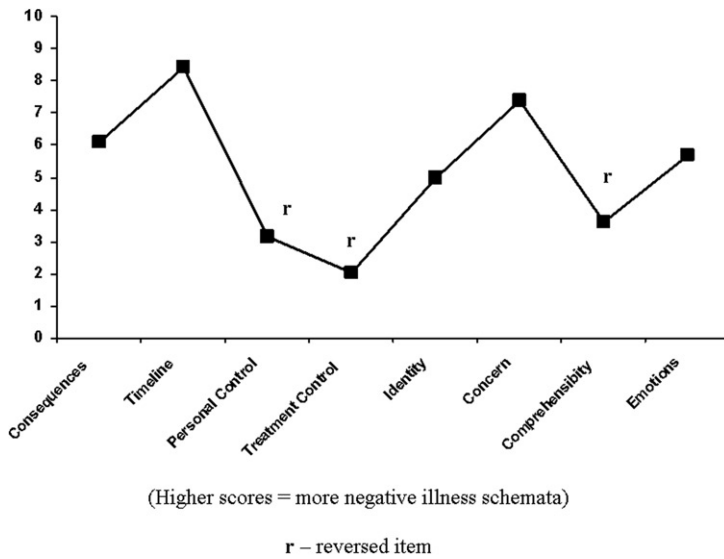


Figure 1. Illness schemata of hypertensive patients ($n = 191$). r = reversed time (Means of the dimensions of the Brief-IPQ).

Illness schemata of hypertension

The results indicated that the patients' common-sense model of hypertension is composed of beliefs about serious consequences, chronic timeline, high concern, and a negative emotional representation, although showing a strong belief in personal and treatment control, and good comprehensibility. The means for the illness schemata of hypertension are depicted in Figure 1.

A Hierarchical Cluster Analysis was performed using Ward's Method to identify different illness schemata of hypertension. The choice of the number of clusters was based on previous health psychology research. A review of 59 of these studies using cluster analysis found that the median number of clusters identified was four (Clatworthy, Buick, Hankins, Weinman, & Horne, 2005). In the present study, three clusters were therefore generated as this number appeared relatively typical of the number of groups found both in illness perception research and health psychology research in general, as referred by a recent study (Clatworthy, Hankins, Buick, Weinman, & Horne, 2007). The results indicated three illness schemata of hypertension (Table 3). Patients in cluster 1 showed a more negative model of hypertension, than the patients in the second cluster. In the third cluster there were significant differences from the other two in all the dimensions, except in identity, which is lower than the other two models. There were no significant differences concerning the demographic variables (gender, age, and education) according to each illness schemata identified, from t -tests and Anova.

Illness schemata and choice of medication

In order to identify how these illness schemata stand in relation to the choice of medication (generic *versus* brand), Pearson χ^2 tests were performed. The results indicated that patients seem to differ in their choice of medication (generic or brand names) according to the three

Table 3. Means (SD) of the clusters for the illness perceptions ($N=171$).

	Range	Cluster 1	Cluster 2	Cluster 3	F	Sig.
		($N=66$)	($N=73$)	($N=43$)		
		M (SD)	M (SD)	M (SD)		
Consequences	0–10	8.09 (2.07) ^a	5.40 (2.84) ^b	3.95 (2.54) ^c	39.31	0.000***
Timeline		8.92 (1.93) ^a	8.99 (1.88) ^a	7.21 (2.67) ^b	11.28	0.000***
Personel control		2.70 (2.46) ^a	2.14 (1.77) ^a	5.47 (1.70) ^b	38.60	0.000***
Treatment control		1.52 (2.10) ^a	1.19 (1.34) ^a	4.26 (1.79) ^b	45.86	0.000***
Identity		7.33 (2.70) ^a	3.92 (2.84) ^b	3.12 (2.26) ^b	42.13	0.000***
Concern		9.12 (1.51) ^a	6.86 (2.57) ^b	5.49 (2.09) ^c	41.44	0.000***
Comprehensibility		3.00 (3.58) ^a	2.55 (2.10) ^a	6.30 (2.11) ^b	27.97	0.000***
Emotions		8.97 (1.55) ^a	4.14 (2.62) ^b	2.98 (3.00) ^c	104.86	0.000***

Note: ^{a,b,c}Means sharing the same superscript are not significantly different according to the *post hoc* Tukey α test.

*** $p < 0.001$

Table 4. Frequencies of Illness schemata by choice of medication ($N=171$).

Choice of medication	Cluster 1	Cluster 2	Cluster 3	Total
Brand	41 (63.1%)	25 (38.5%)	21 (51.2%)	87 (50.9%)
Generic	24 (36.9%)	40 (61.5%)	20 (48.8%)	84 (49.1%)
Total	65 (100%)	65 (100%)	41 (100%)	171 (100%)

illness schemata that we identified ($\chi^2(2)=7.882$; $p < 0.019$). The frequencies of illness schemata by choice of medication are shown on Table 4. Preferences for a generic medicine were 62% less than for a brand medicine (OR = 0.38; $p = 0.01$). The Odds ratio for a individual in cluster 2 to adopt a generic medicine relative to a brand medicine as compared to an individual with cluster 1 increased by 67% (OR = 1.67; $p = 0.047$). There was an interaction between the illness schemata and the choice of generic vs. brand medicine. Individuals in cluster 1 adopted 65% more brand medicines that what would be expected if there were no interaction between the two variables (OR = 1.65; $p = 0.005$). Patients with more serious illness schemata (first cluster) are more likely to choose a brand medicine, whereas patients with a more positive perception of hypertension (second cluster) were more likely to choose a generic medicine. The third group of patients (cluster 3 in Table 4) showed a 'mixed model' in that they were evenly divided between brand and generic. In order to control for demographic factors, a analysis of covariance (Ancova) in which illness perceptions were the dependent variables, choice of medication and type of cluster were the independent variables, and sex (dummy variable), age, and level of education as covariates, was conducted but this did not provide any statistical effect.

Discussion

The present study examined the illness perceptions of hypertensive patients and their relationship with beliefs about specific medicines. Three distinct clusters of illness

schemata were found and these were related to the choice of treatment (generic *versus* branded-medicine). Generic medicines were introduced in Portugal in 2000, but it was only in 2004 that there was a significant increase in the number of units sold and in 2007 there was an increase of 26.5% in sales compared with that of 2006 (INFARMED, 2008). These medicines can be prescribed by a doctor, or dispensed by a pharmacist if the doctor allows the substitution of a branded medicine by a generic one, by ticking a box on the prescription. Otherwise, for over-the-counter (OTC) medicines, the pharmacist can choose what sort of medicine can be dispensed if the consumer does not have any preference.

The results of our study indicated that in general patients with hypertension seem to have an overall illness schema which is similar to that found in previous studies (Ross et al., 2004). The analysis also showed that their beliefs about the necessity of their medicines outweighed their concerns. Horne (1999) suggested that necessity beliefs are likely to be strong in patients with chronic illnesses. In the present study, patients' illness representations indicated that hypertension is seen as a long-term condition, which may be essential for the continuation of medication taking, and explain the relatively strong belief in the necessity of treatment. The beliefs about treatment were associated with the dimensions of the illness perception since beliefs in personal and treatment control were associated with beliefs about the necessity of treatment but not with concern. This result suggests that patients holding beliefs that hypertension is amenable to control, were more likely to believe in the necessity of treatment, and had lower concerns about their medicines. Furthermore, it is possible that patients who keep their regular appointments are more positively oriented for taking their medication. However, it seems that their illness schemata were likely to influence their beliefs about medication concerning the choice between generic and brand names. According to Horne and Weinman (1999), beliefs about a particular illness may influence the choice of treatment, expectations for recovery, and eventually adherence to treatment. The same authors argued that the beliefs about an illness are interconnected with beliefs about medicines.

The hierarchical cluster analyses identified three distinct clusters of illness schemata, which were different according to the choice of medication and independent of demographic variables. Patients with a more negative model of hypertension (cluster 1) showed serious perceptions of consequences, chronic timeline, a strong belief in personal and treatment control, a strong identity, a very high illness concern, and a very negative emotional representation, although they believed they had a good understanding of their condition. Patients in the second cluster showed significant differences from those in cluster 1 since their beliefs about consequences, identity, level of concern, and emotional representations were less negative. In the third cluster there were significant differences from the other two in all the dimensions, except in identity, which was lower than the other two clusters. Thus these patients held more positive beliefs about the consequences of hypertension, a more acute timeline, a weaker belief in personal and treatment control, lower concern and comprehensibility, and a more positive emotional representation. These results suggest that these illness perceptions are more consistent in predicting choice of medication rather than demographic characteristics. However, this should be further explored in a prospective study. According to Rao (2006), patients' treatment choices will depend on their beliefs about the perceived severity of their illness and on the perceived effectiveness of treatment options. According to Inkster et al. (2006), medication adherence in hypertensive patients may be influenced by patient's knowledge, beliefs, and attitudes about hypertension and its treatment. In the present study, patients with a more serious model of hypertension were more likely to choose a branded-name medicine, whereas patients with a more positive perception of hypertension in terms

of consequences, personal and treatment control, and a more positive emotional representation, were more likely to choose a generic medicine. Similar results have been found in previous clinical studies, in which patients with chronic diseases showed a more negative attitude towards generic drugs (Ganther & Kreling, 2000; Himmel et al., 2005). Beliefs about treatment with generic drugs may be the result of the interaction between information about these medicines and the perceived severity of the illness. These beliefs and attitudes could have an impact on primary care because it might be more difficult for doctors to persuade patients to accept generic prescriptions if they perceive their problems as serious and less controllable. This may be particularly important for people who take several medicines and may perceive any changes in their prescriptions as a potential threat to their health. There is therefore a need to study how generic substitution is perceived by patients in relation to potential side effects, efficacy, and confidence in their treatment. Our results also indicated that the choice of treatment for the group of patients who have a low identity score and a lower belief in personal and treatment control was split between brand and generic. One possible explanation is that illness schemata may operate at different cognitive levels in different patients, which may influence their perception of treatment needed. According to Lahdenpera and Kyngas (2001) this cognitive variation may influence the quality and quantity of care and support patients need. The same authors noted that patients need to have knowledge about the therapeutic options for hypertension, in order to adopt the treatment. Due to the fact that the use of generics in Portugal is quite recent, patients may not be aware of the availability of generic medicines, or may not have enough knowledge concerning the type of treatment they are taking. Here, doctors are in an important position to inform patients about the equivalence in efficacy of brand and generic drugs for hypertension. These health professionals play a key role in influencing patients' decision-making concerning branded or generic medicines given the fact they may or may not allow the substitution of a brand by a generic medicine. Ross et al. (2004) also argued that beliefs about medication are important for achieving concordance between doctors and patients and may be a target for interventions to improve adherence with the choice of treatment. These findings also raise questions about the potential for mismatch between patients' models of illness and those of health professionals, which may be more important than medical factors in influencing the choice of medication. Thus health professionals should explore patients' beliefs about hypertension and medicines as a basis for improving outcome. On the other hand, this could serve as a basis for adjusting medication to patients' own beliefs which could help to get blood pressure under control.

Our study may have been limited by sample size, although we were able to detect enough statistical power in order to reduce the probability of a type II error, controlling for the nominal type I error. The level of education of the sample is low and the completion of questionnaires may be a problem. One factor which limits the use of questionnaires in older samples in Portugal is the relatively high rate of illiteracy (INE, 2006). Some patients had problems filling in the questionnaires by themselves, and required help from the research assistant. However, we believe that this sample may be quite similar to a representative sample of Portuguese hypertensive patients, who are compliant with their regular appointments and treatment. Given the fact that the majority of patients were taking branded-name medicines, this limited the possibility of assessing previous experience with generic medicines, which may have had some influence on the results. Medicines are not the only treatment for hypertension and the management of the disease is also done through lifestyle modification, weight loss, smoking cessation, and diet modification (ESH & ESC, 2007). In the current study only beliefs about the illness

and medication were assessed and it was not possible to assess other factors such as co-morbidities which may influence the choice of medication.

The findings of the present study may contribute to increase our understanding of the relationship between patients' beliefs about hypertension and their beliefs concerning treatment and preferences for medication when they are given a choice between generic and brand medicines. Future research needs to further explore how and why patients form specific beliefs concerning their hypertension, and which sort of illness beliefs can influence treatment preferences in doctors and patients, since they may have implications for adherence.

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