

The Prevalence of High Blood Pressure among Marathon Runners during Beirut-Marathon 2014

Souzan Tatari^{1*}, Rusul Mukhtar¹, Hassan Alawieh¹, Abdul Rahman Mourad¹, Ahmad Araj¹, Ali El-Sayed¹, Ahmad Sweid², Lea Daher², Omar Bou Hamdan², Sola Bahous², Samer Kabbani¹

¹Rafik Hariri University Hospital, Beirut, Lebanon

²University Medical Center-Rizk Hospital, Beirut, Lebanon

Email: *tatary_suzan@hotmail.com

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Abstract

Objective: To assess the prevalence of high blood pressure (BP) and cardiovascular risk factors among marathon runners during Beirut-Marathon 2014. **Methods:** A total of 325 marathon runners were divided into 42 km and 10 km groups. They were assessed for cardiovascular risk factors by measuring their BP and answering a questionnaire. The questionnaire composed of 22 questions related to demographic information, risk factors, medical history, family history, medical checkups, use of antihypertensive drugs and definition of hyponatremia. **Results:** There were 30 runners in the 42 km group and 295 in the 10 km group interviewed. The majority of 42 km runners were males 29 (96.7%) vs. 205 (69.5%) in the 10 km group, ($P = 0.001$). The 42 km group was older than 10 km group (47 ± 13.8 years vs. 38.5 ± 14.6 years; $P = 0.0025$). The prevalence of hypertension was 46.7% in the 42 km group as compared to 31.2% in the 10 km group ($P = 0.08$). Systolic BP (SBP) was higher in 42 km group vs. 10 km group (143 ± 22.4 mm Hg vs. 129.9 ± 17.8 mm Hg; $P = 0.0004$). The heart rate was lower among 42 km vs. 10 km group (71 ± 11.1 bpm vs. 84 ± 16 bpm; $P < 0.0001$). Only 10% of the runners in both groups reported that they have hypertension (HTN). **Conclusion:** There is a high prevalence of HTN among marathon runners but minorities were aware that they have hypertension. The 42 km runners tend to be older with higher systolic blood pressure as compared to the 10 km runners.

Keywords

Marathon, Blood Pressure, Cardiovascular Risk Factors

1. Introduction

Appropriate aerobic exercise may decrease cardiovascular events, improve diabetes and high blood pressure (BP), and enhance quality of life [1] [2] [3] [4] [5]. Endurance events such as marathon running may also have health benefits; however, the incidences of sudden cardiac deaths that have occurred during marathons imply an element of risk as well [6] [7] [8]. During aerobic exercise, Systolic BP increases as the exercise intensity increases. The heart works harder to pump more oxygenated blood to the muscles. Some people have an abnormal and extremely high spike in BP when they exercise, which is probably an early indicator of poorly controlled BP, therefore a higher risk for future cardiovascular events. Regular physical activity is the first treatment recommended to lower BP and improve cardiovascular health, both in the general population and in those people with hypertension (HTN) [9] [10]. Chest discomfort, irregular heart rhythm, or abnormal breathlessness when exercising can indicate underlying heart disease and should be investigated.

The purpose of this study was conducted to evaluate to the prevalence of HTN and other cardiovascular risk factors among marathon runners in the 42 km and 10 km race in Beirut-Lebanon.

2. Methods

This is an observational study that was conducted during Beirut-Marathon 2014. Marathon runners who accepted to be examined and answered the questionnaire were included in this study. Runners were excluded if they had incomplete answers to the questionnaire. A total of 400 runners were assessed but due to incomplete information only the data of 325 marathon runners was analyzed. A total of 325 marathon runners were divided according to their running distance into 10 km and 42 km groups. A group of cardiologists and nurses distributed in 4 tents were working in parallel for data collection. Each tent contained multiple automatic BP machines, chairs, case report forms (CRF). The marathon runners were assessed for their cardiovascular risks by measuring their BP, heart rate (HR) and answering a questionnaire early in the morning before the start of the marathon. All runners had to sit for 5 min before their BP measurements. The questionnaire composed of 22 questions inquiring about age, gender, weight, height, body mass index (BMI), SBP, DBP, HR, history of cardiovascular events, diabetes mellitus (DM), dyslipidemia, HTN, family history of HTN, and smoking history. Runners were asked whether they had an electrocardiogram (ECG) or not and their knowledge of abnormal BP definition and whether they were treated for HTN. Moreover, runners were asked if they knew what is the definition of hyponatremia. Data was sent to the clinical research unit at Rafik Hariri University Hospital for data entry and analysis.

3. Statistical Methods

Data was collected using CRFs. Data entry was done using the excel sheets for

analysis. All statistical analyses were performed using statistical analysis system (SAS) software (version 9.1; SAS Institute, Cary, NC). Continuous variables were presented as mean and standard deviation (SD) and categorical variables as absolute and relative frequencies (%). Chi-square test and Student t-test were used to compare differences between the groups, as appropriate. A P-value ≤ 0.05 was considered to be statistically significant.

4. Results

Data was collected from 325 marathon runners. Completed data was analyzed for 30 runners in the 42 km group and 295 runners in the 10 km group. The majority of 42 km runners were males' 29 (96.7%) vs. 205 (69.5%) in the 10 km group, (P=0.001). The 42 km group was older than 10 km group 47 ± 13.8 years vs. 38.5 ± 14.6 years in the 10 km group, (P=0.0025). SBP was higher in 42 km group vs. 10 km group 143 ± 22.4 mm Hg vs. 129.9 ± 17.8 mm Hg respectively, (P=0.0004). The resting heart rate was lower among 42 km group vs. 10 km group 71 ± 11.1 bpm vs. 84 ± 16 bpm respectively, (P < 0.0001). The 42 km runners were healthier, they had less cardiovascular risk factors and they did more regular medical check-ups than the 10 km runners. Moreover, they knew more about hyponatremia than the 10 km runners (see **Table 1**).

Table 1. Comparison of characteristics between 42 km and 10 km Marathon-Runners.

Parameter	42 km (N = 30) Mean \pm SD; N (%)	10 km (N = 295) Mean \pm SD; N (%)	P-value
Age, years	47 \pm 13.8	38.5 \pm 14.6	0.0025
Weight, kg	75.4 \pm 12	74.2 \pm 16.8	NS
Height, cm	174.4 \pm 7.4	171.6 \pm 11.6	NS
BMI	24.5 \pm 2.9	25.5 \pm 9	NS
SBP, mm Hg	143 \pm 22.4	129.9 \pm 17.8	0.0004
DBP, mm Hg	80.7 \pm 10.3	79.5 \pm 11.5	NS
HR, b.p.m	71 \pm 11.1	84 \pm 16	<0.0001
Male Gender	29 (96.7%)	205 (69.5%)	0.001
Cardiovascular disease	0	5 (1.7%)	NS
Smokers	6 (20%)	94 (31.9%)	NS
DM	0	16 (5.4%)	NS
Dyslipidemia	1 (3.3%)	38 (12.9%)	NS
HTN	3 (10%)	31 (10.5%)	NS
Family history of HTN	11 (36.7%)	138 (46.8%)	NS
BP Checking	16 (53.3%)	150 (50.8%)	NS
Lipid Checking	13 (43.3%)	118 (40%)	NS
Sugar Checking	12 (40%)	114 (38.6%)	NS
Awareness of being hypertensive	16 (53.3%)	184 (62.4%)	NS
Trusting Automatic BP devices	20 (66.7%)	225 (76.3%)	NS
Had ECG	16 (53.3%)	144 (48.8%)	NS
Antihypertensive Medications	5 (16.7%)	56 (19%)	NS
Definition of Hyponatremia	6 (20%)	39 (13.2%)	NS
Elevated morning BP	14 (46.7%)	92 (31.2%)	0.08

The prevalence of HTN increases with age for both groups (see **Figure 1**). According to our data, the prevalence of HTN was greater among males than females in the same age groups. It was shown that 45% of male runners had HTN between the ages 40 - 49 years whereas only 14% of the female runners in this age group had HTN. There was 50% of male runners had HTN between 50 - 59 years versus 22% of the female runners and 71.4% of the male runners had HTN at ≥ 60 years versus 44% of the female runners. Moreover, it was observed that almost one third of runners in both groups were not aware that they had elevated BP (36.7% in 42 km vs. 20.7% in the 10 km).

5. Discussion

This study was conducted in Beirut-Lebanon to evaluate the prevalence of HTN among marathon runners. The interview and the blood pressure measurements were done early in the morning before the race started. There is no published data on the Lebanese population on the prevalence of hypertension in this category of people. It was noted that as people get older the prevalence of hypertension increase. This is typical of other populations. We also observed that men had a higher chance to be hypertensive when compared to women in the same age group. The population that was studied represent a health population that perform regular training. However, there was a significant number of runners had hypertension and a significant number were unaware that they are hypertensive. In our study it was noticed that the 42 km runners were older and have higher BP but lower HR as compared to the 10 km runners. This is due to the fact that they are older; hence higher BP, but exercise on a regular basis, hence lowers HR.

Even though the 42 km runners had higher BP than the 10 km runners they tend to use less antihypertensive medications (16.7% of 42 km runners vs. 19%

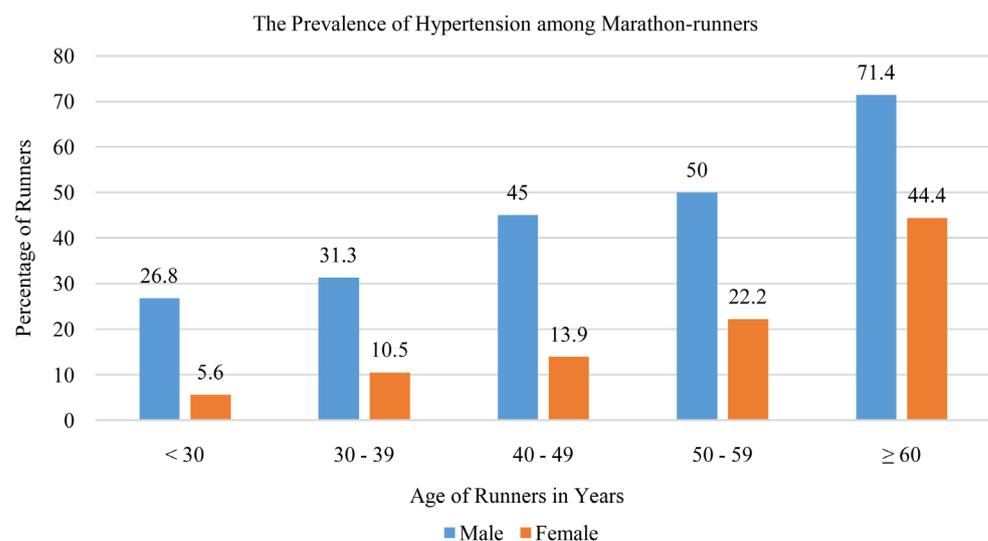


Figure 1. The prevalence of HTN defined as SBP 140 mm Hg or DBP 90 mm Hg according to age and gender among runners in Beirut-Marathon 2014.

of the 10 km runner). This was similar to the study that was done by Williams P.T. who showed that the slower running males and females (determined from marathon finish times and reported 10 km performance) had greater use of hypertension and high cholesterol medications than did their faster running counterparts [11]. He showed that the prevalence of HTN, hypercholesterolemia and DM decrease with the frequency of marathon participation independent of annual running distance [11]. Our study had showed that the 42 km runners had less history of DM and dyslipidemia than the 10 km runners even though the numbers were not statistically significant.

This is the first published data in our region. It reflects the importance of awareness for the prevalence of hypertension in this relatively active and health population. No studies were done on the prevalence of hypertension and other cardiovascular risk factors among marathon runners. Even though the numbers were small but it highlights the importance of awareness that is needed in this population.

6. Limitations

The study is an observational in a relatively small number of runners. The 42 km group was smaller than the 10 km group. Data only represents the Lebanese population. Risk factors assessment was only done through a questionnaire. However, the relatively limited data is essential to raise awareness for the Lebanese population and to conduct more elaborate studies in this age group.

7. Conclusion

There is a high prevalence of HTN among marathon runners but minorities were aware that they are hypertensive. The 42 km runners tend to be older with higher systolic blood pressure as compared to the 10 km runners. This study reflects the importance of raising awareness and conducting more elaborate clinical trials on this population.

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List of Abbreviations

BP	Blood pressure
BMI	Body mass index
CRF	Case report form
DM	Diabetes Mellitus
DBP	Diastolic blood pressure
ECG	Electrocardiogram
HTN	Hypertension
HR	Heart rate
NS	Not significant
SAS	Statistical analysis system
SBP	Systolic blood pressure

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