

# Determining the Difference in Medication Compliance between the General Patient Population and Patients Receiving Antihypertensive Therapy: A Case Study

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This study addressed the issue of medication compliance in general, compliance with antihypertensive therapy, and the relationship between these two groups. In addition to determining the reasons for noncompliance with therapy prescription, the aim of this study was to also establish whether it was considered feasible by the patients to comply with their physician's instructions and whether the patients believed that the prescribed therapy was beneficial to their health. Hypertensive patients were compared to the total study population according to age groups. The study was designed as a cross-sectional survey with the use of a 33-item self-administered questionnaire. The study included 635 individuals who were collecting or buying drugs for the treatment of chronic diseases, with special reference to subjects taking antihypertensive agents (n = 361). More than half (n = 361; 56.9%) of the 635 study subjects were on therapy for arterial hypertension and possibly for some other diseases. The great majority of study subjects reported forgetfulness as the main reason for skipping drug doses. Comparison between the total study population and the subjects treated for arterial hypertension according to age groups (compliant, noncompliant and all together) yielded no statistically significant difference. We concluded that there was no difference in medication compliance between the general patient population and patients receiving antihypertensive therapy and there was no correlation between medication compliance and age.

**Key words:** Compliance, Medications, Arterial hypertension, Age

## INTRODUCTION

The impact of poor adherence grows as the burden of chronic disease grows worldwide. Adherence to long-term therapy for chronic illnesses in developed countries averages 50% (World Health Organization, 2003). In developing countries, the rates are even lower. It is undeniable that many patients experience difficulty in following treatment recommendations. Noncommunicable diseases and mental disorders,

human immunodeficiency virus/acquired immunodeficiency syndrome and tuberculosis, together represented 54% of the burden of all diseases worldwide in 2001 and will exceed 65% worldwide in 2020 (World Health Organization, 2003). The poor are disproportionately affected. Poor adherence to long-term therapies severely compromises the effectiveness of treatment making this a critical issue in population health both from the perspective of quality of life and of health economics. Interventions aimed at improving adherence would provide a significant positive return on investment through primary prevention (of risk factors) and secondary prevention of adverse health outcomes. Adherence is an important modifier of health system effectiveness. Health outcomes cannot be accurately assessed if they are measured predominantly by re-

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source utilization indicators and efficacy of interventions. The population health outcomes predicted by treatment efficacy data cannot be achieved unless adherence rates are used to inform planning and project evaluation. "Increasing the effectiveness of adherence interventions may have a far greater impact on the health of the population than any improvement in specific medical treatments" (Haynes et al., 2008). Studies consistently find significant cost-savings and increases in the effectiveness of health interventions that are attributable to low-cost interventions for improving adherence. Without a system that addresses the determinants of adherence, advances in biomedical technology will fail to realize their potential to reduce the burden of chronic illness. Access to medications is necessary but insufficient in itself for the successful treatment of disease. Health systems must evolve to meet new challenges.

In developed countries, the epidemiological shift in disease burden from acute to chronic diseases over the past 50 years has rendered acute care models of health service delivery inadequate to address the health needs of the population. In developing countries, this shift is occurring at a much faster rate.

The adherence project has adopted the following definition of adherence to long-term therapy, a merged version of the definitions of Haynes (1979) and Rand (1993). Adherence is the extent to which a person's behaviour - taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider. In summary, measurement of treatment adherence provides useful information that outcome-monitoring alone cannot provide, but it remains only an estimate of a patient's actual behaviour. Several of the measurement strategies are costly (e.g. MEMS) or depend on information technology (e.g. pharmacy databases) that is unavailable in many countries. Choosing the "best" measurement strategy to obtain an approximation of adherence behaviour must take all these considerations into account. Most importantly, the strategies employed must meet basic psychometric standards of acceptable reliability and validity (Nunnally and Bernstein, 1994). The goals of the provider or researcher, the accuracy requirements associated with the regimen, the available resources, the response burden on the patient and how the results will be used should also be taken into account. Finally, no single measurement strategy has been deemed optimal. A multi-method approach that combines feasible self-reporting and reasonable objective measures is the current state-of-the-art in measurement of adherence behaviour.

Clinical trials have demonstrated that the treatment

of mild-to-moderate hypertension can reduce the risk of stroke by 30 to 43% (Medical Research Council Working Party, 1992; Singer, 1992; Collins and MacMahon, 1994; Hennekens, 1999) and of myocardial infarction by 15% (Collins et al., 1990). Other costly consequences of untreated hypertension can also be prevented or minimized by effective treatment. Examples of the benefits of treatment include reduction in risk of cardiac failure, reduction in incidence of dementia, preservation of renal function and prevention of blindness in diabetic patients with hypertension (World Health Organization, 2003).

Medical non-compliance has been identified as a major public health problem in the treatment of hypertension. There is a large research record focusing on the understanding of this phenomenon. However, to date, the majority of studies in this field have been focused from the medical care perspective, but few studies have focused on the patients' point of view.

Hypertension is the single most common and most important risk factor for cardiovascular disease (Kannel, 1996). While many investigators have identified a multitude of reasons for noncompliance with medical advice, particularly medication, relatively little progress has actually been made in addressing and overcoming these problems (Myers, 1999; Langman et al., 2001). The strategies discussed here can be adapted for other chronic illnesses requiring long-term compliance with medication. Monitoring patient compliance with medication at every appointment is essential to identify non- or partial-compliance before altering the medication regimen. The findings by Ross et al. (2004) and others (Kjellgren et al., 1995; Svensson et al., 2000; Benson and Britten, 2002, 2003) highlight the importance of asking patients their beliefs about medication either by direct questioning or by administering a short questionnaire, such as 'The Beliefs about Medication Questionnaire' (Horne et al., 1999) and reinforcing the importance of antihypertensive therapy in those patients who fail to see the necessity for such medication. This, in combination with educating patients about hypertension, making them active participants in the management of their disease and providing a nurturing physician-patient relationship, will hopefully result in greater compliance, with significant reductions in blood pressure and fewer fatal and nonfatal cardiovascular/cerebrovascular events (He and MacGregor, 2003). Indeed, the problem is not unique to hypertension in itself, but to many disease states we have to deal with in everyday clinical practice. Various explanations have been proffered to explain why such a large percentage of patients have resistant hypertension, including secondary hypertension and endogenous

resistance to treatment. However, the main reason for inadequate control of blood pressure is poor compliance with the treatment regimen, both pharmacological and behavioural. Understanding the reasons for patient noncompliance with antihypertensive medication is essential if blood pressure is to be more effectively managed (Thrall et al., 2004).

Although adherence is probably not affected by old age itself, it is affected by several factors that are common among older people, such as physical or mental impairments, the use of more drugs, and an increased risk of drug-drug interactions and side effects. Taking several drugs makes remembering when to take each drug harder and increases the risk of adverse drug-drug interactions, particularly when over-the-counter drugs are also being taken. Doctors may be able to simplify the drug regimen—by using one drug that serves two purposes or by reducing the number of times a drug must be taken—to improve adherence and to reduce the risk of interactions. One of the solutions can be the broadening use of electronic monitoring to estimate longitudinal drug exposure (an explicit discipline called “pharmionics”) (Vrijens et al., 2005).

Because older people are generally more sensitive to drugs than younger people, they are more likely to have adverse drug reactions and may require a lower dose of certain drugs (Porter and Kaplan, 2008).

Patient compliance with prescribed therapy is influenced by a number of objective and subjective factors. The aim of the study was to determine whether patient age can influence medication compliance and if so, to what extent. Relationship between age and compliance varies across different studies. In one study, in a sample of older adults there was no relationship between compliance and living arrangements, health, life satisfaction, number of illnesses, age, or sex (Coons et al., 1994). In another study the patients' age was the only factor which was associated with adherence. Patients under the age of 55 years or aged over 65 years had significantly lower adherence than those aged between 55-64 years. Most previous studies coming from hospital-based or clinical trial populations have failed to demonstrate this association with age which may be characteristic of an unselected general practice population. The results may not be applicable to populations of different social or cultural background (Weingarten and Cannon, 1988).

Patients suffering from arterial hypertension should exhibit high level of compliance because hypertension is a disease that requires continuous and strict control. On the other hand, the symptoms may frequently be rather mild and patients may be free from subjective difficulties, which could be responsible for the rela-

tively poor patient compliance (Costa, 1996; Gascón et al., 2004).

The current study addressed the issue of medication compliance in general, compliance with antihypertensive therapy, and relationship between these two groups. In addition to determining the reasons for noncompliance with therapy prescription, the aim of the study was to also establish whether it was considered feasible by the patients to comply with their physician's instructions and whether the patients believed that the prescribed therapy was beneficial to their health. Hypertensive patients were compared with the total study population according to age groups.

## MATERIALS AND METHODS

The study was designed as a cross-sectional survey with the use of a 33-item self-administered questionnaire. The study included 635 individuals who were collecting or buying drugs for the treatment of chronic diseases, with special reference to subjects taking antihypertensive agents ( $n = 361$ ). The survey was conducted at Zagreb pharmacies and the questionnaire was filled out by the study subjects with instructions and help provided by the pharmacist playing the role of questionnaire administrator. The questionnaire was anonymous and study subjects could get their doubts cleared from the pharmacist.

Study subjects were divided into two groups; compliant group and noncompliant group according to self-declared medication compliance. The subjects who responded that they had never failed to take their medication on time were considered compliant, and all other subjects were considered noncompliant.

The questionnaire listed 16 most common reasons for noncompliance and the study subjects had to answer the question on each of these reasons reporting it as the possible cause of his/her noncompliance. These answers were then used to analyze the impact of each reason on noncompliance.

The subjects' attitude towards prescribed therapy was assessed with the help two questions. The first question was an objective one, in which the subjects were asked to explain whether complying with their physician's instructions regarding the medications was considered feasible by them. The optional answers provided were: not sure at all, quite sure, very sure, and absolutely sure. The answer to this question revealed the subject's attitude towards his/her ability to comply with the physician's instructions. The second question was a subjective one, in which the subjects were asked to state whether they believed that the prescribed therapy was beneficial to their health. The

optional answers provided for this question were the same as those provided for the first question. The answer to this question revealed the subjects' confidence in efficacy of the therapy.

### Statistical analysis

Student's *t*-test and Chi-square test with a significance level of  $p < 0.05$  were used when appropriate for the evaluation of the results. All analysis were performed with SigmaStat 3.0 for Windows (SPSS Science software products).

## RESULTS

More than half ( $n = 361$ ; 56.9%) of the 635 study subjects were on therapy for arterial hypertension and possibly for some other diseases. Demographic and social characteristics of the study subjects are presented in Table I.

The number of subjects with increased age was greater, with almost two-thirds (64.7%) of the subjects aged older than 55 years, which is consistent with the known pattern in which drug utilization increases with increasing age. This relationship was even more pronounced in the group of subjects treated for arterial hypertension. A statistically significant difference was seen between all the subjects and subjects treated for arterial hypertension in the 26-35 and 36-45 age groups, but it was not seen in the other age groups.

### Distribution of study subjects according to medication compliance

In the total study population ( $n = 635$ ), the noncompliant subjects prevailed over the compliant subjects ( $n = 370$ ; 58.3% vs  $n = 265$ ; 41.7%). The rate of medication compliance was lower in the group of subjects treated for arterial hypertension as compared with the total study population, however, the difference was not statistically significant ( $p = 0.501$ ). The percentage of compliant and noncompliant subjects is shown in Table II.

The level of compliance was found to increase slightly with age, and hence the subjects aged older than 65 years showed a higher level of medication compliance as compared with the subjects in the other age groups. A similar pattern was observed in the group of subjects treated for arterial hypertension; however, the difference did not reach statistical significance.

There was no statistically significant difference in age distribution between the total study population and subjects treated for arterial hypertension who reported medication compliance ( $p = 0.298$ ) and medication noncompliance ( $p = 0.273$ ) (Table III).

**Table I.** Demographic and social characteristics of the study subjects

		Total study population n = 635		Subjects treated for arterial hypertension n = 361	
		n	%	n	%
Age (yrs)	26-35	50	7.9	8	2.2
	36-45	52	8.2	13	3.6
	46-55	122	19.2	70	19.4
	56-65	162	25.5	104	28.8
	66+	249	39.2	166	46.0
Sex	Male	257	40.5	168	46.5
	Female	378	59.5	193	53.5
Status	Employed	211	33.2	92	25.5
	Unemployed	31	4.9	16	4.4
	Retired	357	56.2	240	66.5
	Recipient of relief	4	0.6	1	0.3
	Student	4	0.6	0	0.0
	Housewife	19	3.0	6	1.7
	Farmer	6	0.9	4	1.1
Education level	Other	3	0.5	2	0.6
	University	238	37.5	127	35.2
	Secondary school	309	48.7	182	50.4
	Elementary school	73	11.5	47	13.0
Living alone	Other	15	2.4	5	1.4
	Yes	119	18.7	68	18.8
Marital status	No	516	81.3	293	81.2
	Married	396	62.4	235	65.1
	Divorced	39	6.1	24	6.6
	Widowed	122	19.2	81	22.4
	Common-law marriage	19	3.0	6	1.7
	Single	59	9.3	15	4.2

**Table II.** Study subjects according to medication compliance

	Compliant		Noncompliant		All	
	n	%	n	%	n	%
Total study population	265	41.7	370	58.3	635	100.0
Subjects treated for arterial hypertension	142	39.3	219	60.7	361	100.0

### Reasons for medication noncompliance

The great majority of study subjects reported for-

**Table III.** Medication compliance and noncompliance according to age groups

Age (yrs)	Total study population				Subjects treated for arterial hypertension			
	Compliance		Noncompliance		Compliance		Noncompliance	
	n	%	n	%	n	%	n	%
26-35	16	32.0	34	68.0	1	12.5	7	87.5
36-45	22	42.3	30	57.7	3	23.1	10	76.9
46-55	50	41.0	72	59.0	26	37.1	44	62.9
56-65	62	38.3	100	61.7	39	37.5	65	62.5
66+	115	46.2	134	53.8	73	44.0	93	56.0
Total	265	41.7	370	58.3	142	39.3	219	60.7

getfulness as the main reason for skipping drug doses (n = 381; 60.0%), followed by being away from home (n = 288; 45.4%) and shortage of the drug (having consumed it all) (n = 282; 44.4%) as the next most common reasons for skipping drug doses. Similar to the total study population, the majority of subjects treated for arterial hypertension reported forgetfulness as the main reason for medication noncompliance (n = 220; 60.9%). The second most common reason was shortage of the drug (n = 169; 46.8%) followed by being away from home (n = 163; 45.2%). The reasons for medication noncompliance in both the groups are presented in a descending order in Table IV.

Comparison of the reasons for medication noncompliance in the total study population versus the subjects on antihypertensive therapy showed no statisti-

cally significant difference ( $p = 0.895$ ), indicating that the subjects treated for arterial hypertension and the total study population did not differ according to the reasons for medication noncompliance.

Analysis of the reasons for medication noncompliance in the total study population according to age groups indicated forgetfulness as the main reason (61.0%) for medication noncompliance in the oldest and largest age group (66+; n = 249) as well as in all the other age groups. In the 66+ age group, the second most common reason for medication noncompliance was shortage of the drug (41.4%), followed by the reason of taking a number of drugs several times a day (41.0%). The latter reason was not amongst the first three most common reasons in any other age group. Being away from home was the second most common reason for medication noncompliance in most of the age

**Table IV.** Reasons for medication noncompliance in the total study population and in the subjects treated for arterial hypertension

Reason for skipping drug doses	Total study population		Subjects treated for arterial hypertension	
	n	%	n	%
I just forgot	381	60.0	220	60.9
I was not at home	288	45.4	163	45.2
I fell short of the drug (I had consumed all of it)	282	44.4	169	46.8
I had problems with timing of the medication	260	40.9	149	41.3
I take a number of drugs several times a day	251	39.5	158	43.8
The drug was not available due to shortage of supply	228	35.9	134	37.1
I was feeling well	228	35.9	126	34.9
I wanted to avoid side effects	188	29.6	112	31.0
My doctor frequently changes my therapy	165	26.0	115	31.9
I felt the drug could be toxic/harmful	150	23.6	90	24.9
I was feeling sleepy at the time of taking the medication	145	22.8	82	22.7
I felt depressed or broken hearted	145	22.8	79	21.9
I was afraid of developing drug dependency	143	22.5	77	21.3
I had cold	133	20.9	78	21.6
The drug was too expensive	132	20.8	81	22.4
I did not want other people to see me while taking the drug	79	12.4	40	11.1

groups; however, in the 66+ age group it was the fifth most common reason for medication noncompliance.

In the 56-65 age group, being away from home and shortage of the drug were the second and third most common reasons for medication noncompliance (51.2% both) respectively.

There was no statistically significant difference between any particular age groups according to the four most common reasons for medication noncompliance, indicating that age had no effect on the frequency of the reasons reported for medication noncompliance in the total study population. Analysis of the reasons for medication noncompliance in the group of subjects treated for arterial hypertension according to age groups indicated forgetfulness as the main reason (60.8%) in the oldest and largest age group (66+;  $n = 166$ ) as well as in all the other age groups. In the 66+ age group, the second most common reason for medication noncompliance was taking a number of drugs several times a day (42.2%), and this reason was so commonly reported only in this age group. It was followed by the reasons of shortage of the drug (42.2%) and having problems with timing of the medication (37.3%). Being away from home ranked as the second most common reason in the other age groups, whereas it was only in the sixth to seventh place in the 66+ age group. In the 56-65 age group, being away from home ranked as the second most common reason (52.9%) and shortage of the drug was the third most common reason (51.0%) for medication noncompliance, the same pattern was noted in the 46-55 age group.

There was no statistically significant difference between any particular age groups according to the four most common reasons for medication noncompliance ( $p = 0.171$ ), suggesting that age had no influence on the frequency of the reasons for medication noncompliance, in the subjects treated for arterial hypertension also.

In the latter group, age had no effect on the frequency of the reasons reported for medication non-

compliance, i.e. the same pattern was noted across all age groups, although forgetfulness was expected to be more common in the older age groups.

The reasons for medication noncompliance in the total study population and in the subjects with arterial hypertension are presented in a descending order in Table V.

### Study subjects' attitude towards prescribed therapy

One of the questions in the poll was aimed at obtaining information on the surety of the subjects' ability to take all the drugs as per the physician's instructions. The results obtained in the total study population were very similar to those obtained in the group of subjects treated for arterial hypertension (Table VI) indicating that the latter group and the former group did not differ according to this issue.

The majority of the total study population ( $n = 602$ ; 94.8%) and the majority of subjects treated for arterial hypertension ( $n = 339$ ; 93.9%) gave a similar answer, i.e. they were sure that they will be able to comply with all instructions regarding the medications.

Although the number of subjects who were not sure about whether they will be able to comply with instructions regarding the medications was quite low in the total study population ( $n = 33$ ; 5.2%), and in the subjects treated for arterial hypertension ( $n = 22$ ; 6.1%), they predominantly comprised of the non-compliant subjects (90.9% in the total study population and 95.5% in the population treated for arterial hypertension).

In both the groups, the noncompliant subjects were statistically significantly more insecure about their ability to comply with instructions regarding the medications than those reporting medication compliance (total population  $p < 0.001$ , hypertensive population  $p < 0.005$ ).

In the total study population, a small number of subjects (both compliant and noncompliant) gave a

**Table V.** Reasons for medication noncompliance in a descending order according to age groups in the total study population and the subjects treated for arterial hypertension

Reason for noncompliance	26-35		36-45		46-55		56-65		66+	
	TSP	AH	TSP	AH	TSP	AH	TSP	AH	TSP	AH
I just forgot	1	*	1	*	1	1	1	1	1	1
I was not at home	2	*	4	*	2	2	2	2	5	6-7
I fell short of the drug (I had consumed all of it)	5	*	2	*	3	3	3	3	2	3
I had problems with the timing of the medication	3	*	5	*	4	4	5	5	4	4

TSP, Total study population; AH, Subjects treated for arterial hypertension

\*The 26-35 and 36-45 age groups in the subjects with arterial hypertension had a very low number of subjects (8 and 13, respectively) and were not included in the table.

**Table VI.** Opinion on the ability of taking all drugs as per the physician's instructions in the total study population and in the group of subjects treated for arterial hypertension

Ability to comply with instructions regarding the medications	All				Compliant				Noncompliant			
	TSP		AH		TSP		AH		TSP		AH	
	n	%	n	%	n	%	n	%	n	%	n	%
I am not sure	33	5.2	22	6.1	3	1.1	1	0.7	30	8.1	21	9.6
I am sure	602	94.8	339	93.9	262	98.9	141	99.3	340	91.9	198	90.4
Total	635	100.0	361	100.0	265	100.0	142	100.0	370	100.0	219	100.0

TSP, Total study population; AH, Subjects treated for arterial hypertension

negative answer (i.e I am not sure) to the question about their ability to take all the drugs as per the physician's instructions.

Comparison of the negative and affirmative answers (quite sure, very sure, and absolutely sure) between the compliant and noncompliant subjects according to age groups yielded no statistically significant difference.

However, in both the groups a statistically significant difference was noted between a positive and negative opinion about the ability to take all the drugs as per the physician's instructions in both the compliant and noncompliant subjects in all the age groups (Table VII).

The next question was: How sure were the subjects

that prescribed therapy will be beneficial to their health? Thus, the study subjects were asked to state their opinion on the favorable effects of treatment on their health (Table VIII).

The majority of total subjects (n = 595; 93.7%) and subjects treated for arterial hypertension (n = 342; 94.7%) stated that they were sure about the favorable effects of prescribed therapy on their health.

There was no statistically significant difference in the opinion on the beneficial health effects of prescribed therapy between the compliant and noncompliant subjects in both the total study population and in the subjects treated for arterial hypertension. In the total study population, there was no influence of age on the

**Table VII.** Opinion in the total study population and in the subjects treated for arterial hypertension about their ability to comply with instructions regarding the medications according to age groups (n (%))

Age (yrs)	Patients	All			Compliant			Noncompliant		
		I am not sure	I am sure	Total	I am not sure	I am sure	Total	I am not sure	I am sure	Total
26-35	TSP	0 (0.0)	50 (100.0)	50 (100.0)	0 (0.0)	16 (100.0)	16 (100.0)	0 (0.0)	34 (100.0)	34 (100.0)
	AH	0 (0.0)	8 (100.0)	8 (100.0)	0 (0.0)	1 (100.0)	1 (100.0)	0 (0.0)	7 (100.0)	7 (100.0)
36-45	TSP	2 (3.8)	50 (96.2)	52 (100.0)	1 (4.5)	21 (95.5)	22 (100.0)	1 (3.3)	29 (96.7)	30 (100.0)
	AH	0 (0.0)	13 (100.0)	13 (100.0)	0 (0.0)	3 (100.0)	3 (100.0)	0 (0.0)	10 (100.0)	10 (100.0)
46-55	TSP	7 (5.7)	115 (94.3)	122 (100.0)	1 (2.0)	49 (98.0)	50 (100.0)	6 (8.3)	66 (91.7)	72 (100.0)
	AH	4 (5.7)	66 (94.3)	70 (100.0)	0 (0.0)	26 (100.0)	26 (100.0)	4 (9.1)	40 (90.9)	44 (100.0)
56-65	TSP	8 (4.9)	154 (95.1)	162 (100.0)	0 (0.0)	62 (100.0)	62 (100.0)	8 (8.0)	92 (92.0)	100 (100.0)
	AH	6 (5.8)	98 (94.2)	104 (100.0)	0 (0.0)	39 (100.0)	39 (100.0)	6 (9.2)	59 (90.8)	65 (100.0)
66+	TSP	16 (6.4)	233 (93.6)	249 (100.0)	1 (0.9)	114 (99.1)	115 (100.0)	15 (11.2)	119 (88.8)	134 (100.0)
	AH	12 (7.2)	154 (92.8)	166 (100.0)	1 (1.4)	72 (98.6)	73 (100.0)	11 (11.8)	82 (88.2)	93 (100.0)

TSP, Total study population; AH, Subjects treated for arterial hypertension

subjects' opinion on the favorable therapeutic effects, although the older population was expected to have more confidence in their prescribed treatment.

However, the rate of affirmative answers given was lower among the noncompliant subjects as compared with compliant subjects in the total study population (91.9% vs 96.2%) and in the hypertensive population (92.7% vs 97.9%). There was no statistically significant difference in the rate of affirmative answers given between the compliant and noncompliant subjects (total study population  $p = 0.040$ , hypertensive group  $p = 0.055$ ).

Subjects with arterial hypertension exhibiting a

positive attitude towards the prescribed treatment and a higher rate of certainty of its favorable effects predominated over those declaring uncertainty about the therapeutic efficacy in all the age groups. Compliant subjects treated for arterial hypertension believed in the beneficial therapeutic effects in a higher percentage than total study population in all the age groups.

The number of subjects who were not sure about the beneficial therapeutic effects was low ( $n = 40$ ; 6.3%), most of them were from the group of noncompliant subjects ( $n = 30$ ; 75.0%).

In the total study population, a small number of

**Table VIII.** Opinion on the beneficial health effects of prescribed therapy in the total study population and in the subjects treated for arterial hypertension

*	All				Compliant				Noncompliant			
	TSP		AH		TSP		AH		TSP		AH	
	n	%	n	%	n	%	n	%	n	%	n	%
I am not sure	40	6.3	19	5.3	10	3.8	3	2.1	30	8.1	16	7.3
I am sure	595	93.7	342	94.7	255	96.2	139	97.9	340	91.9	203	92.7
Total	635	100.0	361	100.0	265	100.0	142	100.0	370	100.0	219	100.0

TSP, Total study population; AH, Subjects treated for arterial hypertension

\*Opinion on the beneficial health effects of prescribed therapy

**Table IX.** Opinion on the beneficial health effects of prescribed therapy in the total study population and the subjects treated for arterial hypertension according to age groups (n (%))

Age (yrs)	Patients	All			Compliant			Noncompliant		
		I am not sure	I am sure	Total	I am not sure	I am sure	Total	I am not sure	I am sure	Total
26-35	TSP	3 (6.0)	47 (94.0)	50 (100.0)	2 (12.5)	14 (87.5)	16 (100.0)	1 (2.9)	33 (97.1)	34 (100.0)
	AH	0 (0.0)	8 (100.0)	8 (100.0)	0 (0.0)	1 (100.0)	1 (100.0)	0 (0.0)	7 (100.0)	7 (100.0)
36-45	TSP	3 (5.8)	49 (94.2)	52 (100.0)	1 (4.5)	21 (95.5)	22 (100.0)	2 (6.7)	28 (93.3)	30 (100.0)
	AH	0 (0.0)	13 (100.0)	13 (100.0)	0 (0.0)	3 (100.0)	3 (100.0)	0 (0.0)	10 (100.0)	10 (100.0)
46-55	TSP	13 (10.7)	109 (89.3)	122 (100.0)	4 (8.0)	46 (92.0)	50 (100.0)	9 (12.5)	63 (87.5)	72 (100.0)
	AH	4 (5.7)	66 (94.3)	70 (100.0)	1 (3.8)	25 (96.2)	26 (100.0)	3 (6.8)	41 (93.2)	44 (100.0)
56-65	TSP	8 (4.9)	154 (95.1)	162 (100.0)	1 (1.6)	61 (98.4)	62 (100.0)	7 (7.0)	93 (93.0)	100 (100.0)
	AH	5 (4.8)	99 (95.2)	104 (100.0)	1 (2.6)	38 (97.4)	39 (100.0)	4 (6.2)	61 (93.8)	65 (100.0)
66+	TSP	13 (5.2)	236 (94.8)	249 (100.0)	2 (1.7)	113 (98.3)	115 (100.0)	11 (8.2)	123 (91.8)	134 (100.0)
	AH	10 (6.0)	156 (94.0)	166 (100.0)	1 (1.4)	72 (98.6)	73 (100.0)	9 (9.7)	84 (90.3)	93 (100.0)

TSP, Total study population; AH, Subjects treated for arterial hypertension



subjects (compliant and noncompliant) gave a negative answer (I am not sure) to the question as to whether they believed that the prescribed therapy would have beneficial effects on their health. There was no statistically significant difference in the negative answers between the compliant and noncompliant subjects according to age groups. Comparison of affirmative answers (quite sure, very sure, and absolutely sure) between the compliant and noncompliant subjects according to age groups yielded no statistically significant difference too.

However, a statistically significant difference was noted between the positive and negative opinions of subjects about the beneficial health effects of the prescribed therapy in both the compliant and noncompliant subjects in all age groups, in the total study population as well as in the hypertension group (Table IX).

In the group of subjects treated for arterial hypertension, the attitude about the favorable therapeutic effects was not influenced by age, although older subjects were presumed to have more confidence in their prescribed treatment.

Comparison of the opinion on the beneficial health effects of prescribed therapy between the total study population and the subjects treated for arterial hypertension according to age groups (compliant, noncompliant and all together) yielded no statistically significant difference, with the exception of the compliant subjects in the total study population and the compliant subjects taking antihypertensive medication, the latter being quite uncertain about the favorable impact of prescribed therapy on their health ( $p = 0.048$ ); this comparison yielded a statistically significantly lower number of subjects treated for arterial hypertension. Difference was noted in spite of the small number of these subjects. Other categories showed no difference according to age groups.

## DISCUSSION

Among the many reasons people give for not adhering to drug treatment, forgetfulness is the most common. The key question then is: Why do people forget? Sometimes, the psychological defense mechanism of denial is at work. Having a disorder causes concern, and having to take a drug is a constant reminder of the disorder. Or, something about the treatment, such as the possible side effects, may greatly concern the person, resulting in a reluctance to follow the treatment plan. By discussing concerns, people can learn that denial of their disorder and misconceptions about their treatment can lead to forgetting to

take drugs as directed, resulting in unwanted effects (Porter and Kaplan, 2008).

Research on adherence has typically focused on the barriers patients face in taking their medications. Common barriers to adherence are under the patient's control, so that attention to them is a necessary and important step in improving adherence. In responses to a questionnaire, typical reasons cited by patients for not taking their medications included forgetfulness (30 percent) (Osterberg and Blaschke, 2005).

The reason for medication noncompliance such as being away from home could also be associated with forgetfulness since the patient should have remembered to bring his medication along with him/her while going out. The next reason reported by the study subjects was shortage of the drug, which could also be related to forgetfulness, i.e. failure to collect or buy new supply of drugs on time. Positive attitude towards one's own ability to comply with the physician's instructions regarding medications predominated over the negative attitude in all the age groups. A similar pattern was also noted in the group of subjects treated for arterial hypertension, although higher motivation for regular therapy administration was expected in older hypertensives. Hypertensive subjects showed a statistically significantly higher rate of positive attitude towards prescribed treatment and ability to comply with the physician's instructions regarding medications than in those subjects that were not sure about the prescribed therapy. Self-reported medication taking compliance behavior of 132 high blood pressure patients was analyzed using an expanded version of the health belief model. Bivariate analysis showed that control over health matters, dependence on providers, perceived barriers, duration of treatment, and others' nonconfirming experience were significantly related to compliance ( $p < 0.05$ ). Log-linear multivariate analysis revealed that three of these five variables—control over health matters, perceived barriers, and duration of treatment—contributed independently to patient compliance. Self-reported medication taking was significantly related to blood pressure control ( $p \leq 0.02$ ). These data provide the basis for developing interventions for providers to facilitate the medication taking behavior of clinic patients (Hershey et al., 1980).

In our study, there was no correlation between medication compliance and age.

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