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EVALUATION OF HYPERTENSION AWARENESS AND TREATMENT ADHERENCE

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Abstract:
Background and Objectives: The aim of this study was to determine hypertension (HT) awareness in the adult population, to identify symptom-oriented misconceptions in illness perception, and to examine the effects of sociodemographic factors (gender, educational status) on medical treatment adherence and the use of traditional methods. **Materials and Methods:** This cross-sectional and descriptive study included 343 adult participants (180 males, 163 females) residing in Samsun province. Data were collected via a structured questionnaire inquiring about the participants' sociodemographic characteristics, epidemiological HT awareness, and the treatment adherence of 131 patients diagnosed with HT. Pearson Chi-square and Fisher's Exact tests were used for statistical analyses. **Results:** The prevalence of physician-diagnosed HT in the sample was found to be 38.2% (n=131). Although 74.3% of the participants knew the diagnostic threshold (140/90 mmHg), 69.4% identified "headache" as the primary symptom. Even though 87.8% of the HT patients knew that medications should be taken every day, the rate of regular medication adherence remained at 65.6%. Of the patients, 12.2% took their medications only when they were symptomatic, and 63.4% used garlic/lemon as an alternative treatment. Although the rate of knowing disease complications increased with higher education levels, the habit of adding salt without tasting the food was most common (66.5%) among university graduates. It was determined that male patients attended outpatient control visits more regularly (p=0.025) and received more information from physicians regarding medication side effects (p=0.014) compared to female patients. **Conclusion:** Although theoretical awareness regarding HT is high in the community, this does not always translate into treatment adherence and proper lifestyle modifications. The tendency of patients to manage an asymptomatic chronic disease like a symptom-oriented (headache) acute condition, and their inclination towards traditional

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methods, are major barriers. To enhance therapeutic success, there is a need to strengthen patient-physician communication in the clinic and to implement behavioral interventions.

Keywords: hypertension, treatment adherence, health literacy, physician-patient relations, complementary therapies

1. Introduction

Arterial hypertension (HT) is a prevalent chronic disease affecting more than 1.4 billion people globally and leading to millions of preventable cardiovascular deaths each year (1). Globally, only 19.7% of patients achieve target blood pressure (BP), which falls significantly short of the "80% diagnosis, 80% treatment, 80% control" target set by the World Hypertension League for 2030 (2). The observation that the global prevalence of uncontrolled HT is 54.6% suggests that a lack of access to medical drugs and poor adherence to medical treatment also contribute to this situation (3). Large-scale studies in Turkey (PatenT and PatenT 2) have shown that while the prevalence of HT is around 30.3% and 31.8%, BP control rates remain low at 28.7% (4). According to the SALTURK study, daily salt consumption in Turkey is considerably high, ranging from 14.8 to 18.0 grams (5). The Black Sea Region, in particular, has the highest HT prevalence (44.9%), largely attributed to dietary habits and high salt intake (6).

Given the asymptomatic nature of HT, it is a significant problem when patients utilize antihypertensive medications as painkillers to relieve immediate symptoms (such as headache) rather than for their chronic protective effects (7). The literature has demonstrated that an increase in education level does not always improve medication adherence; conversely, in some patient groups, a tendency toward mistrust in medication increases in tandem with self-management confidence (8).

Furthermore, perceiving traditional and complementary medicine (T&CM) practices, such as garlic and lemon, as alternatives to evidence-based drug therapy is a major barrier to medication adherence (9).

The aim of this cross-sectional study was to determine HT awareness in the adult population, to identify symptom-oriented misconceptions in illness perception, and to statistically analyze the specific effects of variables such as educational status and gender on medical treatment adherence, outpatient clinic visits, and the use of traditional methods (garlic/lemon).

2. Material and Methods

2.1. Study Design and Sample

This research was designed as a cross-sectional and descriptive study involving adult individuals residing in Samsun province. A total of 343 participants, selected by random sampling, who signed the informed consent form and had no psychological/neurological

barriers preventing them from completing the research questionnaire, were included in the study.

2.2. Data Collection Tools

The data were obtained through a structured questionnaire developed by the researchers following a literature review. The questionnaire consists of three main sections:

- **Sociodemographic and Clinical Characteristics:** Age, gender, height, weight (for Body Mass Index calculation), educational status, and comorbidities (Diabetes Mellitus, Cardiovascular Disease, Hyperlipidemia, etc.).
- **Hypertension Awareness:** Level of knowledge about the genetic transmission of the disease, target blood pressure values (140/90 mmHg threshold), and end-organ damage complications.
- **Treatment Adherence:** Addressed only to the 131 participants diagnosed with HT; this section assessed medication usage habits (every day, when feeling unwell, when eating salty food), frequency of outpatient clinic visits, and the frequency of using alternative/traditional methods (lemon/garlic).

2.3. Ethical Statement

The study was conducted in accordance with the principles of the Declaration of Helsinki. Informed Consent Forms were obtained from all participants, and the anonymization of the data was ensured. Ethical approval with the protocol number GOKAEK 2024/8/28 was obtained from the Non-Interventional Clinical Research Ethics Committee of Samsun University.

2.4. Statistical Analysis

The obtained data were analyzed using IBM SPSS Statistics v26 software. Continuous variables were expressed as mean ± standard deviation or median (min-max); categorical variables were expressed as frequencies (n) and percentages (%). Pearson's chi-square test and the likelihood ratio were used to examine the relationships between categorical variables. In cases where the expected count in the cells was less than 5, Fisher's Exact Test results were used. A two-sided $p < 0.05$ was considered statistically significant.

3. Results

3.1. Sociodemographic Characteristics and Medical History Data

A total of 343 individuals were included in this cross-sectional study conducted in Samsun province. Of the participants, 180 (52.5%) were male, and 163 (47.5%) were female. The mean age of the individuals participating in the study was 46.7 ± 13.3 years, and the mean body mass index (BMI) was calculated as 29.3 ± 4.87 kg/m². University graduates constituted the largest group (197, 57.4%) in the distribution of educational status.

During the open-ended general medical history inquiry ("What are your chronic diseases?"), the number of participants reporting a history of hypertension (HT) was 116

(33.8%); however, when asked the disease-specific question "Do you have a high blood pressure diagnosis?", this number increased to 131 (38.2%). It was found that 15 (11.4%) of the 131 patients who stated they were diagnosed with HT by a physician did not report this condition during the open-ended general inquiry.

The sub-analyses focusing on HT management and medication adherence were conducted on this group of 131 patients (Female: 81, Male: 50) who reported having a physician's diagnosis. The distribution of the sociodemographic and clinical characteristics identified in the sample is presented in Table 1.

Table 1: Sociodemographic and Clinical Characteristics of the Study Sample

	Number (n=343)	**Percent (%)**
Gender		
Male	180	52.5
Female	163	47.5
Educational Status		
Primary School	58	16.9
Middle School	25	7.3
High School	63	18.4
University	197	57.4
Comorbidity Status*		
Hypertension (via Specific Query)	131	38.2
Hypertension (via medical history)	116	33.8
Diabetes Mellitus (DM)	54	15.7
Cardiovascular Disease (CVD)	31	9.0
Thyroid Diseases	26	7.6
Hyperlipidemia (HPL)	23	6.7
Rheumatic Diseases	15	4.4
Chronic Kidney Disease (CKD)	5	1.5
Chronic Liver Disease	4	1.2

* Since multiple diseases could be reported, percentages were calculated based on the total number of participants (N=343).

3.2. Epidemiological Awareness, Symptom Expectation, and Lifestyle

Of the participants, 255 (74.3%) correctly identified the clinical diagnostic threshold value for HT (140/90 mmHg). In the study group, 71 (20.7%) perceived 120/80 mmHg, and 17 (5.0%) perceived 90/60 mmHg as the diagnostic threshold. The proportion of those who correctly estimated the current approximate national prevalence of HT ("1 in 3 people") was found to be 34.1% (n=117), while 185 (53.9%) of the participants stated the national prevalence as "1 in 10 people."

When HT symptoms were questioned, 238 participants (69.4%) identified "headache" as the primary symptom. The number of participants who had never had their blood pressure measured was 157 (45.8%). In the context of target organ damage awareness, while the risks of cardiovascular, cerebrovascular, and ocular complications were known by over 86.0%, awareness regarding kidney damage complications remained lower at 70.8%.

The majority of the participants were aware that salt consumption, stress, obesity, and smoking increase blood pressure. The number of participants who added extra salt after tasting their food was 207 (60.3%), and the number of those who added salt without tasting was 27 (7.9%). The belief that garlic (60.9%) and lemon (71.4%) lower blood pressure was prevalent in the community. The levels of cognitive awareness and lifestyle perception identified in the sample are presented in Table 2.

Table 2: Cognitive Awareness and Lifestyle Perception Levels Regarding Hypertension

	Number (n=343)	**Percent (%)**
Clinical and Epidemiological Knowledge		
Knowing the Diagnostic Threshold Value (140/90 mmHg)	255	74.3
Knowing the Prevalence in Society (1 in 3 People)	117	34.1
Awareness of Familial Transmission	180	52.5
The Most Common Symptom of the Disease is "Headache"	238	69.4
Target Organ Damage Awareness		
Heart	315	91.8
Brain	305	88.9
Blood Vessels	303	88.3
Eyes	295	86.0
Kidneys	243	70.8
Risk Factor and Lifestyle Perception		
Belief that Dietary Modification Will Lower Blood Pressure	291	84.8
Belief that Regular Exercise Will Lower Blood Pressure	255	74.3
Awareness that Smoking Will Raise Blood Pressure	238	69.4
Belief that Lemon Consumption Will Lower Blood Pressure	245	71.4
Belief that Garlic Consumption Will Lower Blood Pressure	209	60.9
Medication Duration Knowledge		
"Medication should not be discontinued when blood pressure normalizes"	181	52.8

3.3. Disease Monitoring, Communication, and Treatment Adherence

In the subgroup diagnosed with HT (n=131), disease durations were reported as >10 years (43.5%, n=57), 5-10 years (21.4%, n=28), and <5 years (35.1%, n=46). When diagnostic methods were examined, it was determined that 87 (66.4%) of the patients were diagnosed via home monitoring or 24-hour ambulatory blood pressure monitoring, and 44 (33.6%) via in-office measurement.

When patient-physician communication was evaluated, the proportion of patients who stated that they did not receive/remember a "salt-free diet" recommendation from their physician was 39.7% (n=52), and the proportion of patients who stated that they did not receive information from their physician about the side effects of prescribed medications was 54.2% (n=71).

While the number of patients who knew that medications "should be used every day" was 115 (87.8%), the number of patients who regularly used their medication treatment every day was 86 (65.6%). It was found that 16 (12.2%) of the patients took their medications "only when they felt unwell" or "when they consumed salty food."

According to clinical follow-up data, the proportion of patients presenting to a physician only when they had a complaint was at the level of 46.6% (n=61). It was detected that 83 (63.4%) of the patients used garlic or lemon in addition to/as an alternative to their medical treatments. How the patients' HT diagnoses were made, their clinical follow-ups, and treatment adherence are presented in Table 3.

Table 3: Diagnosis, Clinical Follow-up, and Treatment Adherence in Hypertension Patients

	Number (n=131)	**Percent (%)**
Diagnostic Method		
Out-of-Hospital Monitoring (Home + Holter)	87	66.4
In-Hospital Office Physician Measurement	44	33.6
Physician-Patient Communication		
Those who received a salt-free diet recommendation	79	60.3
Those who did not receive information about medication side effects	71	54.2
Medication Knowledge and Practice		
Those who know the medication must be taken "every day"	115	87.8
Those who take their medication regularly "every day"	86	65.6
Those who occasionally forget their medication	23	17.6
Those who take long breaks / Do not use medication	22	16.8
Symptom-Based Medication Use		
Taking only "when feeling unwell / after eating salty food"	16	12.2
Clinical Follow-up Pattern		
Visiting the physician only when having complaints	61	46.6
Attending regular check-ups	48	36.6
Those who never go to the doctor	22	16.8
Complementary Practices		
Those who consume lemon and/or garlic	83	63.4

3.4. Factors Affecting Treatment Adherence

3.4.1. Gender Differences

HT was more common in females (49.7%) than in males (27.8%) (P<0.001). Along with HT, the prevalence of Diabetes Mellitus (P=0.002) and thyroid diseases (P<0.001) was also found to be higher in females. The proportion of males who reported "never" having their blood pressure measured (55.0%) was higher than that of females (35.6%) (P=0.001). Female participants knew the kidney-damaging effect of HT (P=0.031) and the importance of diet (P=0.033) at a higher rate compared to males (Table 4).

When follow-up data were analyzed by gender in the HT diagnosed subgroup (n=131); the rate of attending regular outpatient clinic check-ups after diagnosis was found to be higher in males (44.0%) than in females (32.1%) (P = 0.025). The proportion of male patients declaring they were informed by the physician about medication side effects was also statistically higher (P = 0.014).

Table 4: Comparison of Comorbidity, Clinical Perception, and Adherence by Gender

	Female (n=163)	Male (n=180)	P Value
	n (%)	n (%)	
Epidemiology and Comorbidity (N=343)			
Prevalence of Physician-Diagnosed HT	81 (49.7)	50 (27.8)	<0.001
Prevalence of Diabetes Mellitus (DM)	36 (22.1)	18 (10.0)	0.002
Prevalence of Thyroid Disease	23 (14.1)	3 (1.7)	<0.001
Screening and Cognitive Perception (N=343)			
Those who "Never" Measure their Blood Pressure	58 (35.6)	99 (55.0)	0.001
Knowing that HT Causes Kidney Damage	125 (76.7)	118 (65.6)	0.031
Knowing that Diet Lowers Blood Pressure	143 (87.7)	148 (82.2)	0.033
HT Diagnosed Subgroup Analysis (n=131)	**n=81**	**n=50**	
Attending Regular Doctor Check-ups	26 (32.1)	22 (44.0)	0.025
Receiving Medication Side Effect Info from Physician	15 (18.5)	21 (42.0)	0.014

3.4.2. Differences According to Educational Status

An inversely proportional relationship was observed between educational level and HT prevalence (P<0.001). In higher education groups, the rates of knowing the genetic transmission of the disease (P=0.001), anticipating cardiac (P=0.010) and renal (P=0.014) damage risks, and comprehending the risks of sodium consumption (P =0.007) were found to be significantly higher.

While the rate of identifying salt as a risk factor was highest among university graduates (90.9%), the behavior of "adding extra salt without tasting the food" was also found most frequently in this group (131, 66.5%). The declaration of "never" using table salt, on the other hand, was higher among primary school graduates (P =0.029).

The proportion of primary school graduates agreeing with the statement "Every HT patient must definitely use medication" was 56.9%, whereas the proportion of university graduates was 41.1% (P=0.024). In patients diagnosed with HT (n=131), no statistically significant relationship was found between educational status and the rates of regular use of prescribed medications (P=0.350).

Table 5: Comparison of Comorbidity, Clinical Perception, and Adherence by Educational Status

	Primary School (n=58)	University (n=197)	P Value
	n (%)	n (%)	
Epidemiology and Comorbidity (N=343)			
Prevalence of Physician-Diagnosed HT	43 (74.1)	44 (22.3)	<0.001
Prevalence of Diabetes Mellitus (DM)	20 (34.5)	17 (8.6)	<0.001
Cognitive Perception and Theoretical Awareness (N=343)			
Knowing the Genetic Transmission of the Disease	21 (36.2)	123 (62.4)	0.001
Knowing that HT Damages the Heart	47 (81.0)	188 (95.4)	0.010
Knowing that HT Causes Kidney Damage	34 (58.6)	146 (74.1)	0.014
Knowing that Salt Raises Blood Pressure	44 (75.9)	179 (90.9)	0.007
Lifestyle and Medical Perception (N=343)			

Belief that "Every HT Patient Must Take Medication"	33 (56.9)	81 (41.1)	0.024
Those who "Never" Use Salt at the Table	18 (31.0)	54 (27.4)	0.029
Irregularity in Medication Use (n=131) *	19 (44.2)	17 (38.6)	0.350

* Analyzed solely over the HT-diagnosed patients (n=131) (Primary School n=43, University n=44).

In the table, reference categories (Primary School and University) are presented to reflect the epidemiological distribution; P values are the result of an omnibus analysis (Pearson Chi-Square) encompassing all 4 education categories (Primary School, Middle School, High School, University).

4. Discussion

This research examines the difficulties in HT management across its cognitive, sociodemographic, and communicative dimensions. Our findings indicate that blood pressure control is a process that relies on more than just prescribing the correct medication; it is a clinical picture shaped by the patient's personal beliefs, educational status, and the patient-physician relationship.

Current data from the World Health Organization shows global HT control rates stalling at 23% (1). The 38.2% prevalence we obtained from our real-world data and the accompanying treatment nonadherence are consistent with national data (PatenT-2, SEMT) (4,6). The fact that the majority of patients (66.4%) receive their diagnosis via home measurements or Holter monitoring, and that 74.3% know 140/90 mmHg as the hospital measurement diagnostic threshold in accordance with the 2024 ESC Guidelines (10), demonstrates a relatively high level of hypertension awareness in the community.

There is a distinct discrepancy between patients' good level of knowledge about their diagnosis and their adherence to treatment. Over half of the participants (53.9%) estimated the prevalence of HT in society at a low rate, such as "1 in 10 people." This suggests that patients tend to underestimate the prevalence and severity of their own disease. While the percentage of those who know the medication must be taken every day is 87.8%, the fact that only 65.6% actually put this into practice is quite striking. Additionally, the fact that 45.8% of the population has never had their blood pressure measured and that 11.4% of HT-diagnosed patients do not state their illness during general medical history inquiries is clinically significant. These findings suggest that patients tend to normalize hypertension as a natural part of aging rather than a medical problem requiring management.

General medical consensus suggests that as the level of education increases, health literacy and medical adherence will improve (11). However, our findings do not completely align with this expectation. Although university graduates were the group that best knew the organ damage risks and the effects of salt (90.9%), we observed the risky habit of "adding salt without tasting the food" most frequently in this group (66.5%). An intense work pace, high frequency of ready/processed food (fast food) consumption, or the habit of eating out among the highly educated group might have paved the way for this situation. Furthermore, it is noteworthy that the belief that "HT patients must

definitely use medication" dropped from 56.9% among primary school graduates to 41.1% among university graduates (p=0.024). Evaluated through the Health Belief Model, this picture might indicate that highly educated patients experience cognitive dissonance by more easily accessing digital information sources and internally questioning physician recommendations (12). Developing a tendency to question medical authority within the digital information ecosystem can result in the rejection of physician prescriptions and reduced treatment adherence in highly educated individuals (13). On the other hand, the fact that 39.7% of patients stated they did not receive a specific "salt-free diet" recommendation during their outpatient visits suggests that insufficient time allocated for lifestyle modifications due to limited examination periods in outpatient clinics might have laid the groundwork for patients to continue their risky behaviors.

Despite the largely asymptomatic nature of HT (14), 69.4% of the patients in our study associated the disease with headaches. The fact that only half of the patients (52.8%) agreed with the idea that "medication is not stopped when blood pressure returns to normal" supports the premise that treatment is perceived as an instant crisis intervention, like taking a painkiller, rather than a chronic lifelong process that requires management. Similarly, there is a selective bias in their knowledge levels regarding organ damage. While damages that can result in acute events, such as heart (91.8%) and brain (88.9%) damage, are very well known by patients, kidney damage (70.8%), which progresses relatively more insidiously, remains in the background. The practice of taking medications only when there is a headache may stem from patients mistakenly believing their physiological stress is the actual cause of their elevated blood pressure. Current neurophysiological data also show that physical tension related to stress can reactively raise blood pressure, and the natural resolution of the pain after taking the medication can be encoded by the patient through false conditioning as relief provided by the drug (15). Unfortunately, this symptom-oriented medication use puts vascular structures at risk by exacerbating blood pressure fluctuations.

The more frequent occurrence of hypertension (49.7%) and accompanying cardiometabolic diseases in female patients in our study can be explained by known postmenopausal biological changes, increased arterial stiffness, and visceral fat accumulation (16). Even though women were more conscious regarding diet and organ damage (p=0.031), we detected notable differences during the disease process. The finding that men attend outpatient controls more regularly (p=0.025) and receive more information about medication side effects from the physician (42.0% vs 18.5%) suggests that there might be gender-based differences in health-seeking behavior. It was a significant problem that female patients, who have a higher potential to experience side effects such as edema due to calcium channel blockers or cough due to ACE inhibitors (17), because of body composition and pharmacokinetic differences, did not receive sufficient information from physicians regarding these issues (54.2%). When a patient encounters an unexpected side effect, they might discontinue the medication on their own initiative, which can result in treatment failure.

Another important finding in our study was the high interest in natural methods. A total of 63.4% of the participants viewed garlic or lemon as a part of or an alternative

to medical treatment. This is a reflection of the trust attributed to the perception of naturalness in society. Although the existence of a vasodilator effect of garlic (Allium sativum) through enabling nitric oxide (NO) synthesis has been demonstrated in the literature (18), such herbal supplements alone cannot provide the strict blood pressure control targeted by current guidelines. The consumption of these products outside of physician control, driven by the feeling of safety created by natural products, can set the stage for dangerous pharmacokinetic interactions, especially in patients simultaneously using anticoagulants or multiple drugs (polypharmacy).

Due to the cross-sectional nature of our study, it is difficult to establish definite cause-and-effect relationships based on the observed findings. For instance, the high prevalence of HT (74.1%) among primary school graduates might not solely be related to a lack of education but also to the older average age in this group. Since our data relies on the patients' own declarations, there is some room for recall bias or giving socially expected answers. Finally, the uniquely high-sodium dietary culture of the Black Sea Region, where the research was conducted, may limit the exact extrapolation of our results to the general population of Turkey.

5. Conclusion

In summary, this study reveals that the barriers to achieving target blood pressure do not solely stem from medical or pharmacological deficiencies. The patient's beliefs, education, and the quality of patient-physician communication in the consultation room are as determinative as the prescribed drug itself. An approach that solely focuses on physiological targets will remain insufficient in reducing cardiovascular risk. In future patient education strategies, emphasis should be placed on behavioral interventions aimed at breaking the "if I have no headache, I have no hypertension" perception. Furthermore, patient-physician shared decision-making processes should be more effectively integrated into clinical practice, and a focus should be placed on overcoming therapeutic inertia among physicians.

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Conflict of Interest Statement
The authors declare no conflicts of interest.

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