

Evaluation of the Influence of Prunus Dulcis on the Blood Pressure Regulation in Hypertensive Individuals-a Comparative Study

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Abstract

Almonds are considered an important source of several micronutrients, vitamins, as well as minerals such as calcium, vitamin E, zinc, magnesium, thiamine, potassium, phosphorus, and they also possess a high fiber content. The current study aims at understanding the correlation between consumption of magnesium-rich almond nut intake and blood pressure. A case-controlled trial was carried out by doing a stratified sampling consisting of about 10 people and they were divided into two groups consisting of 5 people without hypertension in group A as control and 5 people suffering from hypertension in group B. Group A and Group B were made to consume almonds and the blood pressure of the people in both the groups was periodically recorded for a week to evaluate the effectiveness of almond on blood pressure.,with the collected results a statistical analysis were performed with “chi square test” using stastical software “SPSS Version 23” and represented in the form of pie charts and bar graphs. The current study deals with the relationship between the effect observed due to the consumption of almond nuts on blood pressure. The effect observed in group B is greater than in group A.The statistical analysis (Independent sample t test) showed that there is no significant difference between the two groups(P Value >0.05). The current study results provide experimental support proving the effectiveness of almond intake on blood pressure.

Keywords: Diastolic Blood Pressure, Innovative Method, Systolic Blood Pressure, Prunus Dulcis.

Introduction

Almond, scientifically known as Prunus Dulcis is a tree species native to Iran and its surrounding countries. The Prunus Dulcis is a deciduous tree growing up to 10 m with the trunk of up to 30 cm in diameter bearing a fruit named drupe which consists of an outer shell and a seed inside which is cultivated over many generations for edible use since it is a rich source of mono and polyunsaturated fatty acids (Li Z et al., 2020). Almonds are considered as an important source of several micronutrients, vitamins, as well as minerals such as calcium, vitamin E, zinc, magnesium, thiamine, potassium, phosphorus and, also possess a high fiber content (Eslampour et al., 2020). The skin of almonds contains properties such as flavonoids which makes the almond nut a potent natural source with antioxidant property (Jenkins et al., 2008; Timothy et al., 2019; Jenkins et al., 2003).

Blood pressure is the lateral pressure exerted by the flowing blood on the walls of the blood vessels. Blood pressure comprises two components namely systolic blood pressure and diastolic blood pressure (Wien et al., 2010; Tamimi et al., 2016; Chen et al., 2015). Systolic blood pressure is the maximum arterial pressure exerted during the system, whereas diastolic BP refers to the minimum arterial blood pressure exerted during diastole. The normal range of blood pressure for healthy individuals ranges from 105 to 135mmhg for systolic blood pressure

and ranges around 60 to 90 mmHg for diastolic blood pressure. Hypertension is a condition that has existed for many long years. It is generally referred to as a condition where there is a rise in blood pressure of unknown cause that increases the risk for cerebral, cardiac, and renal events (Lamb et al., 2018; Harsha et al., 2017). Hypertension in patients is found to be of different types there are two primary hypertension types involved (Jalali et al., 2020; Dhillon et al., 2016).

Primary hypertension is found to exist predominantly among individuals than the second type of hypertension, out of these there are few other types in existence such as essential hypertension, isolated systolic hypertension, malignant hypertension, resistant hypertension (Rubin et al., 1997). Among these types, isolated systolic hypertension is the frequent type of hypertension observed within patients (Savica et al., 2010; Preethikaa & Brundha, 2018). Orthostatic hypotension is defined as a reduction in systolic blood pressure to a range of around at least 20 mmHg or a fall of diastolic blood pressure of at least 10mmHg (Brundha et al., 2019).

Orthostatic hypotension is a common problem among elderly people, orthostatic hypotension is closely associated with significant morbidity and mortality, which may be caused by medications, the cumulative effects of age, and hypertension-related alterations in blood pressure regulation or age-associated diseases that impair autonomic function (Jaminet P & Jaminet SC, 2013). The current study aims to understand the correlation between consumption of magnesium-rich almond nut intake and blood pressure. Our team has extensive knowledge and research experience that has translated into high quality publications (Anita et al., 2020). The current study results lead to the development of alternative natural drug combinations to problems such as blood pressure.

Methods

A case-controlled pilot study is performed to evaluate the effectiveness of almond nut intake on blood pressure. The study was carried out by doing a stratified sampling consisting of about 10 people and they were divided into two groups, group B Consist of 5 people suffering without hypertension in the age group of 30-40 years, and group A consist of 5 hypertension patients. Group A and Group B were given 8 to 10 hours-soaked almonds in the early morning time and their blood pressure value is noted in the evening for the people in both the groups and their blood pressure is periodically recorded (Figure 1) for a week to evaluate the effectiveness of almonds on blood pressure. Measures such as the selection of participants who are under medication for hypertension for 5 years, placing restrictions over the participant population are taken to minimize the bias occurring in sampling. The difference range in systole and diastole blood pressure value of both the group before and after almond consumption is analyzed and tabulated separately for both the groups and with the collected data, and statistical analysis (Independent sample t test) was performed using the statistical software “SPSS version 20”. The final results were analyzed and represented in the form of pie charts and bar graphs.



Figure 1. Apparatus Used in the Study with Blood Pressure Value Recorded in the Study

Results and Discussion

Hypertension, one of the most prevalent conditions which exist for a long period is generally a condition that exists as a result of an increase in the blood pressure value which leads to further conditions such as the increased risk of cerebral, cardiac, and renal events. It is evident from the analysis done in the present study on almonds that the presence of several micronutrients, vitamins, high fiber content, and also the skin of almond nuts is also seen to contain properties such as flavonoids with antioxidant properties.

Table 1. Blood Pressure Level of Group A People (Non-Hypertensive).

Days/Samples	Sample 1 BP in mmH	Sample 2 BP in mmH	Sample 3 BP in mmH	Sample 4 BP in mmHg	Sample 5 BP in mmHg
Day 1 Before Almon	130/64	117/80	85/62	99/75	115/77
Day 2	127/72	109/74	100/72	92/70	113/68
Day 3	126/71	118/67	106/68	95/66	112/79
Day 4	124/59	114/72	100/61	98/53	112/74
Day 5	129/74	110/71	102/57	96/57	111/66

Table 2. Blood Pressure Level of Group B People (Hypertensive)

Day/Sample	Sample 1 BP in mmH	Sample 2 BP in mmH	Sample 3 BP in mmH	Sample 4 BP in mmH	Sample 5 BP in mmH
Day 1 Before Almo	116/60	111/58	130/79	116/87	124/83
Day 2	117/80	111/56	128/82	116/71	122/65
Day 3	113/61	112/60	124/66	114/69	125/73
Day 4	114/63	110/66	122/100	115/71	121/89
Day 5	108/62	115/72	123/71	110/57	123/68

Table 3. Systolic and Diastolic Changes After Almond Consumption Among Non-Hypertension Group.

Non hypertension Group	Systolic Difference	Diastolic Difference
Sample 1	1	-10
Sample 2	7	9
Sample 3	-17	5
Sample 4	3	18
Sample 5	4	11

Table 4. Systolic and Diastolic Changes After Almond Consumption Among Hypertension Group

Hypertension Group	Systolic Differenc	Diastolic Difference
Sample 1	8	-2
Sample 2	-4	14
Sample 3	7	8
Sample 4	6	30
Sample 5	1	15

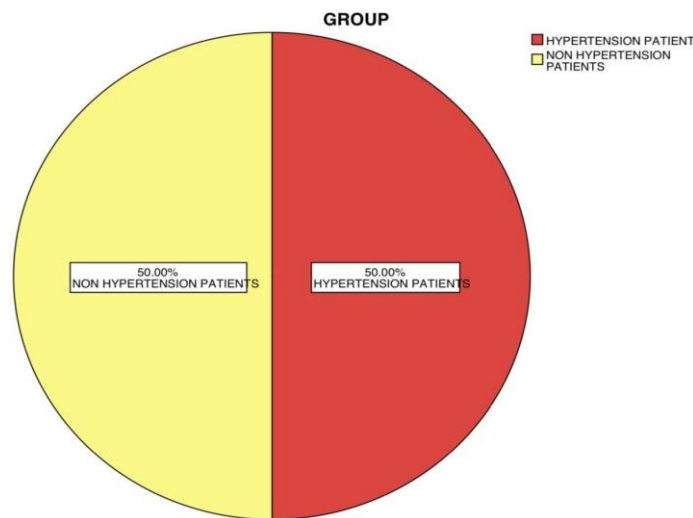


Figure 2. The Pie Chart Depicts the Ratio of the Study Population, 50% of Hypertension Sample (Red) and 50% of Non-Hypertension Patients (Yellow)

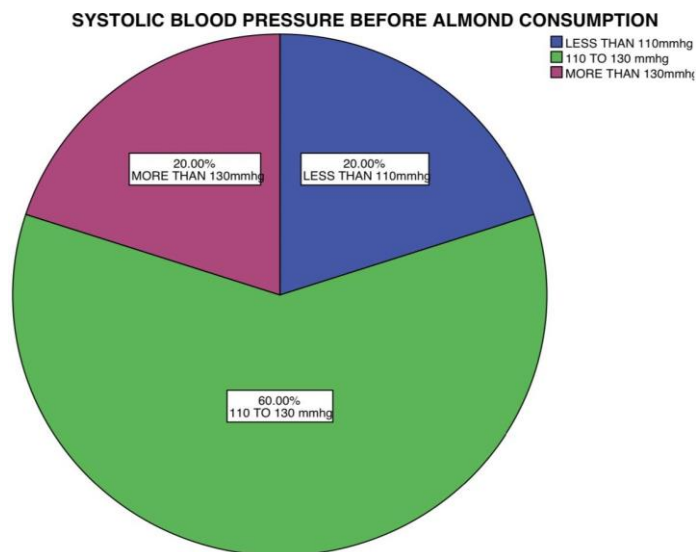


Figure 3. The Pie Chart Depict the Values of Systolic Blood Pressure Before Almond Consumption, 20% of the People were in the Range of Less than 110mmHg (blue), 60% of the People were in the Range of 110 to 130mmHg (green), 20% of the People were in the Range of more than 130mmHg (pink).

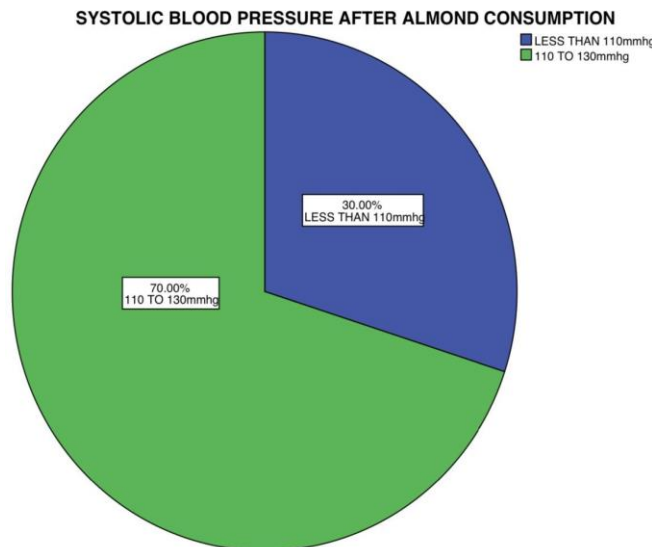


Figure 4. The Pie Chart Depicts the Values of Systolic Blood Pressure After Almond Consumption, 30% of the People were in the Range of Less than 110mmHg (blue), 70% of the People were in the Range of 110 to 130mmHg (green).

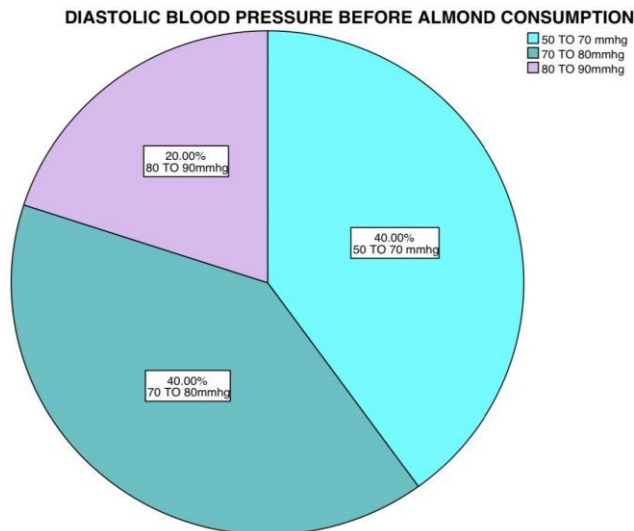


Figure 5. The Pie Chart Depict the Values of Diastolic Blood Pressure Before Almond Consumption, 40% of the People were in the Range of 50 to 70 mmHg (blue), 40% of the People were in the Range of 70 to 80mmHg (green), 20% of the People were in the Range of 80 to 90mmHg (violet).

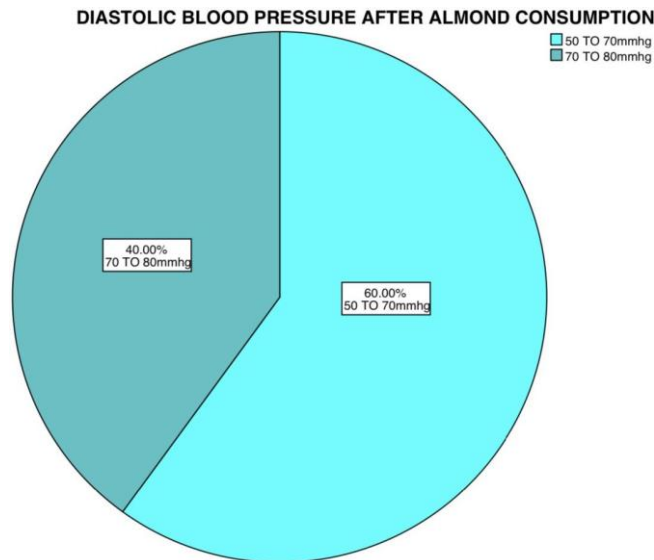


Figure 6. The Pie Chart Depict the Values of Diastolic Blood Pressure After Almond Consumption, 60% of the People were in the Range of 50 to 70 mmHg (blue), 40% of the People were in the Range of 70 to 80mmHg (green).

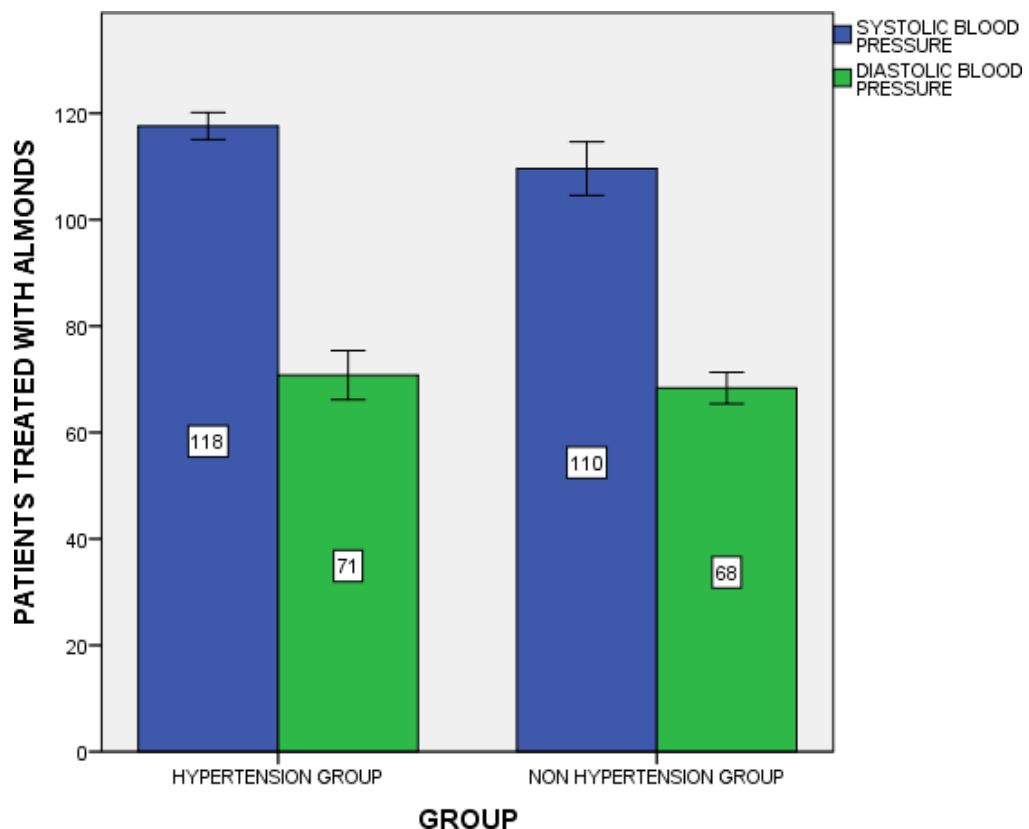


Figure 7. The error bar graph represents the reduction level of blood pressure among the hypertension and non-hypertension patients treated with almonds. Blue colour denotes the systolic blood pressure to be 118 on a average for the hypertension group and 110 on a average for the non-hypertension group and Green colour denotes the diastolic blood pressure to be 71 on an average for the hypertension group and 68 for the non-hypertension group.

The results of the pilot study conducted with a sample size of 10 divided into hypertension and non-hypertension groups (Figure 2). The study results depict that the mean systolic blood pressure value is 113.60 and the mean diastole blood pressure value is 69.56. When compared to non-hypertensives, Hypertensive individuals have more effect on almond consumption on BP regulation. The statistical analysis (Independent sample t test) showed that there is no significant difference between the two groups (P Value >0.05).

The results tabulated in Table 1 and Figures 3-6 of the current study depict that the non-hypertension group consists of people in the age group of 30-40 years. The results tabulated in Table 2 of the current study depict that the hypertension group consists of 5 samples, sample1 is of the age 66 under the medication “triovance 20mg”. Sample 2 is of the age 51 under the medication “Telma 40mg”. sample3 is of the age 74 under the medication “Telbrit MT”. sample4 is of the age group 45 under the medication “Atenolol 25mg”. Sample 5 is of the age 52 under the medication “Depin 10 mg”.

The results tabulated in Table 3,4 and Figures 3-7 of the current study depict that there is a significant decrease in the diastole blood pressure compared to systolic blood pressure after almond consumption, but it also depicts that there are few situations like the case of sample 1 and samples 2 of the hypertension group where is no significant decrease in the blood pressure even after consumption of almonds.

The study conducted by Ramadurai (2019) have also reported the effect of almond intake with the epidemiological and clinical evidence collected in the study that the diet pattern loaded with monounsaturated fatty acids and nuts to reduce blood pressure as well as blood lipid levels when compared with the current study, both the topics are quite different but the fact that almond nut posses blood pressure reducing tendency is confirmed (Uchida K et al, 1996). Previous studies conducted by

Khan (2018), also demonstrate the mechanism behind the fact that nut consumption reduces blood lipid profile and blood pressure, and with the study results, the previous study proved that the reduction property of almonds is because of the increased dietary fiber intake which tends the increases fecal bulk, reducing the interval time in the intestine ultimately leading to decreasing or control of the profiles.

So, the relationship between almond nuts or be it any edible nut obtained from plants possesses many health benefits, in specific this study demonstrated the link between the effect observed due to the consumption of almond nuts on blood pressure. The present study possesses limitations such as the short period of follow-up, small sample size and it deals only with one particular parameter. Further studies with a large sample size, focus on many parameters like demographic details, treatment history, and complications, and with a long period of follow-up time should be done to significantly demonstrate the relationship and to effectively bring up the habit of consuming almonds as a remedy or as a treatment for hypertension patients.

Conclusion

In the current study within the limitations, it was found that almond consumption has no significant effect on Blood Pressure regulation in both Non-Hypertensives and Hypertensive Individuals. When compared with the changes in Blood pressure between Non-Hypertensive and Hypertensive Individuals, we conclude that Hypertensives showed changes in their Blood Pressure on Almond consumption than the non-hypertensive people so the inclusion of almond

supplementation in the routine diet in Hypertensive individuals may help to regulate blood pressure.

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