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## Knowledge and Attitudes of Medical Faculty Intern Students in the Diagnosis and Treatment of Hypertension: A Cross-sectional Study

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**Abstract:** Hypertension is an important public health problem with high morbidity and mortality and is seen in approximately 1 in 3 people worldwide. Hypertension can cause direct or indirect labour losses, but despite this, awareness in the society remains at low levels. This research examined hypertension awareness in medical school students who will graduate. The research is a cross-sectional descriptive study. The study population consisted of 55 students studying in the last year of Erzincan Binali Yıldırım University Faculty of Medicine. For the study, a questionnaire consisting of 26 questions was sent to the students electronically (Google forms), which was prepared by the researcher and questioned the presence of hypertension risk factors in the participants and the participant's knowledge and attitudes about the diagnosis and treatment of hypertension. Of 55 students, 53 (96.3%) were reached. Of the participants, 23 (43.4%) were female, and 30 (56.6%) were male. When the risk factors in the Turkish Hypertension Consensus Report were questioned among the participants, it was seen that the most common risk factor had a stressful personality with 66% (n=35). Of the participants, 18 (34%) had not measured blood pressure in the last six months. Of the participants, 73.6% stated that they could manage hypertension patient's diagnosis, follow-up and treatment with their current knowledge. It was seen that the average of correct answers given by the participants to 6 information questions about hypertension was  $3.55 \pm 1.21$ . While most of the participants think that they can diagnose, treat and follow up the hypertension patient, the remaining 26.4% think that they are insufficient. It is a situation that should be questioned well what makes them think they cannot follow hypertension patients. Interventions should be planned in medical education so that all students who will graduate are competent in hypertension. ©2023 NTMS.

**Keywords:** Hypertension; Essential Hypertension; Medical Education; Primary Healthcare.

## 1. Introduction

Although there may be different cut-off values in the guidelines of different countries, hypertension is defined as a systolic blood pressure  $\geq 140$  mmHg and/or a diastolic blood pressure  $\geq 90$  mmHg<sup>1,2</sup>. Hypertension is an important public health problem that is common

in Turkey and worldwide and causes high mortality and morbidity if not controlled<sup>3</sup>.

Hypertension is directly related to cardiovascular diseases, cerebrovascular diseases, kidney diseases and deaths at young ages. For example, it is the most

significant cause of congestive heart failure <sup>4</sup>. Conditions such as heart attack, kidney failure, and cerebrovascular events may be the first reason for presentation in patients with hypertension, who unfortunately cannot be diagnosed early. The Framingham study found underlying hypertension in 91% of newly diagnosed heart failure cases <sup>4</sup>.

Hypertension is present in about one in three people worldwide; therefore, approximately 9.4 million people die each year <sup>5</sup>. According to the World Health Organization data, hypertension is responsible for 45% of deaths due to cardiovascular diseases and 51% of deaths due to stroke <sup>5</sup>. According to the same report, Turkey is located in a high-risk region for ischemic heart diseases <sup>5</sup>.

In the Prevalence, Awareness And Treatment of Hypertension in Turkey (PATENT) study conducted in 2003, the prevalence of hypertension was found to be 31.8% <sup>3</sup>. This rate was 42.3% for those between the ages of 35-64, in other words, those who provide economic added value to the country and who work <sup>3</sup>. In the PATENT 2 study conducted in 2012, the prevalence of hypertension regressed some what and was found to be 30.3% <sup>6</sup>. Although the hypertension awareness rate has increased from 40.7% to 54.7%, it is still insufficient <sup>6</sup>.

According to the Turkey Burden of Disease Study conducted in Turkey, cardiovascular diseases are the most common cause of both deaths and the main diseases that constitute the disease burden in Turkey <sup>7</sup>. In the same study, the mortality rate attributed to hypertension, which can be prevented by controlling hypertension, is 25.2% of all deaths <sup>7</sup>.

Although hypertension rarely causes symptoms in the early stages, it begins to affect vital organs such as the brain, heart and kidneys. Follow-up and treatment of patients who cannot be diagnosed early may be difficult in the future. For this reason, the World Health Organization has used the "silent killer" analogy for hypertension <sup>5</sup>. In the Turkish Hypertension Consensus Report, it is recommended to measure blood pressure at every examination in adults for early diagnosis <sup>2</sup>.

Although approximately 95% of hypertension patients are considered as primary hypertension, the mechanism of hypertension formation in these patients is not fully known <sup>8, 9</sup>. However, obesity, excessive salt consumption, alcohol, smoking, sedentary life and genetic factors are thought to be effective <sup>2, 9</sup>. For this reason, it is necessary to question these risk factors in every hypertension patient and to eliminate these causes.

Only 5% of all hypertension cases are secondary hypertension, and it is not cost-effective to examine every patient for suspected secondary hypertension<sup>2</sup>. It can be done easily in primary care in 95% of the patients; Complete blood count, urinalysis, fasting blood sugar, sodium, potassium, uric acid, lipid profile, creatinine and electrocardiography are sufficient.

The lack of a referral system in primary health care services in our country is seen as an important

deficiency in managing health services <sup>10</sup>. Therefore, all first-line physicians should be well-equipped in the diagnosis and treatment of hypertension and should refrain from referring newly diagnosed hypertension cases to an upper level.

There is a need for experienced and trained health personnel about hypertension in every field, whether working in primary health care or 3<sup>rd</sup> level hospital. Diagnosis, follow-up and treatment of a major portion of hypertension patients can be easily done in primary health care, where the access of the patients is also easier. According to the health statistics year book published by the Ministry of Health of the Republic of Turkey in 2019, about 288 million applications were made to the 1st level health institutions 2019, while the total number of applications to the 2nd and 3rd level hospitals was about 525 million <sup>11</sup>. For this reason, training health professionals who will work in primary health care, especially physicians, gain significant importance. Although there are studies in the literature that measure the knowledge and attitudes of physicians and other health professionals actively working in the field, few studies examine the status of physician candidates who have not yet started to work professionally. Physicians may have gained these abilities through their own efforts after they started to work actively. This study may be useful in terms of showing whether the medical education of physician candidates about hypertension is sufficient or insufficient.

Our study aimed to examine the knowledge and attitudes of physicians, those who have reached the end of their education period and will work in primary health care after graduation about hypertension.

## 2. Material and Methods

### 2.1. Materials

A patient group consisting of 30 patients (16 females-14 males) diagnosed with SLE and followed in Erzurum Atatürk University Health Research and Application Center Directorate Physical Medicine and Rehabilitation Department Polyclinic and 20 healthy individuals (10 females-10 males) without any systemic disease was included in our study. Informed Consent Form was signed by the patient and control group who agreed to participate in the study.

Blood samples collected for this study, which was approved by Erzurum Atatürk University Faculty of Medicine Ethics Committee, were used for RNA isolation (Roche) and gene expression studies (Roche Light Cycler 480 Real-Time) in Atatürk University Faculty of Medicine Laboratory of Medical Biology Department.

### 2.2. Methods

The population of the study consisted of 55 students studying in the last year of Erzincan Binali Yıldırım University Faculty of Medicine. For the study, a questionnaire consisting of 26 questions was sent to the students electronically (Google forms) prepared by the

researcher, questioning the presence of hypertension risk factors in the participants and the participant's knowledge and attitudes about the diagnosis and treatment of hypertension. Each question was coded as to be answered, and the students could not move on to the next question without answering one question. Therefore, no missing data were detected.

The participants were questioned about a risk factor for hypertension in the Turkish Hypertension Consensus Report: BMI>30, smoking and alcohol use, regular exercise, presence of sleep apnea, family history, diet, and stressful personality. The presence of each of the risk factors was evaluated as 1 point, and the answer to the question "Do you exercise regularly" was "I do not usually do", "I do not do it at all"; and "I eat unhealthily" and "I eat very unhealthily" to the question "How do you think your diet is in general?" giving 1 point was evaluated, and hypertension risk score was calculated.

Knowledge score was created by calculating 1 point for each correct answer and 0 points for each wrong answer given to the 6 questions asked about the knowledge level of the participants.

### 2.2.3. Statistical analysis

SPSS 18.0 package program was used for the statistical analysis of the data. The statistical significance level was taken as  $p < 0.05$ . Ethics committee approval was obtained for the study from the local ethics committee with the decision dated 25/10/2021 and numbered 11/05. Descriptive statistics were used to evaluate the data, Pearson correlation analysis was used to compare two numerical data, and one-way ANOVA was used when the normally distributed and variable variances were equal between the groups.

## 3. Results

Of 55 senior medical students, 53 (96.3%) studying in the 2020-2021 academic year were reached. Of the participants, 43.4% ( $n=23$ ) were female, and 56.6% ( $n=30$ ) were male. The BMI of 3 (5.6%) individuals, two men and one woman, was  $>30$ . Other data of the participants are given in Table 1.

**Table 1:** Age, height, weight and BMI data of the participants.

	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>SD</i>
<i>Age</i>	22	27	24,17	0,97
<i>Height</i>	151	187	170,55	8,14
<i>Weight (kg)</i>	45	100	69,53	12,10
<i>BMI</i>	18	31	23,81	3,10

The participants questioned the risk factors in the Turkish Hypertension Consensus Report, and it was observed that none of the participants had witnessed sleep apnea. Other risk factors query is as in Table 2. The most common risk factor had a stressful personality with 66% ( $n=35$ ). This is followed by not exercising regularly. Of the participants, 39.6% said

they usually do not exercise regularly and 11.3% said they never do.

**Table 2:** Participants' risk factors.

	<i>n</i>	<i>%</i>
<b><i>Stressful personality structure</i></b>		
<i>Yes</i>	35	66
<i>No</i>	18	34
<b><i>Regular exercise status</i></b>		
<i>I do it all the time</i>	5	9,4
<i>I usually do</i>	12	22.6
<i>I do</i>	9	17
<i>I don't usually do</i>	21	39,6
<i>I never do</i>	6	11.3
<b><i>Diagnosis of hypertension in first-degree relatives</i></b>		
<i>Yes</i>	23	43.4
<i>No</i>	30	56.6
<b><i>Presence of diabetes in first degree relatives</i></b>		
<i>Yes</i>	22	41.5
<i>No</i>	31	58.5
<b><i>Presence of dyslipidemia in first degree relatives</i></b>		
<i>Yes</i>	15	28.8
<i>No</i>	38	71.7
<b><i>Smoking status</i></b>		
<i>Yes</i>	13	24.5
<i>No</i>	40	75.5
<b><i>How is the diet in general?</i></b>		
<i>Very healthy</i>	1	1.9
<i>Healthy</i>	8	15.1
<b><i>Neither healthy nor unhealthy</i></b>	36	67.9
<i>Unhealthy</i>	8	15.1
<i>Very unhealthy</i>	0	0
<b><i>Presence of diabetes mellitus</i></b>		
<i>Yes</i>	0	0
<i>No</i>	52	98.1
<b><i>There is impaired glucose intolerance</i></b>	1	1.9

Only one of the participants was diagnosed with hypertension and did not use medication, while there remaining 52 (98.1%) said they had not been diagnosed with hypertension before. In comparison, 34% ( $n=18$ ) of the participants did not have their blood pressure measured in the last six months.

The questions were asked to determine the participants' attitudes toward the diagnosis and treatment of hypertension, and their answers are given in Table 3.

While 17% ( $n=9$ ) of the participants stated that the diagnosis, follow-up and treatment of hypertension could be made entirely in primary care, 73.6% stated that they could completely manage a hypertension patient with their current knowledge.

While 60.4% ( $n=32$ ) of the participants gave the correct answer to the question of "how much salt should be taken daily", 39.6% ( $n=21$ ) gave the wrong answer.

Participants were asked "Should medication be started immediately in cases where systolic blood pressure is

>140 and diastolic blood pressure is >90", 86.8% (n=46) of the participants gave the answer "no", while 13.2% (n=7) gave the answer "yes".

When the questions about the drug choices of the participants were examined, it was seen that 49.1%

(n=26) of the participants did not know the first group of drugs to be started in the treatment of hypertension, and 43.4% (n=23) could not choose the appropriate combinations.

**Table 3:** Attitudes of the participants about the diagnosis and treatment of hypertension.

	<i>I totally agree</i>	<i>I mostly agree</i>	<i>I agree</i>	<i>I mostly disagree</i>	<i>I totally disagree</i>
<b><i>The blood pressure of every patient who comes to be examined should be measured.</i></b>	26.4% (n=14)	45.3% (n=24)	20.8% (n=11)	5.7% (n=3)	1.9% (n=1)
<i>Diagnosis, follow-up and treatment of hypertension can be done completely in primary care.</i>	17% (n=9)	45.3% (n=24)	28.3% (n=15)	7.5% (n=4)	1.9% (n=1)
<b><i>Primary care physicians should assume more responsibility in the management of hypertension.</i></b>	32.1% (n=17)	32.1% (n=17)	22.6% (n=12)	13.2% (n=7)	0 (n=0)
<i>I can diagnose, follow and treat a hypertension patient with my current knowledge.</i>	3.8% (n=2)	26.4% (n=14)	43.4% (n=23)	24.5% (n=13)	1.9% (n=1)

Likewise, 60.4% (n=32) of the participants thought that patients whose target blood pressure values could not be reached with monotherapy should be referred to a cardiologist or internal medicine specialist.

To the question of "How should the target blood pressure values in the elderly be compared to young adults", 26.4% (n=14) of the participants gave the answer "lower", while 73.6% (n=39) gave the answer "higher".

Considering the scores obtained by the participants from the knowledge questions, it was seen that the knowledge score average was  $3.56 \pm 1.25$  (Table 4). No significant correlation was found between knowledge score and risk score ( $p=0.756$ ).

**Table 4:** Participants' mean risk and knowledge scores.

	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>SD</i>
<i>Risk score</i>	0	7	2.92	1.74
<i>Knowledge score</i>	1	6	3.55	1.21

A significant relationship was found between the current information, diagnosis, follow-up and treatment of hypertension, and knowledge score ( $p=0.035$ ).

#### 4. Discussion

In our study, 73.6% of the participants (3.8% totally agree, 26.4% mostly agree, and 43.4% agree) stated that they could manage a hypertension patient's diagnosis, follow-up and treatment processes. Although this rate is high, higher rates can be expected for a disease seen in one out of three people in the community.

Hypertension is a public health problem seen in approximately one in three people worldwide and brings a great burden to societies both in the field of

health and economically <sup>5</sup>. Hypertension is a disease that physicians at all levels can follow up on. One of every three applications to health facilities in our country is made to primary care facilities. Therefore, the perception that hypertension should be managed only in 2<sup>nd</sup> and 3<sup>rd</sup>-level hospitals is wrong. On the other hand, the patient may not go to the referred place due to the workload, the difficulty of finding a queue in the hospital, etc. This causes a delay in the treatment of the patient. A study conducted in the USA observed that between 3% and 18% of the referred patients did not go to the referred specialist <sup>12</sup>.

The referral process is essential in guiding patients correctly, preventing unnecessary applications to higher-level health institutions, using health resources more effectively, increasing patient satisfaction and providing health services more efficiently <sup>10</sup>. An effective referral system increases the quality of every step of the health system. However, there is no effective referral system in our country. This deficiency poses a severe problem regarding the effective planning and management of health services. For this reason, it is necessary to establish a referral system and provide necessary training in primary health care services <sup>10</sup>.

Risk factors such as smoking and alcohol use, obesity, stressful personality structure, family history, excessive salt consumption, dyslipidemia, insufficient physical activity, diabetes, and sleep apnea should be questioned, reasons that may suggest secondary hypertension should be reviewed, and a detailed physical examination should be performed. In our study, it was observed that the participants had approximately three risk factors among these risk factors. The most common risk factor was having a stressful personality, with 66%. Exposure to

psychological stress and the resulting sympathetic discharge can increase blood pressure by causing vasoconstriction. When exposure to stress is prolonged, the susceptibility to hypertension increases<sup>13, 14</sup>. In experiments on borderline hypertensive mice, mice regularly exposed to stress developed hypertension<sup>15</sup>. In a study conducted on medical school students in Mersin, 58.3% of the students were found to have mild to severe stress, and stress increased significantly from the 3rd term<sup>16</sup>. In another study conducted in Malaysia, this rate was found to be 56% and it was mentioned that medical school education is a stressful process<sup>17</sup>. Although the stress situation has not been evaluated with a universal scale and its causes have not been questioned, the increased exam stress, future anxiety and uncertainties, especially with graduation, may have increased the stress coefficient in students.

Another frequently observed risk factor was sedentary life. Of the participants, 39.6% said they usually do not exercise regularly, and 11.3% said they never do. Regular exercise can reduce systolic blood pressure by 5-7 mmHg, which is about the same as the benefit of monopharmacotherapy<sup>18, 19</sup>. This is why almost all hypertension guidelines recommend regular exercise<sup>2, 9, 13, 20</sup>. Unfortunately, studies show that medical students' physical activity levels could be much higher<sup>21-23</sup>. In a study conducted by Gömleksiz et al. in a medical school in Elazığ, it was found that 67.5% of the students did not exercise regularly<sup>22</sup>. This situation is more evident especially in 5th and 6th-semester students, probably due to the medical speciality exam to be taken after graduation<sup>22</sup>. This is expected since we included students who will graduate in our study.

Although awareness has increased compared to previous years, it cannot be said that there is a full awareness of hypertension in our society<sup>3, 6</sup>. Although uncomplicated hypertension measuring device is sufficient for the diagnosis, it was seen that 45.3% of the participants who were found to have hypertension in the PATENT 2 study needed to be made aware of this condition<sup>6</sup>. Almost all of the participants in our study stated that they did not have hypertension. However, although they have been in the clinics for the last 1 year, they probably have a sphygmomanometer wherever they work, and they have repeatedly measured the blood pressure of others within the scope of practical training, approximately one-third of the participants have not had their own blood pressure measured in the last six months. We find this data important. Despite all these opportunities, even in the group of physicians who should have the highest awareness of blood pressure in society, awareness needs to be sufficient. A study conducted with physicians in Japan showed that middle-aged physicians had sufficient theoretical knowledge about hypertension but were more reluctant to treat patients than younger physicians<sup>24</sup>. This finding has been particularly associated with changing medical education<sup>24</sup>. One of the best examples of such a program was experienced in Canada. As a result of the

Education Program (CHEP) initiated in 1999 to improve hypertension management and reduce the burden of cardiovascular disease in Canada, 84.4% of antihypertensive prescriptions and hypertension in the Canadian population between 1996 and 2003 showed a 65.1% increase in the number of individuals diagnosed<sup>25</sup>. A study conducted on 340 patients registered in a family health center in Muğla found that 36.4% (n=124) of the participants never had their blood pressure measured, and their remaining 63.6% had it measured periodically<sup>26</sup>. From this point of view, it is a remarkable finding that the awareness of hypertension in the average population is somewhat better than that of medical school students. In this respect, there is a need for medical education practices that will increase awareness.

"Should primary care physicians take more responsibility in the management of hypertension in the current situation?" was asked, and 86.8% (n=46) of the participants answered either completely agree, mostly agree or agree. However, when asked, "Can you diagnose, follow up and treat a hypertension patient with your current knowledge?" this rate was low to 73.6% (n=39). When asked the participants, "Can the diagnosis, follow-up and treatment of hypertension be completely done in primary care" 90.6% (n=48) said they agree, mostly agree or agree. Although one-quarter of the participants feel inadequate in the follow-up of hypertension, it is a pleasing development that at least most of them agree that this follow-up can be done entirely in primary care and that the majority of them believe that primary care should take on more responsibility. In a study conducted on family physicians in Bursa, the most common chronic disease that physicians encountered was hypertension, with 24%.

In contrast, physicians were asked about the diseases they had the most difficulty managing the patient, and hypertension ranked 4th after diabetes mellitus, psychiatric diseases and rheumatological diseases<sup>27</sup>. It is an exciting finding that although hypertension is the most common chronic disease physicians see, they feel inadequate in managing it. On the other hand, when the theoretical knowledge scores of the participants are examined, it is seen that the mean score is  $3.55 \pm 1.21$  out of 6 points. In addition, a significant relationship was found between the knowledge score and thinking that one could follow hypertension ( $p=0.035$ ). Although the theoretical knowledge inquiry was not made on a Standard scale, essential questions such as some risk factors, drugs that can be started in the first group and drugs that cannot be combined were asked. Although the participants' theoretical knowledge is sufficient, it is a situation that should be questioned well. What makes them think that they cannot follow hypertension? This may be due to the fact that medical faculties in our country give less importance to practical education than theoretical courses. The reason for this may be the conversion of education to the online form and the disruption of practical training due

to the COVID-19 pandemic. More emphasis should be placed on the follow-up of common diseases such as hypertension in medical education, and students should be trained on systematic practical approaches. It is very essential to train physicians who can meet the health needs of society, with the training of trainers if necessary<sup>28</sup>.

## 5. Conclusions

Although there are studies on hypertension attitudes and behaviours in the literature, especially with physicians working in the field, studies with physicians who will graduate and have yet to start to work in the field are limited. In our study, one-third of the participants did not have their blood pressure measured in the last six months, and while most of them think that primary care should take a more active role in the follow-up of hypertension, some of them feel inadequate. Further studies with higher sample sizes questioning the reasons for this finding are needed. It should not be forgotten that hypertension is a public health problem, and effective diagnosis, follow-up and treatment by physicians from all levels will favour societies. Even in managing a disease such as hypertension, which is very common in society and whose diagnosis, follow-up and treatment processes are simple, physician candidates are reluctant to take an active role.

## Limitations of the Study

There are some limitations of our study. One of the most important limitations is the sample size. However, the number of students could be higher because our university is newly established. The results cannot be generalized due to the small number of students and the single-centre study. Nevertheless, most of the students were reached. Another limitation is that the attitudes and knowledge levels of the participants about hypertension were not made using a standardized general form since a suitable questionnaire could not be found in the literature review. Still, questions were asked about the main topics in hypertension guidelines and a general frame work was tried to be drawn<sup>29-31</sup>. In addition, the participants were given training on the subject after the study, so pre-post could not be done. There is a need for such studies in the future in order to measure the effectiveness of the education provided.

## Strengths of the Study

Although there are many studies on hypertension in the literature, as far as we can see, we have not come across a study on physician candidates who are about to complete their medical education but have yet to start working actively. Knowing whether physicians' knowledge and attitudes about hypertension are formed by their medical education by developing themselves in the field can help us to see our deficiencies in medical education<sup>24</sup>.

There are two major limitations in this study that can be addressed in future research. First, the sample size is

larger. Second, showing that the number of interleukins involved in sle disease is higher.

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None.

## Conflict of Interests

All authors declare there is no conflict of interest.

## Financial Support

No financial support was received for this study.

## Author Contributions

EG: Conceptualization, Methodology, Formal analysis, Writing-Original Draft. MY: Conceptualization, Methodology, Writing-Review and Editing.

## Ethical Approval

Ethics committee approval was obtained for the study from the Erzincan Binali Yıldırım University Clinical Research Ethics Committee with the decision dated 25/10/2021 and numbered 11/05.

## Data sharing statement

All data underlying the results are available in the article, and no additional source data are required.

## Consent to participate

Consent was obtained from those who participated in the study.

## Informed Statement

Informed consent was obtained from those who agreed to participate in the study.

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