

# Factors Associated with Hypertensive Patients' Compliance with Recommended Lifestyle Behaviors

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**ABSTRACT:** **Background:** A crucial element in controlling blood pressure is non-pharmaceutical treatment. However, only a few studies specifically address the question of hypertensive patients' compliance with physicians' recommendations for a healthy lifestyle.

**Objectives:** To explore factors associated with hypertensive patients' compliance with lifestyle recommendations regarding physical activity, smoking cessation and proper diet.

**Methods:** We performed a secondary data analysis of a representative sample of 1125 hypertensive patients in Israel's two largest health funds. Data were collected in 2002–2003 by telephone interviews using structured questionnaires. The response rate was 77%. Bivariate and multivariate analysis was conducted.

**Results:** About half of the hypertensive patients reported doing regular exercise and adhering to a special diet; 13% were smokers. About half reported receiving counseling on smoking cessation and diet and a third on physical exercise. A quarter reported receiving explanations regarding self-measurement of blood pressure and signs of deterioration. Multivariate analysis revealed that patients' beliefs about hypertension management, their knowledge on hypertension and its management, and physician counseling on a healthy lifestyle and self-care, have an independent effect on compliance with recommended lifestyle behaviors.

**Conclusions:** The low counseling rates suggest that there may be a need to improve physicians' counseling skills so that they will be more confident and effective in delivering this service to their patients. A model based on educating both physicians and patients may contribute to improving the care of hypertensive patients.

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**KEY WORDS:** hypertension, patient compliance, patient adherence, lifestyle, risk reduction behavior

**A**n integral and crucial element in controlling blood pressure is non-pharmaceutical treatment, which includes smoking cessation, weight reduction, proper diet, and regular physical activity. However, the level of patients' compliance with medical and non-medical treatment recommendations is low. Consequently, blood pressure is controlled in only about a third of hypertensive patients [1,2].

Patients' education, their knowledge of cardiovascular risk factors, their perception of the benefits and potential risks of treatment, and their active participation in treatment decisions have been found to affect their compliance with treatment recommendations [3]. Physicians play an important role in helping patients modify unhealthy lifestyles and behaviors [4,5], but they do not always routinely advise their hypertensive patients to change their behavior [6].

Most research on patient compliance with hypertension-control guidelines focuses on medication, adverse events of the medication, and the patients' sense of well-being. There are only a few studies that specifically address the issue of compliance with recommendations for a healthy lifestyle, none of which were conducted in Israel. The objective of the present study was to explore factors associated with the compliance of hypertensive patients with lifestyle recommendations regarding physical activity, smoking cessation and proper diet.

## PATIENTS AND METHODS

This is a secondary data analysis of a study on the implementation of hypertension and diabetes guidelines in primary care [7]. The study was approved by the Institutional Review Board of HaEmek Medical Center. The study population included hypertensive patients of primary care physicians affiliated with the two largest health funds in Israel (Clalit Health Services and Maccabi Healthcare Services), insuring over 80% of the population.

The sample was drawn in two stages. In the first stage, a representative stratified sample of 997 primary care physicians was drawn from the health funds' lists. Of these, 743 physi-

\*Deceased

cians were interviewed, yielding a response rate of 78%. In the second stage, we sampled 1775 patients with hypertension and/or diabetes listed with these primary care physicians. A total of 1369 participants completed the patient questionnaire (77% response rate). Each participant was assigned a weight based on the probability of being sampled. The secondary data analysis presented in this article is based on the 1125 weighted cases of patients with hypertension.

#### DATA COLLECTION

Between December 2002 and June 2003, telephone interviews, using structured questionnaires, were conducted with hypertensive patients. The questions were constructed by the research team based on the health funds' guidelines for treating hypertension. A pretest was conducted with 300 patients and the questions were tested for face and construct validity. The interviews lasted an average of 20 minutes and were conducted by trained interviewers. The questionnaires were translated into Russian and Arabic to include significant segments of Israel's population that do not speak Hebrew fluently.

#### MEASURES

The outcome variable of the study was health behaviors. Patients responded yes vs. no/sometimes to questions on physical activity, whether they followed a special hypertension diet (e.g., caloric restriction, no salty foods, etc.), and whether they smoked. A measure was built by counting the number of times participants reported healthy health behaviors. The 20% with the highest health behavior compliance scores were defined as "high" in the measure. Independent variables in the study were:

- *Sociodemographics*: gender, age, education, family status and country of origin
- *Body mass index*: calculated according to self-report of height and weight, and categorized into normal (19–25), overweight (26–29) and obese (30 and over)
- *Level of blood pressure*: self-report of numerical blood pressure level last time tested, and response to the question: "is your blood pressure controlled nowadays?" (yes vs. sometimes/no)
- *Medication*: self-report on taking prescription medicines regularly for blood pressure patients (yes vs. sometimes/no)
- *Counseling on lifestyle behaviors and self-care*: We used seven questions (yes vs. no) to ascertain whether or not participants received counseling from medical staff regarding appropriate diet, body weight, smoking cessation, physical activity, risks and complications of hypertension, self-measurement of blood pressure, and signs of deterioration in the patient's medical condition. Respondents who answered "yes" to 5–7 items were defined as "high" in this measure

- *Knowledge on hypertension*: Respondents were asked whether they thought the following statements were true or false: "High blood pressure can damage blood vessels and lead to heart attacks and strokes," "Being overweight affects blood pressure," "Salt consumption raises blood pressure," "Physical activity helps reduce blood pressure," and "Medication is all that is needed to treat hypertension." The measure counted the number of correct answers ranging from 0 to 5. Those with 0–2 correct answers were defined as "low"
- *Beliefs about hypertension management*: The respondents were asked to respond "yes" or "no" to the following statements: "I believe that medication to reduce hypertension will help me feel better," "I believe that a diet to reduce hypertension will help me feel better," "A patient diagnosed with hypertension has to continue treatment whether or not his/her condition improves," "I believe that it is possible to control my blood pressure." The measure counted the number of constructive beliefs from 0 to 4. Those with 0–2 constructive beliefs were defined as "low"
- *Perceived responsibility for hypertension management*: We evaluated perceived responsibility for hypertension care based on patients' reports as being "primarily or solely of the patient" vs. "primarily of the medical team."

#### STATISTICAL ANALYSIS

Statistical analyses were conducted using the SPSS Version 11.5 computer package. We first ran descriptive statistics. We then conducted chi-square tests to establish bivariate correlations with the outcome variables. All variables significant at the 0.05 level were examined for multi-collinearity and then entered into multivariate logistic regression models as potential predictors of compliance with recommended lifestyle behaviors. We found no multi-collinearity effects among the various indices entered into the regression models.

#### RESULTS

The characteristics of the study population are shown in Table 1. Fifty percent of the patients were men, and 78% of the sample was 61 years old and over; 56% were born outside Israel, 73% were married, and 34% had more than 12 years of education. Regarding their medical condition, 41% were overweight (BMI 26–29) and 24% were obese (BMI 30 and above); 69% reported that their blood pressure was controlled. When asked about numerical values, 52% reported that their blood pressure was lower than 140/90 mmHg at the last measurement. Taking prescription medication was reported by 95%.

About half the current smokers reported receiving counseling on smoking cessation. About half of all respondents reported receiving counseling on diet and a third on physi-

BMI = body mass index

**Table 1.** Sociodemographic and medical characteristics of patients

	(n=1125)
<b>Age (yrs)</b>	
24–60	244 (22)
61–72	384 (35)
73+	464 (43)
<b>Gender</b>	
Male	560 (50)
Female	565 (50)
<b>Country of origin</b>	
Israel	478 (44)
Other countries	613 (56)
<b>Family status</b>	
Married/living with partner	790 (73)
Divorced/separated	44 (4)
Widowed	229 (21)
Single	26 (2)
<b>Education (last institution attended)</b>	
Post-high school/college or university	364 (34)
Other	713 (66)
<b>BMI</b>	
Normal	335 (35)
Overweight	388 (41)
Obese	233 (24)
<b>Systolic and diastolic blood pressure when last checked</b>	
Healthy, below 140/90	405 (52)
140/90–159/99	197 (25)
160/99–179/109	139 (18)
Over 180/110	39 (5)
<b>Is your blood pressure controlled?</b>	
Yes	729 (69)
Sometimes	210 (20)
No	111 (11)
<b>Has your physician prescribed medication for hypertension</b>	
Yes	1054 (95)
No	52 (5)

The numbers in parentheses represent the percentage of patients with a valid answer for each field

cal exercise. A quarter reported receiving explanations about self-measurement of blood pressure and about signs of deterioration they should watch out for [Table 2].

About half of the patients reported doing regular exercise and adhering to a special diet to reduce hypertension. Overall knowledge rates were high on most items but 37% of the patients believed that treating the disease only with medication was sufficient. Most people believed that high blood pressure can be treated [Table 3].

A multivariate logistic regression analysis to predict patients' compliance with a healthy lifestyle shows that age under 60 (odds ratio 0.62,  $P < 0.05$ ), low scores on the "positive beliefs about hypertension management" scale (OR 0.44,  $P < 0.05$ ) and on the "knowledge about hypertension and its management" scale (OR 0.28,  $P < 0.05$ ) predicted low scores on healthy lifestyle behavior. Reported counseling by the primary care physician on a healthy lifestyle and self-care

**Table 2.** Patients' reports on lifestyle and self-management counseling by medical staff

	(n=1125)
<b>Lifestyle counseling</b>	
Current physician recommended physical activity	
Yes	338 (31)
Current physician discussed smoking cessation (current smokers only)	
Yes	77 (54)
Current physician discussed the need for a suitable diet – what you may and may not eat	
Yes	581 (54)
Current physician discussed your desirable weight	
Yes	532 (50)
<b>Self-management counseling</b>	
Current physician explained the risks and complications of high blood pressure	
Yes	57 (641)
Current physician explained how to measure blood pressure by yourself	
Yes	24 (270)
Current physician explained about signs for deterioration	
Yes	25 (281)

The numbers in parentheses represent the percentage of patients with a valid answer for each field

(OR 1.59,  $P < 0.05$ ) predicted high scores on healthy lifestyle behavior. Other demographic variables in the model (gender, education, language) did not have a statistically significant effect on compliance with a healthy lifestyle.

## DISCUSSION

The results of the study show that the majority of hypertension patients are informed and have knowledge about both hypertension and the effect of a healthy lifestyle on controlling blood pressure. Furthermore, most believed that their disease could be managed. However, we found that many patients did not lead a healthy lifestyle. Only two-thirds of the respondents reported that they exercise and 13% of the respondents still smoke. Furthermore, only one-third of the respondents have a body mass index within normal levels, while others are overweight or obese. Finally, only 52% of the respondents reported that they had normal blood pressure levels ( $< 140/90 \text{ mmHg}$ ) at their last checkup and 95% were prescribed medication. These findings suggest that patients' lifestyle behaviors may contribute to their elevated blood pressure levels. Data from the U.S. National Health and Nutrition Examination Survey for 1999–2004 show that 65% of hypertensive patients do not have their blood pressure controlled to levels below 140/90 mmHg, which is attributed to poor management of elevated systolic blood pressure [8].

The non-optimal results among hypertensive patients in Israel could stem from the fact that in addition to the great difficulty in lifestyle adjustment [2,9], only a third to half of

**Table 3.** Patients' reported health behaviors, knowledge and beliefs about hypertension and its management

		(n=1125)	
<b>General Behavior</b>			
<b>Do you exercise regularly?</b>			
Yes		537 (48)	
No		588 (52)	
<b>Do you smoke, or have you in the past?</b>			
I smoke		143 (13)	
I used to smoke		410 (36)	
I have never smoked		572 (51)	
<b>Do you follow a special diet for your hypertension (low calorie, low fat, salt-free, etc.)?</b>			
Yes		500 (45)	
Sometimes		230 (21)	
No		379 (34)	
<b>Knowledge</b>			
<b>Unbalanced blood pressure can damage blood vessels and lead to heart attacks and strokes</b>			
True		997 (91)	
False		5 (1)	
Don't know		97 (8)	
<b>Being overweight does not affect blood pressure</b>			
True		154 (14)	
False		799 (73)	
Don't know		148 (13)	
<b>Salt consumption raises blood pressure</b>			
True		975 (88)	
False		26 (2)	
Don't know		106 (10)	
<b>Physical exercise helps reduce blood pressure</b>			
True		853 (78)	
False		60 (5)	
Don't know		184 (17)	
The numbers in parentheses represent the percentage of patients with a valid answer for each field			
<b>Medication is all that is needed to treat hypertension</b>			
True		410 (37)	
False		600 (54)	
Don't know		93 (9)	
<b>Beliefs</b>			
<b>I believe that medication to reduce hypertension will help me feel better</b>			
Agree		933 (88)	
Don't entirely agree		69 (6)	
Disagree		40(4)	
Don't know		18 (2)	
<b>I believe that a diet to reduce hypertension will help me feel better</b>			
Agree		827 (77)	
Don't entirely agree		70 (6)	
Disagree		101 (10)	
Don't know		74(7)	
<b>A hypertension patient has to be treated constantly, whether or not his/her health improves</b>			
Agree		978 (90)	
Don't entirely agree		26 (3)	
Disagree		25 (2)	
Don't know		53 (5)	
<b>I believe that it is possible to control my blood pressure</b>			
Agree		821 (76)	
Don't entirely agree		88 (8)	
Disagree		55 (5)	
Don't know		111(11)	
<b>Who is responsible for ensuring your blood pressure is balanced?</b>			
Full/main responsibility is with the doctor and/or nurse		207 (21)	
Full/main responsibility is with the patient		823 (79)	

The numbers in parentheses represent the percentage of patients with a valid answer for each field

**Table 4.** Multivariate logistic regression: predictors of healthy lifestyle behavior

	OR	CI 95%
Age (up to 60)	0.62*	0.41-0.94
Language (Hebrew)	1.24	0.67-2.30
Gender (male)	1.05	0.75-1.45
Education (high)	1.34	0.95-1.90
Believes responsibility for balanced blood pressure is primarily of medical team	0.79	0.49-1.27
Constructive beliefs about hypertension management (low)	0.44*	0.25-0.79
Knowledge about hypertension and its management (low)	0.28*	0.12-0.64
Received counseling about lifestyle & self-care (high)	1.59*	1.06-2.34

P<0.05\*

Hosmer and Lemshow test chi-square 5.69, P = 0.68

the hypertensive patients reported receiving counseling from their physician on the necessity of smoking cessation, correct diet, desired weight, and regular exercise in the treatment of blood pressure. Previous studies suggest that knowledge transferred from medical staff is an important factor in inducing patients to comply with lifestyle recommendations

[10]. Nevertheless, similar low counseling rates were reported in studies conducted abroad [11-13].

The main finding of the multivariate analysis was that patients' beliefs about hypertension management, patients' knowledge about hypertension and its management, and physician counseling on a healthy lifestyle and self-care each have an independent effect on hypertensive patients' reported compliance with the recommended lifestyle behaviors.

The effect of beliefs and knowledge about hypertension and its management is concordant with the known theoretical model relating attitudes to changes in lifestyle behaviors [14], as well as findings of former studies reporting that patient education about hypertension and lifestyle modification improved blood pressure control [2,3]. Apparently, such patients can play a more active role in their treatment and therefore are more effective in controlling their condition. The role of physician counseling in patient's compliance with lifestyle changes is also concordant with previous empiric studies [5,10]. Low counseling rates are attributed to a lack of time, knowledge, skills and training in lifestyle counseling, leading to physicians' low self-confidence in performing this role [15-17].

One of the greatest challenges facing medical systems is finding effective strategies for convincing and helping patients with chronic disease, including those with hypertension, to change their lifestyle and to play an active part in their treatment. The predominant theory is that there is a need to understand what motivates each patient and what affects his/her motivation and to convince him/her to make the change accordingly [18,19]. This can be achieved by organizing patient-centered workshops, for example, to teach about hypertension and to enhance patients' motivation to play an active role in their treatment. This will result in empowering patients and making them partners in the management of their condition.

This study has several limitations. First, the study was based on self-reporting by patients regarding their lifestyle behaviors and physician recommendations. These may be inaccurate because of "social desirability" responses or recall difficulties. Nevertheless, patients are considered a reliable source of information [20] on such topics. Furthermore, there is no alternative source of information regarding patients' behaviors and physicians' lifestyle counseling as this is not recorded in the medical files. Second, as in previous studies on these topics, the cross-sectional nature of the design prohibits conclusions about cause and effect, and therefore we refer only to an association between lifestyle behaviors and the independent variables in the multivariate regression model.

In conclusion, our study showed that receiving counseling from a physician about a healthy lifestyle and self-care, being informed about hypertension and its management, and having positive beliefs with regard to managing this condition led to maintenance of a healthy lifestyle. However, the low counseling rates found in the study suggest that there may be a need to improve physicians' counseling skills so that they will be more confident and effective in delivering this service to their patients. A model based on educating both physicians and patients may contribute to improving the care of hypertensive patients.

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#### "There is more to life than increasing its speed"

Mohandas Karamchand Gandhi (1869-1948), political and ideological leader of India who through mass civil disobedience and total non-violence led India to independence and inspired civil rights and freedom movements across the world

#### "A society grows great when old men plant trees whose shade they know they shall never sit in"

Greek proverb

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