## RESEARCH ARTICLE

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# Hypertension Control in North Cyprus and Feasibility of Life Style Changes 

# Berksel et al. Hypertension Control and Feasibility of Life Style Changes 

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#### Abstract

BACKGROUND/AIMS: Hypertension (HT) is a significant preventable risk factor for cardiovascular disease, stroke, and chronic kidney disease. It is defined as systolic blood pressure $\geq 140 \mathrm{mmHg}$, or diastolic blood pressure $\geq 90 \mathrm{mmHg}$, or both, often linked to obesity. Around $75 \%$ of HT cases are directly related to obesity. Effective blood pressure (BP) control in hypertensive patients relies on medical treatment and lifestyle adjustments. However, no prior study in Northern Cyprus has examined HT control and recommended lifestyle changes. MATERIALS AND METHODS: This study, conducted between May and August 2022, involved 185 hypertensive patients in Northern Cyprus. Data collection included height and weight measurements, along with a 14 -question questionnaire to assess BP values and lifestyle habits. Statistical analysis was performed using IBM ${ }^{\circledR}$ SPSS Statistics Version 18.0. RESULTS: Results revealed that only $42.7 \%$ of participants had controlled BP and that a significant $83.8 \%$ were overweight or obese. Most patients did not adhere to recommended daily salt intake, engage in regular physical activity, or maintain a healthy diet. Specifically, 76.8\% consumed more than the recommended 5-6 grams of salt daily, and 55.1\% favored animal-based foods over fruits and vegetables. In terms of physical activity, $88.1 \%$ did not engage in activities like swimming, biking, running, or brisk walking for the recommended $30-45$ minutes daily. Furthermore, $28.1 \%$ of hypertensive patients smoked. Alcohol consumption was low, with $43.2 \%$ reporting never consuming it. CONCLUSION: The majority of hypertensive patients were overweight or obese, lacked BP control, and did not adhere to recommended lifestyle changes. Notably, maintaining daily salt consumption $<6$ grams was statistically associated with effective BP control in Turkish Cypriots. This underscores the importance of lifestyle modifications in HT management. Keywords: Hypertension, blood pressure, obesity, lifestyle changes.


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## INTRODUCTION

Hypertension (HT) is one of the most important preventable risk factors for cardiovascular disease, stroke, and chronic kidney disease when not detected early and treated appropriately. HT is defined as systolic blood pressure (SBP) $\geq 140 \mathrm{mmHg}$, or diastolic blood pressure (DBP) $\geq 90$ mmHg , or both (1). According to the World Health Organization, one in four adult males and one in five adult females have high blood pressure (BP), and only one in five patients with HT have their BP under control (2).
Obesity is a major cause of HT. It is estimated that at least $75 \%$ of HT cases are directly related to obesity (3). Therefore, it is essential to develop treatment strategies for obesity management to reduce the incidence of obesity-related HT and effectively manage high BP in obese individuals. Conducted studies indicate that with the use of antihypertensive medication, only one-third of patients reached the targeted BP (SBP lower than 140 mmHg , DBP lower than 90 mmHg ). Therefore, relying solely on antihypertensive medicines for BP control is both challenging and not a correct approach $(4,5)$.
Studies demonstrate that changes in the lifestyles of hypertensive patients are beneficial and effective in reducing cardiovascular risk and controlling BP (6-9). The recommended lifestyle changes for hypertensive patients include reducing daily salt consumption, decreasing the intake of foods rich in dietary cholesterol and saturated fat from animal sources, minimizing fast food consumption, increasing daily physical activity, reducing alcohol intake, avoiding smoking, and controlling body weight $(10,11)$.
The aim of this study is to determine the proportion of hypertensive patients whose BP is under control and the proportion of participants who have adapted lifestyle changes accordingly in Northem Cyprus.

## MATERIALS AND METHODS

The research was conducted in Northern Cyprus between May and August 2022. A total of 185 Turkish Cypriot citizens diagnosed with HT by medical doctors, aged between 18 and 80, participated in the study. The patients were selected from various clinics and hospitals. Pregnant women, cancer patients, those with advanced heart failure, and those with advanced kidney insufficiency were excluded from the study.
A simple random sampling method was employed. A questionnaire consisting of 14 questions about daily physical activity, daily salt consumption, dietary habits, alcohol consumption, and smoking habits was administered. The reported daily salt consumption by the participants was
based on their verbal information during face-to-face interviews regarding salt-rich foods. Specifically, they were asked about the salt content in commonly consumed items such as cheese, halloumi, and olives, as well as the amount of salt added during food preparation and after cooking. Additionally, the questionnaire covered pickles, salty dried nuts, fast food, mustard, ketchup, and bread consumption. The co-author, a dietitian, determined whether the salt intake exceeded 5-6 grams daily. The salt content was assessed based on portion sizes using the Nutrient Compound Scale and the National Nutrient Composition Database "Turkomp" (12). For example, 5 olives contain 0.587 grams of salt, 1 piece of halloumi ( 30 g ) contains 0.78 grams, and 1 piece of white cheese ( 30 g ) contains 0.96 grams. Furthermore, 1 dessertspoon of salt added during cooking corresponds to 5 grams of salt (the amount is calculated based on the number of people consuming the food).
BP measurements for the hypertensive patients were taken after a minimum of 5 minutes of rest in a seated position, at least twice, and the average of these two measurements was recorded. Participants with high blood pressure were re-measured after 5 minutes. The BP readings for hypertensive patients were taken by the same doctor and using the same blood pressure monitor.

## Statistical Analysis

Height and weight values were recorded to calculate the participants' body mass index (BMI). BMI is obtained by dividing body weight in kilograms by height in meters squared. Therefore, the height of the hypertensive patients was measured in meters without shoes, and their weight was measured without jackets and shoes on a scale, with an adjustment of approximately 1 kilogram for clothing. The evaluation categorized BMI as follows: $18.5-24.99 \mathrm{~kg} / \mathrm{m}^{2}$ (normal), $25-29.99 \mathrm{~kg} / \mathrm{m}^{2}$ (overweight), $30-39.99 \mathrm{~kg} / \mathrm{m}^{2}$ (obese), and $\geq 40 \mathrm{~kg} / \mathrm{m}^{2}$ (severely obese).
The questionnaire forms were administered face-to-face, and for data analysis, the SPSS statistical program (IBM ${ }^{\circledR}$ SPSS Statistics Version 18.0) was utilized. Descriptive statistics included frequency, percentage, mean, average, standard deviation, as well as minimum and maximum values for data analysis.

## RESULTS

81 of the 185 hypertensive patients were female ( $43.8 \%$ ) and 104 (56.2\%) were males. In terms of the age distribution of the participants, $3.8 \%$ of them were $18-39$ years, $37.3 \%$ of them were $40-59$ years, and $58.9 \%$ of them were $60-80$ years.
Table 2 shows the BP measurement values of the hypertensive patients. $42.7 \%$ of them had normal BP, whereas $57.3 \%$ of them had higher than the normal BP. When the implementation rates of lifestyles of the hypertensive patients were analyzed, $16.2 \%$ of their BMI was within the normal range ( $18.5-24.99 \mathrm{~kg} / \mathrm{m}^{2}$ ), $46.5 \%$ were overweight ( $25-29.99$ $\mathrm{kg} / \mathrm{m}^{2}$ ), $34.6 \%$ of them were obese ( $30-39.99 \mathrm{~kg} / \mathrm{m}^{2}$ ), and $2.7 \%$ of them were severely obese ( $\geq 40 \mathrm{~kg} / \mathrm{m}^{2}$ ). In other words, $83.8 \%$ of the patients had a BMI above the normal range.
In terms of smoking, $24.9 \%$ of the participants had quit smoking, $28.1 \%$ were current smokers, and $47.0 \%$ had never smoked. Regarding alcohol consumption, $43.2 \%$ had never consumed alcohol, $44.3 \%$ consumed it very rarely, and $12.4 \%$ consumed more than two drinks at least twice a week.
When it comes to daily salt consumption and dietary habits, the majority of the hypertensive patients consumed more than 5-6 grams. Specifically, $76.8 \%$ consumed more than 5-6 grams daily, while $23.2 \%$ consumed less than 5-6 grams.
Analyzing nutrition habits, $55.1 \%$ consumed foods of animal origin, whereas $44.3 \%$ consumed foods rich in fruits and vegetables. As for daily physical activities of the participants, $88 \%$ of them did not engage in additional physical activities such as swimming, biking, running, or brisk
walking for 30-45 minutes per day. Only $1.6 \%$ participated in physical activity once a week. Additionally, $2.2 \%$ engaged in physical activity $2-3$ times a week, and $8.1 \%$ were physically active on at least 5 days a week.
In this study, we found that reducing salt intake, especially, would lead to more effective BP control compared to other lifestyle changes ( $p<0.05$ ).

## DISCUSSION

HT is one of the most important preventable risk factors for cardiovascular disease, stroke, and chronic kidney disease when not detected early and treated appropriately. HT treatment involves a process that includes medical treatment, lifestyle changes, and lifelong patient training (13). When the BP controls of hypertensive patients were evaluated, there was a consistency with previous studies. In a 2017 study conducted with 211 hypertensive patients, $35.8 \%$ of the patients had controlled BP, while $70.4 \%$ did not (14). According to another study with 380 hypertensive patients, $45.3 \%$ had controlled BP (15). The results of a cross-sectional study in 2022 showed that $43.2 \%$ of the patients had controlled BP, while $56.8 \%$ did not (16), In our study, $42.7 \%$ of the participants had controlled BP, indicating consistency with previous research.
Within the scope of this study, when evaluating the adaptation of lifestyle changes in hypertensive patients, the majority of the hypertensive patients ( $83.8 \%$ ) had body weights above the normal range. $46.5 \%$ of hypertensive patients were overweight, $34.6 \%$ were obese, and $2.7 \%$ were extremely obese. The prevalence of obesity is not only increasing in Northern Cyprus but also globally. Approximately $68 \%$ of US adults are either overweight or obese (17). Weight gain is associated with increases in BP and incidence of HT. It is estimated that at least $75 \%$ of the incidence of HT is directly related to obesity (3).
In our study, $12.4 \%$ of hypertensive patients consumed more than two doubles of alcohol at least twice a week, and $44.3 \%$ consumed alcohol occasionally. Alcohol consumption increases the risk of obesity due to its high caloric content and also raises BP. The pressor effect of alcohol has been established in clinical trials, with an estimated increase in systolic blood pressure of 1 mmHg per 10 grams of alcohol (18). $28.1 \%$ of hypertensive patients smoked, and $28.9 \%$ of them had quit smoking in our study. While there is no study demonstrating a direct reduction in BP from quitting smoking, it is necessary for preventing resistance against medical treatment and reducing cardiovascular disease risks (19). These results align with a study involving 525 individuals conducted in Turkey in 2019 regarding smoking and alcohol consumption rates. In the study, $27.6 \%$ smoked and $9.3 \%$ consumed alcohol. According to a study conducted in Southern Cyprus in 2022, it was shown that $35.5 \%$ of the participants smoked (20).
It is known that high sodium intake increases blood pressure. Therefore, hypertensive patients are advised to limit their daily salt intake to no more than 6 grams (21). Restricting salt intake not only lowers BP but also reduces the risk of HT, with or without weight loss, and decreases the incidence of cardiovascular events $(22,23)$. In our study, we determined that daily salt consumption of less than 6 grams a day was statistically associated with effective BP control in Turkish Cypriots. There has been no study conducted on daily salt consumption in Northern Cyprus. In two studies conducted in Turkey in 2008 and 2012, daily salt consumption was found to be 18 grams and 14.8 grams, respectively $(24,25)$. When analyzing the daily salt consumption of the patients, the majority reduced their daily salt intake ( $67.7 \%$ ), but did not limit it to 5-6 grams. In this study, the proportion of hypertensive patients consuming daily salt of less than 5-6 grams was $23.2 \%$, while more than 5-6 grams was $76.8 \%$. According to the results of two
studies in Turkey, in one study, $70.5 \%$ of the patients reduced their daily salt consumption, whereas in the other study, $67.8 \%$ reduced it $(26,27)$.
In terms of evaluating dietary habits, $55.1 \%$ consumed animal origin foods, while $44.3 \%$ consumed foods rich in fruits and vegetables. Reducing the intake of trans-unsaturated fatty acids and saturated fatty acids, while increasing the consumption of vegetables, fruits, and whole-grain products, improves BP control and aids in maintaining a healthy body weight (28-30). Vegetables are a good source of potassium, which has a positive effect on BP regulation (31). The imbalance between energy intake and expenditure is a key factor contributing to overweight and obesity. Patients should be encouraged to increase their daily physical activity to enhance energy expenditure. In our study, $88 \%$ of hypertensive patients did not engage in any physical activity beyond their daily routine, and only $8.1 \%$ participated in activities such as biking, swimming, running, or brisk walking for $30-45$ minutes at least five days a week. The significant benefits of physical activity include increasing high-density lipoprotein-cholesterol levels, reducing triglyceride levels, improving glycemic control due to increased tissue sensitivity to insulin, as well as reducing BP (28).

## Study Limitations

To address the limitations of this study, it is important to acknowledge certain constraints that may have influenced our findings. First, in this study, obesity assessment was based solely on BMI, which means only individuals with general obesity were identified. Since waist circumference (WC) measurements were not taken, those with abdominal obesity were not identified. Consequently, the ratio of obesity-related hypertension could not be determined in our study. Next, the participants' daily salt consumption was evaluated without measuring 24 -hour urinary sodium excretion, leading to an approximation of consumption as above or below 6 grams. Last, for patients who had previously been diagnosed with HT by their doctors and had their medications adjusted, only their BP levels were measured to determine whether they were under control. It was not investigated whether they were using their medications in sufficient doses and in a proper manner.

## CONCLUSION

Obesity and HT are steadily increasing both in our country and worldwide. There is an association between HT and obesity, with nearly two-thirds of hypertensive patients being obese. Obesity is not only a significant factor in the development of HT but also in controlling BP in those who already have HT. Lowering the prevalence of obesity will also lead to a reduction in the prevalence of HT. The primary focus in combating the development of HT and obesity should be on increasing physical activity and instilling healthy dietary habits. Therefore, new strategies should be developed for combating obesity, and the fight against obesity should begin in childhood.

## MAIN POINTS

- InNorthern Cyprus, there has been no study related to hypertension control and lifestyle changes. This is the first study in the literature that investigates the association between lifestyle changes and hypertension among Turkish Cypriots.
- This research found that the majority of hypertensive patients did not have their blood pressure under control and did not adhere to the recommended lifestyle changes.
$-83.8 \%$ of hypertensive patients were overweight or obese.
- This study determined that salt consumption of less than 5-6 grams a day is statistically associated with effective blood pressure control in Turkish Cypriots.


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| Table 1. Distribution of hypertensive patients according to their sociodemographic <br> characteristics |  |  |  |  |
| :--- | :--- | :--- | :---: | :---: |
| Sociodemographic characteristics | $\mathbf{n}$ | $\%$ |  |  |
| Gender | 81 | 43.8 |  |  |
| Woman | 104 | 56.2 |  |  |
| Man |  |  |  |  |
| Age group | 7 | 3.8 |  |  |
| $18-39$ | 69 | 37.3 |  |  |
| $40-59$ | 109 | 58.9 |  |  |
| $60-80$ |  |  |  |  |

## Table 2. BP measurement values of patients

| Blood pressure | $\mathbf{n}$ | $\mathbf{\%}$ |
| :--- | :--- | :--- |
| Normal blood pressure (blood pressure under control) | 79 | 42.7 |
| Blood pressure higher than normal (blood pressure not under control) | 106 | 57.3 |


| Table 3. Lifestyle changes application rates of hypertensive patients |  |  |
| :---: | :---: | :---: |
| Lifestyle changes | n $\quad$ \% |  |
| Body weight control |  |  |
| BMI 18.5-24.99 kg/m² (Normal) | 30 | 16.2 |
| BMI $25.0-25.99 \mathrm{~kg} / \mathrm{m}^{2}$ (Overweight) | 86 | 46.5 |
| BMI 30.0-39.9 kg/m² (Obese) | 64 | 34.6 |
| BMI $\geq 40 \mathrm{~kg} / \mathrm{m}^{2}$ (Excessive obese) | 5 | 2.7 |
| Smoking habits |  |  |
| Quit smoking | 46 | 24.9 |
| Current smoker | 52 | 28.1 |
| Non-smoker | 87 | 47.0 |
| Alcohol Consumption |  |  |
| Sometimes | 82 | 44.3 |
| More than 2 doubles at least 2 days a week | 15 | 8.1 |
| More than 2 doubles per day | 8 | 4.3 |
| Never | 80 | 43.2 |
| Salt Consumption |  |  |
| Less than 5-6 grams per day | 43 | 23.2 |
| More than 5-6 grams per day | 142 | 76.8 |
| Food Consumption |  |  |
| Diet rich in saturated fat and cholesterol | 102 | 55.1 |
| Vegetable/fruit-based diet low in saturated fat and cholesterol | 82 | 44.3 |
| Vegetarian | 1 | 0.5 |
| Physical activity |  |  |
| 30-45 minutes brisk walking, jogging, swimming or cycling once a week | 3 | 1.6 |
| Walking, jogging, swimming or cycling for 30-45 minutes 2-3 days a week | 4 | 2.2 |
| 30-45 minutes of brisk walking, running, swimming or cycling at least 5 days a week | 15 | 8.1 |
| Not doing any physical activity | 163 | 88.1 |

Table 4. Lifestyle changes and BP control

| Blood pressure control Lifestyle changes | Effective control |  | Ineffective control |  | Total |  | p |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | n | \% | n | \% | n | \% |  |
| BMI |  |  |  |  |  |  |  |
| <18.5 (Underweight) | 0 | 0 | 0.0 | 0 | 0 | 0.0 |  |
| 18.5-24.9 (Normal) | 17 | 56.7 | 13 | 43.3 | 30 | 16.2 | 0.238 |


| 25.0-25.9 (Overweight) | 36 | 41.9 | 50 | 58.1 | 86 | 46.5 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 30.0-39.9 (Obese) | 23 | 35.9 | 41 | 64.1 | 64 | 34.6 |  |
| $\geq 40$ (Extremely obese) | 3 | 60.0 | 2 | 40 | 5 | 2.7 |  |
| Smoking |  |  |  |  |  |  |  |
| Ex-smoker | 19 | 41.3 | 27 | 58.7 | 46 | 24.9 | 0.670 |
| Smoker | 20 | 38.5 | 32 | 61.5 | 52 | 28.1 |  |
| No smoker | 40 | 46 | 47 | 54 |  | 47.0 |  |
| Alcohol |  |  |  |  |  |  |  |
| Rare | 32 | 39 | 50 | 61 | 82 | 44.3 | 0.303 |
| More than 2 (more than 10 cl ) | 9 | 60 | 6 | 40 | 15 | 8.1 |  |
| Every day (more than 10 cl ) | 5 | 62.5 | 3 | 37.5 | 8 | 4.3 |  |
| Never | 33 | 41.3 | 47 | 58.8 | 80 | 43.2 |  |
| Salt intake |  |  |  |  |  |  |  |
| Daily less than 5-6 gram | 32 | 74.4 | 11 | 25.6 | 43 | 23.2 | *0.000 |
| Daily more than 5-6 gram | 47 | 33.1 | 95 | 66.9 | 142 | 76.8 |  |
| Diet |  |  |  |  |  |  |  |
| Animal based diet rich in saturated fat and cholesterol | 42 | 41.2 | 60 | 58.8 | 102 | 55.1 | 0.595 |
| Vegetable based diet rich in low in saturated fat and cholesterol | 37 | 45.1 | 45 | 54.9 | 82 | 44.3 |  |
| Vegetarian | 0 | 0 | 1 | 100 | 1 | 0.5 |  |
| Physical activity |  |  |  |  |  |  |  |
| 30-45 minutes, walking 1 day in a week | 1 | 33.3 | 2 | 66.7 | 3 | 1.6 | 0.257 |
| 30-45 minutes, walking 2-3 days in a week | 2 | 50.0 | 2 | 50.0 | 4 | 2.2 |  |
| 30-45 minutes, walking at least 5 days in a week | 10 | 66.7 | 5 | 33.3 | 15 | 8.1 |  |
| No exercise | 66 | 40.5 | 97 | 59.5 | 163 | 88.1 |  |
| * $\mathrm{p}<0.05$ (chi square test) |  |  |  |  |  |  |  |

