

## Lifestyle Modifications for Hypertension Management

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### ABSTRACT

**Background:** Hypertension is often not taken seriously by patients due to its chronic and silent nature. Establishing a proper managing plan that leads to sufficient control of blood pressure will result in the prevention of most complications and comorbidities associated with hypertension. The most important aspect of long term management of hypertension lies in lifestyle modification which includes diet, exercise, and social habits. Non-pharmacologic therapy plays an essential role in reducing blood pressure as well as in preventing the development of hypertension in normal individuals. **Aim of the work:** this review was to explore the various modifications a patient can make in lifestyle to maintain and manage blood pressure to achieve a better quality of life.

**Methodology:** We conducted this review using a comprehensive search of MEDLINE, PubMed, and EMBASE, January 1976, through February 2017. The following search terms were used: hypertension, management of hypertension, lifestyle modification, exercise, Mediterranean diet, non-pharmacological management of chronic disease. **Conclusion:** Even a small decrease in blood pressure can lead to huge benefits on a public health scale. Current evidence supports the application of lifestyle modifications to control blood pressure. These modifications include the control of all possible related factors in order to achieve optimal blood pressure which includes sodium intake, dietary modifications such as Mediterranean diet and reducing alcohol intake, exercise, smoking cessation, and meditation. Family physicians must play a very important role in educating, counseling, and encouraging patients about the benefits of these modifications and their impact in over-all health.

**Keywords:** hypertension, management of hypertension, lifestyle modification, exercise, non-pharmacological management of chronic disease

### INTRODUCTION

Due to its silent and chronic nature, hypertension is usually not taken seriously by patients leading to poor control, despite its strong association with severe morbidities and high mortality, mainly as a result of cardiovascular diseases. This silent nature makes patients sometimes unaware of themselves having the disease. A survey that was done from 1985 to 1992 in Canada concluded that in the age group between 18 and 74 years old, 22% had hypertension, and about half of them were not aware of this, about one fifth of them were not treated although they were aware, and only about 10% were controlled <sup>[1]</sup>.

Establishing a proper managing plan that leads to sufficient control of blood pressure will result in the prevention of most complications and comorbidities associated with hypertension. The most important initial step when managing a hypertensive patient is lifestyle modification <sup>[2]</sup>. Increased weight, high sodium intake, physical inactivity, and consumption of large amounts of alcohol, are all associated with significant elevation of blood pressure. The most important lifestyle-related factor is weight; therefore experts recommend keeping the body mass index (BMI) less than 25 kg/m<sup>2</sup> when dealing with

hypertensive patients. Other recommendations include limited alcohol consumption and increased physical activity. Diet should contain reduced amounts of sodium and fat. Fresh fruits, vegetables, and legumes are among the most recommended nutrients <sup>[3]</sup>.

Non-pharmacologic therapy (also known as lifestyle modification) plays an essential role in reducing blood pressure and even preventing the development of hypertension in normal individuals. Life style modification should be the first step in any hypertensive patient before the initiation of pharmacologic therapy and must be continued even after starting long-term drugs. Even patients with drug-controlled hypertension, proper life-style modification can allow the reduction or even withdrawal of drugs when patients are highly committed to the new changes. Life style modifications are also important in non-hypertensive individuals especially those at higher risks, to prevent later development of hypertension. These lifestyle modifications can have a significant effect on the general mortality rates, even if they seem simple. For example, a reduction in systolic blood pressure as small as 3-mmHg can result in a 5%

reduction in cardiac mortality, and 8% reduction in strokes mortality. Therefore, a proper plan for lifestyle modifications is most important initial step [4].

### METHODOLOGY

#### • Data Sources and Search terms

We conducted this review using a comprehensive search of MEDLINE, PubMed, and EMBASE, January 1976, through February 2017. The following search terms were used: hypertension, management of hypertension, lifestyle modification, exercise, Mediterranean diet, non-pharmacological management of chronic disease.

#### • Data Extraction

Two reviewers have independently reviewed the studies, abstracted data, and disagreements were resolved by consensus. Studies were evaluated for quality and a review protocol was followed throughout.

### Dietary Modifications

#### Reducing Salt (Sodium Chloride) Intake

High levels of sodium chloride (salt) significantly increases blood pressure, and current present evidence in medical literature proves this fact. On the other hand, it has been proven that decreased intake of salt can significantly decrease the risk and incidence of hypertension. Control of salt intake has also been found to improve under-controlled hypertension in elderly, and significantly decrease cardiac morbidities in obese patients [5]. A recent large study found that weight loss along with salt intake control can significantly decrease the risk of hypertension by about 20%. Another study found reduction of salt intake reduced hypertension risk along with the need of drugs to control blood pressure in the elderly. All these studies led to the recommendation of limiting daily salt intake to 6g [6].

The Dietary Approaches to Stop Hypertension (DASH)-Sodium feeding study, documented that lower sodium intake will significantly decrease the risk of hypertension in non-hypertensive population. The study classified sodium levels intake into three levels: high (about 143 mmol/d, which reflects the consumption of most people), intermediate (about 106 mmol/d) and low (65 mmol/d). They found that intermediate sodium intake can reduce hypertension incidence and complications. However, low intake was associated with additional lowering in blood pressure and improvement in outcomes. Reducing the intake of sodium in a normal healthy individual from high to intermediate will significantly decrease systolic blood pressure by up to 2.1 mmHg, and further reduction from intermediate to low will

additionally reduce blood pressure by 4.6mmHg. Blacks were shown to be affected by decreased sodium intake more than whites. All the previously mentioned reductions in systolic blood pressure were also shown in similar trends for diastolic blood pressure [7; 8].

These previous results all led to the establishment of guidelines that recommend less intake of sodium, along with consumption the DASH diet (which we will discuss further). To achieve this, patients should limit adding salt to food, which is sometimes challenging even to highly committed individuals [9].

#### Mediterranean-Type Diet and Omega-3 Fatty Acids

Another randomized prospective study (The Lyon Diet Heart Study) conducted to study the effects of Mediterranean diet (that is rich in omega-3 fatty acid) on the secondary prevention of recurrence of cardiac events when compared to a typical diet [10]. Groups on the Mediterranean diet consumed mostly chicken, and margarine rather than neat and butter. After a follow-up period of four years, they were found to have significantly less cardiac events when compared to the other group. Specifically, they had less incidence of fatal and non-fatal myocardial infarctions (14 vs. 44 events;  $p=0.0001$ ), stroke, unstable angina, pulmonary or peripheral embolism (27 vs. 90 events,  $p=0.0001$ ), and hospital admissions rate (95 vs. 180 events,  $p=0.0002$ ) [10].

The GISSI Prevenzione Trial (also known as the Gruppo Italiano per lo Studio della Sopravvivenza nell'Infarto Miocardico) is considered to be the largest study on the effects of omega-3 [11]. In this study, more than eleven thousand Italian individuals who had previously suffered from a myocardial infarction were randomized to receive vitamin E, supplement with omega-3, or placebo. After following included patients for more than three years, the group with omega-3 showed a decreased risk of nonfatal myocardial infarction, stroke, and death. However, it is not known until now how omega-3 works to achieve this benefits. Some theories suggest that they decrease blood pressure by their antiplatelets effects, or by their effects in lowering TGs. Large observational and clinical studies concluded that consumption of omega-3 twice a week is linked with a 40% less mortality due to cardiac causes. Highest levels of omega-3 fatty acids are found in ocean fish like mackerel, tuna, and Salmon, and fresh water fish like lake trout and channel catfish [12].

#### Coffee

Of all chemical compounds present in coffee, only caffeine has been thoroughly studied. Amount

of caffeine in a cup of coffee can vary among persons and coffee types, but it is estimated that a 150ml cup will contain between 60 and 120 mg of caffeine (a 150ml cup of tea will contain 20 to 40 mg of caffeine, and a 330ml can of cola will contain 30 to 50 mg of caffeine) <sup>[13]</sup>.

It has been established for a long time that caffeine intake is correlated with a dose-dependent elevation of blood pressure that can reach about 15 mmHg and 10 mmHg increase in systolic and diastolic pressures respectively. The most approved theory for this increase is the antagonist effects of caffeine on adenosine receptors, which will consequently cause vasoconstriction and elevated blood pressure. Effects of caffeine can last for about five hours following intake <sup>[14]</sup>.

No previous randomized controlled trial (RCTs) studied the effects of caffeine consumption on hypertension for more than eight weeks of follow up. A systematic review was recently published and included hypertensive patients and normotensive individuals and followed them for short period of time. This review included 11 RCTs and found a significant increase in systolic and diastolic blood pressure following coffee intake <sup>[15]</sup>.

The impact of coffee on hypertension, however, is challenging to be assessed due to the presence of many confounding factors like lifestyle, age, and other comorbidities. Therefore, the previously mentioned studies, with their small samples, cannot reach a conclusion on the long-term influence of caffeine consumption on blood pressure.

### **Alcohol**

Several large epidemiological studies have documented the association between excessive alcohol intake (that is more than two drinks a day) and high blood pressure. Moreover, several RCTs proved the effects of reduced alcohol intake on decreasing blood pressure in hypertensive patients and even normotensive drinkers. However, the Prevention and Treatment of Hypertension Study examined moderate and heavy drinkers and found that decreased consumption of alcohols caused a non-significant decrease in blood pressure. In summary, it is recommended to decrease consumption of alcohol to less than three drinks a day <sup>[16]</sup>.

### **Increasing Potassium Intake**

Unlike sodium, high potassium levels are linked with a lower blood pressure. Data from observational epidemiological studies showed a strong association. However, clinical trials could not reach conclusive results. a recent systematic review

and meta-analysis showed that potassium supplementation was associated with lower blood pressure. A potassium supplementation that is between 60 and 120 mmol/d was associated with 4.4 and 2.5 mmHg reduction in systolic and diastolic blood pressures, respectively, in hypertensive patients. normotensive individuals reported benefits that reached about 1.8 and 1.00 mmHg reduction in systolic and diastolic blood pressure, respectively. Blacks showed increased response to potassium supplementation than whites. Potassium is highly available in everyday diet, therefore, potassium-rich food is preferred than pharmacologic supplementation <sup>[17]</sup>.

### **Reduced Fat and Cholesterol Diet**

Other than sodium, potassium, and caffeine intake, several dietary modifications have been associated with reducing blood pressure. For example, vegetarian diets were found in several observational and clinical studies to cause reduction in blood pressure. However, it is still not known how vegetarian diets achieve this. Calcium and magnesium were also studied. However, a large study with about two thousands participants found no significant association between calcium and magnesium supplementation and blood pressure levels <sup>[18]</sup>.

On the other hand, the DASH diet that contains more fruits, vegetables, dairy products, fish, poultry, whole grains, and nuts, with less sweets, fat, red meat, and sugary beverages, was found to be the most effective diet for controlling hypertension. It was found also found to have high levels of calcium, potassium, and magnesium. This diet was found to decrease systolic and diastolic blood pressure by 3.5 and 2.1 respectively among normal individuals. However, blood pressure reduction was more prominent and significant in hypertensive patients, with even higher response in blacks than whites <sup>[19]</sup>.

### **Other Dietary Factors**

Supplementation with omega-3 fatty acids has also been found to decrease blood pressure significantly. Two recently-published systematic reviews and meta-analyses found high daily doses of omega-3 to significantly lower blood pressure in hypertensive patients, with no significant effects on normotensive individuals. However, these high doses were also associated with significant adverse events leading to the limiting of their use. The association between mono-saturated fatty acids and blood pressure has not been sufficiently studied. A recent trial found that mono-saturated fatty acid consumption was associated with reduction of systolic and diastolic blood pressures by 8 and 6 mmHg respectively.

Additional research on mono-saturated fats and on Mediterranean diets in general, is required to establish these effects on blood pressure <sup>[20]</sup>.

Increased consumption of proteins has also been suggested to decrease blood pressure, with many studies supporting this hypothesis. Studies on Japanese-American men in Hawaii, British men and women, Japanese rural farmers, Chinese men and women, American children, and American men, all showed higher protein levels to correlate with reduced blood pressures. An important factor that may help determining the effects of protein on blood pressure is being animal or non-animal <sup>[21]</sup>.

### **Physical Activity**

Regardless of weight changes, high levels of physical activity have been associated with significantly reduced blood pressure. A systematic review and meta-analysis that included more than 25 RCTs, found that aerobic exercise can lead to up to 4 mmHg reduction in systolic blood pressure. However, the intensity of exercise was found not to correlate with the magnitude of blood pressure changes. High levels of physical activity also promote blood pressure reduction by leading to weight loss, which is considered an essential lifestyle-related factor. The US surgeon general recommends a 30-minute exercise should be practiced daily <sup>[22]</sup>.

### **Body Weight**

Weight is strongly associated with increased blood pressure and hypertension. This strong association was proven in several observational and clinical studies. This association is very important in the management of blood pressure, due to the high prevalence of obesity in the US. Almost all studies have concluded that a reduction in weight would result in a reduction in blood pressure. Trials have found that each kilogram lost will lead to 1.6 and 1.1 mmHg reduction in systolic and diastolic blood pressure, respectively <sup>[23]</sup>.

### **Quitting smoking**

Cigarettes smoking causes the release of nicotine which will consequently stimulate the sympathetic nervous system leading to the secretion of noradrenaline, and adrenaline, eventually causing hypertension. It is estimated that patients how some cigarettes will have a 4 mmHg and 3 mmHg increase in systolic, and diastolic blood pressures, respectively, when compared to controls <sup>[24]</sup>.

The association between strokes and cardiovascular complication and hypertension is established, with a significant increase in this risk among hypertensive smokers, when compared to non-smoker

hypertensive patients. Studies suggest that male, hypertensive, smokers have a significantly higher overall risk of strokes (ischemic and hemorrhagic), and the number of cigarettes smokes correlates with the risk. therefore, any lifestyle modification should include a plan for smoking cessation <sup>[25]</sup>.

### **Meditation**

Repetition of phrases and words (also known as mantra), attention to breathing to achieve inner calm, are both considered important types of meditation that help focusing and detachment. The effects of meditation on blood pressure were proven in one study that reported significant reduction of blood pressure. however, later studies were inconclusive. other two small observational studies followed about two hundred hypertensive patients for long time and documented decreased mortality rates with meditation. other studies are needed to detect real effects of meditation, and possible other benefits <sup>[26]</sup>.

### **Drug therapy versus lifestyle change**

The impact of lifestyle modifications versus pharmacologic therapy on blood pressure is yet to be determined. Fours studies that included diet modifications found that these modifications were even better in controlling blood pressure and reducing cholesterol levels than drugs. A significant decline in blood cholesterol levels will further lead to significantly decreased cardiovascular complications, morbidities, and mortality rates. Effects of a healthy diet with cholesterol reduction can even replace the use of pharmacologic agents for controlling blood pressure <sup>[27]</sup>.

## **CONCLUSION**

Blood pressure is influenced by many factors like age, sex, physical activity, race, diet, smoking, alcohol intake, and many other factors that each plays a certain role in controlling blood pressure. Even a small decrease in blood pressure, can lead to huge, benefits on a public health scale. Current evidence supports the application of lifestyle modifications to control blood pressure. These modifications include the control of all possible related factors in order to achieve optimal blood pressure. Family physicians must play a very important role in educating, counseling, and encouraging patients about the benefits of these modifications and their impact in over-all health.

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