Evaluation of hypertension knowledge among hypertensive and non-hypertensive adults: a cross-sectional study from Palestine

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ABSTRACT

Hypertension is one of the leading causes of morbidity and mortality worldwide and significantly contributes to the burden of non-communicable diseases especially in low and middle income countries like Palestine. The current study aimed to evaluate the level of knowledge on hypertension among the Palestinian hypertensive and non-hypertensive adults in the West Bank. The study was conducted in a cross-sectional design in Hebron, Ramallah, Nablus, and Tulkarm directorates in the West Bank. Convenient proportional sample from each directorate was selected with a total of 1200 subjects from all directorates. The participants were interviewed face to face for data collection using a previously validated hypertension knowledge level scale questionnaire (HK-LS) that included (among others) self-reported lifestyle, medication and clinical history questions. The questionnaire had 22 questions where a new continuous variable (score) was developed ranged from 0-22. In our study, the participants had an adequate level of knowledge regarding hypertension and they showed a good understanding of the main concepts (definition, medical treatment, lifestyle, diet, complications). The mean score for hypertensive and non-hypertensive participants were 18.22 and 16.74 respectively. This indicates that those with hypertension have superior knowledge amongst the two groups. Hypertensive participants' results were related to some socio-demographic factors including city, age, educational level, and physician visit. On the other hand, non-hypertensive participants' scores were associated with age, gender, marital status, smoking status, educational level, and physician visit. Knowledge of hypertension among the general population was acceptable and those with hypertension showed a higher level of knowledge in comparison to those without hypertension. There should be more focus on educational programs that help improve the knowledge about hypertension in the general population. There should also be an emphasis on the importance of the physicians' role in the awareness and education of the patients.

Keywords: Hypertension; Knowledge; Palestine

INTRODUCTION

Hypertension (HTN) is a common condition seen in primary health care centers. Although it could be preventable, it has a significant contribution to morbidity and mortality worldwide (1). HTN is a serious attribute to coronary heart disease, stroke and renal disease. In correspondence with disability adjusted life years measurements, HTN became the 1st leading risk factor for global disease burden in 2010, whereas it was the 4th in 1990 (2).

Worldwide, around one in every five adults have HTN and the numbers rose from 600 million in 1980 to 1 billion in 2008 affecting roughly 40% of adults above 25 years of age (3). It is estimated that more than 9.4 million deaths occur annually as a result of complications from HTN (4). In Palestine the percentage of deaths caused by hypertensive cardiovascular disease (CVD) (among all deaths from CVD) reached 9.4% in 2014 (5). Furthermore, towards the end of 2014, the prevalence of raised blood pressure was estimated to be 35.8% in both sexes, 35.6% and 36% in females and males, respectively (6).

Controlling blood pressure is usually possible by two methods, pharmacological treatment and lifestyle changes including eating healthy food, maintaining a healthy weight, limiting alcohol/smoking, and monitoring the blood pressure at home (7). Combining both methods is usually considered to be effective, however, it has been shown that this is difficult among the general population due to many reasons such as limited access to health care, increased age (8), and lack of awareness and knowledge about HTN (9).

In Palestine, although there is an increase in the incidence of HTN among the Palestinian adults, there is little to no data regarding HTN and the level of knowledge about it mainly among the general population whether hypertensive patients or non-hypertensive individuals.

In 2013, a study in Palestine performed in the three governorates in the West Bank (Nablus, Ramallah, and Hebron) revealed that the prevalence of HTN reached 27.6%, in which 51% were aware of their medical state, 40.2% were receiving treatment, and only 9.5% had been able to maintain an acceptable level of blood pressure. The study concluded that although the prevalence of HTN among the Palestinian population was reasonably high, the awareness and appropriate approach was lacking (10).

This study aimed to assess the level of knowledge regarding HTN and identify its mostly associated factors among the Palestinian adults to better identify the targets for any interventions in order to increase education, awareness and minimize disability and deaths from this serious and silent killer disorder in Palestine.

MATERIALS AND METHODS

Study design, population and settings

A cross-sectional study was conducted in four directorates in the West Bank (Hebron, Ramallah, Nablus and Tulkarm) from Oct 1st to Dec 1st 2016. We chose these directorates due to their accessibility to the study researchers and their representativeness from North (Nablus and Tulkarem) to Middle (Ramallah) and South (Hebron) of the West Bank. The study population was estimated around (2,790,331) (5). The subjects were taken from the general population (hypertensive and non-hypertensive individuals) who were above 18 years of age with or without a history of hypertension or any other co-morbidities. Those with cognitive dysfunction or refused to participate weren't included. Subjects were identified from different settings in these directorates including primary health care centers, hospitals, public centers, markets, and universities in the West Bank.

Sample size

Subjects were recruited by a non-probability convenient method. The sample size was calculated using the following equation (11):

$$SS = \frac{Z^2 * (p) * (1-p)}{c^2}$$

Z = Standard normal variant (1.96 for 95% confidence level)

p = Expected proportion in population based on previous studies

c = Absolute error

We used a standard normal variant of 1.96 and an absolute error of 5% (at 5% type 1 error). As for the proportion of the population we used a knowledge level percentage from previous studies. However, there were no previous studies in Palestine regarding this topic. Therefore, we used the percentage of knowledge reported in Jordan in 2016 among the Jordanian adults (73.65%) (12). The total sample size for each district was calculated around 300 subjects which gave a total of 1200 for the four directorates. However, the four directorates have significantly different population size in which, Nablus, Tulkarm, Ramallah and Hebron have population sizes of (372621), (178774), (338383), (684247) respectively (5). Depending on this information, the 1200 total sample size was proportionally divided among the four districts (i.e., 482 participants from Hebron, 302 from Nablus, 276 from Ramallah, and 143 from Tulkarm).

DATA COLLECTION FORM

The participants were interviewed face to face for an average of ten minutes to fill in a previously validated and standardized hypertension knowledge level scale questionnaire [HK-LS] (9) obtained with permission. We have added some other variables to the questionnaire that were appropriate for the Palestinian conditions obtained from previous studies (8, 12, 13, 14).

The questionnaire was composed of two sections. The first section included socio-demographic characteristics and clinical history and information of the participants.

The second section included the hypertension knowledge level scale [HK-LS] which was composed of 22 questions regarding hypertension definition, medical treatment, lifestyle, diet, and hypertension medical complications. The answer of each question composed of three options; correct, incorrect and don't know.

Ethical consideration

An-Najah National University Institutional Review Board (IRB) and the scientific research committee at An-Najah National University (Faculty of Medicine and Health Sciences) have given their approval to conduct this study. Permission was obtained from the medical and administrative managers of each hospital and medical center prior to collecting any data.

Two sixth year medical students trained to deliver the questions on the same manner while collecting the data. Subjects were first given information about the study including the ethical issues. A verbal consent was obtained from each participant and there was no interference from the interviewers with the participant's choice of answer.

DATA ANALYSIS

All data has been entered and analyzed using the statistical software package SPSS (Statistical Package for the Social Sciences) version 16. The questionnaire has 22 questions regarding knowledge about hypertension with five different categories. Each question was given one mark, with a total score of 22. When analyzing our data, a new variable (score) was developed, ranging from 0-22. The new variable was analyzed as a continuous variable in the analysis.

The Kolmogorov-Smirnov test was used to assess the normal distribution of data. If the distribution of the continuous dependant variable (score) was normally distributed, therefore, the student t-test and one way ANOVA were used to assess the association between the HK-LS scores and the socio-demographic variables, in regards to their personal history of hypertension. It was also used to assess the relation between HK-LS scores and the presence of hypertension among the participants. Linear regression analysis was performed to study the relationship between the participants' weight and the HK-LS scores. A P value of < 0.05 was always considered statistically significant.

RESULTS

1. Socio-demographic characteristics of the study participants

We were able to recruit the total estimated sample size (1200 participants). Of the 1200 participants in our study, the percentage of males and females were 45.8% and 54.2%, respectively. The most prevalent age category was 18-29 years old (28.6%). Around 70.8% of the total study population was married and 56.1% of them had only elementary or high school educational level. Nearly, 60.2% of the total have never smoked and only 25.3% reported that they perform physical activity (see Table 1 for more details).

2. Clinical history of the study participants

Nearly 379 (31.6%) of the participants reported previous history of hypertension (81.5% of them, 309, are taking their anti-hypertensive medications). Of the total, 64.1% had family history of hypertension while 73.2% had no personal history of chronic disease, whereas 53.8% had family history of chronic disease (majority were endocrine 42.7%). Only 68.7% of the total reported visiting a physician and 48.54% of them had regular visits (see Table 2 for more details).

Table(1) Socio-demographic characteristics of the participants included in the study

Variable	**Frequency (%)**
City	
Hebron	482 (40.2)
Nablus	302 (25.2)
Ramallah	273 (22.8)
Tulkarm	143 (11.9)
Place of residence	
City	565 (47.1)
Village	577 (48.1)
Refugee camp	57 (4.8)
Age (years)	
18-29	355 (28.6)
30-39	219 (18.2)
40-49	202 (16.8)
50-59	236 (19.7)
60 or more	188 (15.7)
Sex	
Male	550 (45.8)
Female	650 (54.2)
Marital Status	
Single	275 (22.9)
Married	849 (70.8)
Divorced	20 (1.7)
Widow	56 (4.7)
Educational Level	
None	77 (6.4)
Elementary or High school	637 (56.1)
Diploma	96 (8)
College or University	373 (25.2)
Higher education	51 (4.2)
Employment status	
Employed	481 (40.1)
Unemployed	719 (59.9)
Monthly income (NIS)	
<2500	538 (44.8)
≥2500	662 (55.2)
Participant responsible for family income?	
Yes	424 (35.3)
No	776 (64.7)
Smoking status	
Smoker	377 (31.4)
Ex-smoker	100 (8.3)
Never smoker	723 (60.2)
Physical Activity	
Exercise	304 (25.3)
Doesn't exercise	896 (74.7)
Weight (kg) [Mean ± SD]	[76.6 ± 16.21]
Height (m) [Mean ± SD]	[1.67.04 ± 0.10]

NIS, New Israeli Shekels; SD, standard deviation; kg, kilogram; m, meter.

Table(2) Self-reported clinical history of the participants

Variable	**Frequency (%)**
Personal history of hypertension	
Yes	379 (31.6)
No	821 (68.4)
If yes, are you taking anti-hypertensive medication?	
Yes	309 (81.53)
No	70 (18.47)
If yes, are you compliant to your anti-hypertensive medication?	
Yes	274 (88.67)
No	35 (11.33)
Participants family history of hypertension	
Yes	769 (64.1)
No	431 (35.9)
Personal history of chronic disease	
Yes	321 (26.8)
Cardiac	74 (6.2)
Renal	16 (1.3)
Endocrine	228 (19)
Others*	50 (4.2)
No	879 (73.2)
Family history of chronic disease	
Yes	646 (53.8)
Cardiac	198 (16.5)
Renal	6.3 (5.2)
Endocrine	512 (42.7)
Others**	26 (2.2)
No	554 (46.2)
Do you visit physician?	
Yes	842 (68.7)
No	376 (31.3)
If yes, does the participant visit the physician regularly?	
Yes	400 (48.54)
No	442 (51.45)

*Other chronic diseases including anemia, asthma, hyperlipidemia, rheumatoid arthritis, inflammatory bowel disease, Peptic ulcer disease gout, stroke, seizures, and cancer.**Other family chronic diseases including asthma, inflammatory bowel disease, cystic fibrosis, duchenne muscular dystrophy, gout, hyperlipidemia, rheumatoid arthritis, stroke, and cancer.

3. Participants' knowledge on hypertension definition and medical treatment

In general, a large proportion of participants had acceptable knowledge about the definition of hypertension and its treatment. Around 52.5% of the participants knew that increased diastolic blood pressure indicates increased blood pressure although 75.6% stated that both high diastolic or systolic blood pressure indicates increased blood pressure (Table 3).

4. Knowledge of lifestyle and diet related factor to hypertension

Among the participants in our study, those who were in favor of red meat and white meat as a healthier option for hypertensive individuals were 29.1% and 57.8%, respectively. The majority of the participants displayed good knowledge regarding lifestyle and diet related factors of hypertension (Table 3).

5. Knowledge regarding hypertension complications

Following the results regarding the questions about hypertension complication, the majority of the participants were aware that this disease can cause strokes (89.5%), heart attacks (85.7%), premature death (76.2 %), and visual disturbance (75.5%) if left untreated. However, only half of them (58.8%) realized that hypertension can cause kidney failure if left untreated (Table 3).

6. Difference in knowledge about hypertension among hypertensive and non-hypertensive participants

There was a significant association between knowledge about the definition of hypertension and medical treatment and the personal history of hypertension among participants. Those with hypertension showed better knowledge overall. However, there wasn't a significant difference among participants' answers when asked if medical treatment is sufficient and no lifestyle modification is required.

Table(3) Knowledge of hypertension definition, medical treatment, lifestyle, diet and hypertension complications among the general population

Definition		**Correct n (%)***	**Incorrect n (%)***	**Don't know n (%)***
1	High diastolic or systolic blood pressure indicates increased blood pressure.	907 (75.6)	93 (7.8)	200 (16.7)
2	Increased diastolic blood pressure also indicates increased blood pressure.	630 (52.5)	266 (22.2)	304 (25.3)
Drug compliance		**Correct n (%)***	**Incorrect n (%)***	**Don't know n (%)***
3	Increased blood pressure is the result of aging, so treatment is unnecessary.	119 (9.9)	1014 (84.5)	67 (5.6)
4	If the medication for increased blood pressure can control blood pressure, there is no need to change lifestyles.	171 (14.2)	996 (80.5)	63 (5.2)
5	If individuals with increased blood pressure change their lifestyles, there is no need for treatment.	346 (28.8)	775 (64.6)	79 (6.6)
6	Individuals with increased blood pressure can eat salty foods as long as they take their drugs regularly.	127 (10.6)	1014 (84.5)	59 (4.9)
Medical treatment		**Correct n (%)***	**Incorrect n (%)***	**Don't know n (%)***
7	Individuals with increased blood pressure must take their medication in a manner that makes them feel good.	268 (22.3)	881 (73.4)	51 (4.2)
8	Drugs for increased blood pressure must be taken every day.	977 (81.4)	98 (8.2)	125 (10.4)
9	Individuals with increased blood pressure must take their medication only when they feel ill.	243 (20.2)	893 (74.4)	64 (5.5)
10	Individuals with increased blood pressure must take their medication throughout their life.	845 (70.4)	209 (17.4)	146 (12.2)
Lifestyle		**Correct n (%)***	**Incorrect n (%)***	**Don't know n (%)***
1	For individuals with increased blood pressure, the best cooking method is frying.	17 (1.4)	1161 (90.8)	22 (1.8)
2	For individuals with increased blood pressure, the best cooking method is boiling or grilling.	1150 (95.8)	25 (2.1)	25 (2.1)
3	Individuals with increased blood pressure must eat fruits and vegetables frequently.	1174 (97.8)	13 (1.1)	13 (1.1)
4	Individuals with increased blood pressure must not smoke.	1127 (93.9)	53 (4.4)	20 (1.7)
5	Individuals with increased blood pressure can drink alcoholic beverages.	26 (2.2)	1142 (95.2)	32 (2.7)
Diet		**Correct n (%)***	**Incorrect n (%)***	**Don't know n (%)***
6	The best type of meat for individuals with increased blood pressure is red meat.	349 (29.1)	677 (56.4)	174 (14.5)
7	The best type of meat for individuals with increased blood pressure is white meat.	693 (57.8)	338 (28.2)	169 (14.1)
Complications		**Correct n (%)***	**Incorrect n (%)***	**Don't know n (%)***
1	Increased blood pressure can cause strokes, if left untreated.	1074 (89.5)	40 (3.3)	86 (7.2)
2	Increased blood pressure can cause heart diseases, such as heart attack, if left untreated.	1028 (85.7)	56 (4.7)	116 (9.7)
3	Increased blood pressure can cause premature death if left untreated.	915 (76.2)	126 (10.5)	159 (13.2)
4	Increased blood pressure can cause kidney failure, if left untreated.	705 (58.8)	177 (14.8)	318 (26.5)
5	Increased blood pressure can cause visual disturbances, if left untreated.	906 (75.5)	137 (11.4)	157 (13.1)

*Data are expressed as number (percent) of each group.

Hypertensive individuals knew that smoking is harmful for hypertensive individuals and displayed better knowledge regarding the suitable diet for those with high blood pressure than those without hypertension. But there wasn't a significant difference among the two groups when asked about other lifestyle related factors to hypertension.

Participants with hypertension were more aware that hypertension could cause kidney failure, whereas non-hypertensive participants could better identify premature death and visual disturbances as a complication of high blood pressure. With respect to knowledge of strokes and heart diseases as a complication of hypertension, there was no significant difference between the two groups.

7. HK-LS scores among hypertensive and non-hypertensive individuals

The mean score of hypertensive individuals (18.22) was higher than that of non-hypertensive individuals (16.74), resulting in a significance in the difference of HK-LS score. This indicates that those with hypertension have superior knowledge amongst the two groups (Table 4).

8. Association between socio-demographic factors and HK-LS scores

As shown in Table 5, the groups that displayed the highest mean scores were those who reside in Hebron (HTN; 19.12), age 40-49 (HTN; 19.24), females (HTN; 18.36), married (HTN; 18.49), ex-smokers (HTN; 18.45), city residents (HTN; 18.51), with a high educational level (HTN; 21.08), employed (HTN; 18.45), physically active (HTN; 18.63), and those who visit a physician (HTN; 18.51). Regarding the personal history of hypertension, in the presence of hypertension there was a significant association between the HK-LS scores and city, age, educational level and physician visits. Whereas in the absence of hypertension the HK-LS scores were associated with the gender, marital status, smoking status, physician visits, and education level of the participants (Table 5).

9. Association between weight of participants and HK-LS scores

The weight of the participants had a borderline significant positive association with the HK-LS scores among the hypertensive patients while there was no significant association with the HK-LS scores and weight among the non-hypertensive participants as shown in the Table 6.

Table (4) Students t-test analysis for the mean difference in scores of HK-LS among hypertensive and non-hypertensive participants

	N	Mean (SD)	Min-Max	95% Confidence Interval	*P*-Value
HTN	379	18.22 (3.62)	1-22	17.86-18.59	**<0.001***
No HTN	821	16.74 (3.38)	0-22	16.51-16.98	

*Statistically significant (p < 0.05). HTN, hypertension; N, number of participants; SD, standard deviation; Min, minimum; Max, maximum.

Table(5) ANOVA analysis for the association between participants HK-LS scores and socio-demographic factors

Variable	Mean (SD)		95% Confidence Interval		*P*-Value	
	HTN	**No HTN**	**HTN**	**No HTN**	**HTN**	**No HTN**
City						
Hebron	19.12 (2.63)	16.73 (3.79)	18.65-19.59	16.34-17.12	**<0.001***	0.682
Ramallah	18.15 (2.99)	16.84 (3.04)	17.45-18.85	16.41-17.26		
Nablus	18.32 (4.10)	16.56 (3.10)	17.53-19.11	16.11-17.00		
Tulkarm	16.76 (4.34)	17.10 (2.58)	15.78-17.74	16.47-17.75		
Age					**<0.001***	**<0.001***
18-29	16.62 (2.72)	16.22 (3.68)	15.17-18.08	15.83-16.61		
30-39	18.29 (3.59)	17.21 (2.89)	17.16-19.41	16.78-17.64		
40-49	19.24 (2.52)	17.16 (2.90)	18.62-19.85	16.67-17.66		
50-59	18.93 (3.07)	17.56 (3.05)	18.39-19.47	16.97-18.14		
60 or more	17.14 (4.38)	15.98 (3.92)	16.36-17.91	15.00-16.97		
Gender					0.338	**<0.001***
Male	17.99 (3.87)	16.03 (3.57)	17.33-18.64	15.68-16.37		
Female	18.36 (3.48)	17.47 (3.01)	17.92-18.80	17.18-17.77		
Marital status					**0.015**	**<0.001***
Single	16.48 (3.48)	15.76 (3.69)	14.97-17.99	15.30-16.22		
Married	18.49 (3.52)	17.25 (3.08)	18.10-18.89	16.99-17.51		
Divorced	16.50 (3.06)	15.60 (3.02)	14.31-18.69	13.44-17.76		
Widow	17.64 (4.23)	15.50 (4.67)	16.32-18.96	12.80-18.20		

...... continue table(5)

Variable	Mean (SD)		95% Confidence Interval		*P*-Value	
	HTN	**No HTN**	**HTN**	**No HTN**	**HTN**	**No HTN**
Smoking status					0.276	**<0.001***
Smoker	17.59 (4.76)	15.88 (3.53)	16.45-18.74	15.48-16.28		
Ex-smoker	18.45 (3.01)	16.94 (3.27)	17.60-19.30	16.00-17.88		
Doesn't smoke	18.35 (3.38)	17.30 (3.74)	17.90-18.76	17.00-17.59		
Residency					0.325	0.115
City	18.51 (3.21)	16.53 (3.72)	18.04-18.98	16.16-16.91		
Village	17.96 (4.05)	16.99 (2.97)	17.35-18.57	16.70-17.28		
Refugee camp	17.92 (3.30)	16.24 (3.94)	16.51-19.32	14.84-17.64		
Educational level					**<0.001***	**<0.001***
None	15.76 (5.07)	13.70 (5.07)	14.32-17.20	11.70-15.71		
Elementary or High school	18.37 (3.34)	16.82 (3.28)	17.94-18.79	16.51-17.13		
Diploma	18.42 (2.82)	17.18 (3.15)	17.38-19.46	16.40-17.97		
College or University	19.28 (2.65)	16.75 (3.27)	18.46-20.10	16.35-17.15		
Higher education	21.08 (1.25)	17.26 (3.23)	20.32-21.84	16.20-18.33		
Employment status					0.467	0.092
Employed	18.45 (4.09)	16.53 (3.47)	17.65-19.25	16.18-16.88		
Unemployed	18.14 (3.44)	16.93 (3.29)	17.73-18.55	16.62-17.24		
Physical activity					0.307	**0.033**
Exercise	18.63 (3.48)	16.35 (3.47)	17.79-19.48	15.90-16.79		
Doesn't Exercise	18.14 (3.65)	16.90 (3.30)	17.73-18.54	16.63-17.18		
Do you visit a physician?					**<0.001***	**0.003***
Yes	18.51 (3.29)	17.03 (3.16)	18.16-18.17	16.75-17.31		
No	15.83 (5.10)	16.33 (3.64)	14.22-17.44	15.94-16.72		

*Data are expressed as number (percent) of each group. **Statistically significant ($p < 0.05$). SD, standard deviation; HTN, hypertension.

Table (6) Simple linear regression analysis for the association of the participants' weight with the HK-LS scores

Variable	B		Beta		95% Confidence Interval for B		*P*-Value	
	HTN	**No HTN**	**HTN**	**No HTN**	**HTN**	**No HTN**	**HTN**	**No HTN**
Weight	0.022	0.011	0.102	-0.015	0.00-0.04	-0.018-0.012	0.048	0.670

B, unstandardized regression coefficient; Beta, standardized regression coefficient; HTN, hypertension.

DISCUSSION

The purpose of this cross-sectional study was to evaluate hypertension knowledge among Palestinian adults living in the West Bank and its relation to the personal history of hypertension and socio-demographic factors of the participants. It was conducted in public and health care centers in Hebron, Ramallah, Nablus, and Tulkarm. We concluded that Palestinian adults had a generally good level of knowledge regarding hypertension. These results were similar to that of a study conducted in North Carolina (15) and in Jordan, in 2016, which showed a good level of knowledge about hypertension among Jordanian adults (12). It is also contradictory to several other studies (3, 13, 16, 17). Moreover, there was a significant difference between hypertensive and non-hypertensive participants regarding their knowledge about hypertension.

The participants in our study had acceptable knowledge about the medical definition and treatment of hypertension. It is worth noting that 83.1% of hypertensive participants knew that

HTN medication should be taken for life, while 12.1% believed medication should only be taken when they feel ill. These results were better than that of a study done among hypertensive patients in Nigeria, in which, only a third reported that hypertension treatment is life-long and the majority believed that medication for high blood pressure should only be taken when feeling ill (18).

When comparing both hypertensive and non-hypertensive participants, hypertensive participants showed a more satisfying level of knowledge regarding hypertension definition and medical treatment although there was no difference between the two groups when asked if lifestyle changes are not needed if medication is used.

When asked about lifestyle, there was a similar trend among hypertensive and non-hypertensive participants, in which, the majority answered correctly indicating a high level of knowledge in both groups. But hypertensive participants had more knowledge of the harmful effect of smoking. Our results were consistent with the Jordanian study (12) and contradictory to another study done in Egypt (16).

In general, only 57.8% of the participants knew that white meat is the healthier option and those who were hypertensive were more likely to answer as such. This tells us that although there was an appropriate response to that question, there needs to be an improvement in the knowledge of red meats negative relation to hypertension.

The participants had satisfactory knowledge regarding the complications of hypertension. Both groups had a similar response when asked about strokes and heart disease. Hypertensive participants acknowledged kidney failure as a complication more often than non-hypertensive participants. Our findings showed that our participants displayed slightly lower knowledge than Sanne et al. which found that the participants who believe hypertension can cause heart attacks, strokes and kidney problems were 94.9%, 98% and 76.4%, respectively. This doesn't correspond with the results of Familoni et al. who found that 53.2% recognize heart failure, kidney failure and strokes as a complication of hypertension. Nonetheless, more non-hypertensive participants realized that premature death and visual disturbances are complications of hypertension.

Upon calculating the scores of the participants, the mean score among hypertensive participants was higher than that of non-hypertensive participants, and it was statistically significant. This shows a relationship between the presence of hypertension and the level of knowledge of hypertension. This finding is similar to that of Eshah et al. (2016) Hypertensive participants' scores were related to some of the socio-demographic factors including city, age, educational level, and physician visits. They also scored higher than non-hypertensive participants regardless of the different socio-demographic characteristics. Those residing in Hebron scored highest from both groups in all four cities (19.12) and those in Tulkarm scored the lowest (16.76). After observing the differences between the age groups, we noticed that as the participants become younger or older in age, the scores decrease, with the highest scores in mid age participants 40-49 (19.24). Several other studies reported that hypertension knowledge was related to age, in which older participants had lower knowledge (13, 19). As expected, the educational level was directly proportional to the knowledge of the hypertensive participants. The hypertensive participants with higher education scored (21.08) and those with no education scored (15.76), which are the highest and lowest among all educational levels, respectively. This was similar to findings of previous studies (3, 7, 12, 13, 20) . Those who visit physicians had better knowledge overall than those who don't. This implies the positive effect of physicians in providing information and improving awareness in general. Previous studies have also proved the role of physicians and health care workers in increasing hypertension knowledge (3, 17).

On the other hand, non-hypertensive participants had somewhat similar trends of scores to hypertensive participants when analyzed in relation to the different socio-demographic factors. For example, those aged 18-29 scored (16.22) and those age 60 or more scored (15.98). The other age groups showed similar scores ranging from (17.16-17.56). Although their scores are lower than their fellow hypertensive age groups, we considered it relatively acceptable. As its counterpart, non-hypertensive participants with higher education also had higher scores. Non-hypertensive participants' scores were associated with age, gender, marital status, smoking status, educational level, and physician visits. Looking back, the hypertensive participants' scores had lesser associations. In comparison, a study done in Turkey, 2012, a significant association was observed between knowledge score and age, gender, educational level and history of hypertension (9). And in Jordan, 2016, a significant relationship was found between socio-demographic, clinical variables, and knowledge of hypertension (12). These results were corresponding to the findings in our study.

In Palestine, there are no previous studies that evaluate knowledge among Palestinians concerning hypertension, and only a few which estimate the prevalence, awareness, and treatment of hypertension among Palestinians. Our study is the first of its kind in Palestine to examine knowledge of hypertension in particular, compare the knowledge between hypertensive and non-hypertensive individuals, and evaluate the relationship between knowledge of hypertension and socio-demographic factors.

Study limitations

The major limitations that faced the researchers while conducting this study were the time and difficulty of access to the targeted areas. The large sample size (1200), nearly equal gender distribution in the sample, and the cities we chose to cover in this study, which properly represented the West Bank population in the north, south, and middle, aided in decreasing the bias in our results. There was no missing data because each questionnaire was filled in during a face to face interview.

CONCLUSIONS

Knowledge of hypertension among the general population was acceptable and they showed a good understanding of the main concepts. Those with hypertension showed a higher level of knowledge in comparison to those without hypertension. We recommend the establishment of educational programs aiming to improve HTN knowledge and awareness, as well as, encouraging physicians to improve their communication skills in conveying information about hypertension to their patients.

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Authors' contributions

HA conducted the study design and protocol. AT and SA collected the data. HA, AT and SA drafted the Manuscript and performed the data analysis. MK reviewed the manuscript while AH helped in the ideas and the study protocol development. All authors read and approved the final version of the manuscript.

CONFLICT OF INTERESTS

The authors report no conflicts of interest in this manuscript

REFERENCES

1) James PA, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee (JNC 8). JAMA. 2014;311(5):507-20.

2) Bromfield S, Muntner P. High blood pressure: the leading global burden of disease risk factor and the need for worldwide prevention programs. Curr Hypertens Rep. 2013;15(3):134-6.

3) Kilic M, Uzunçakmak T, Ede H. The effect of knowledge about hypertension on the control of high blood pressure. Int J Cardiovasc Acad. 2016;2(1):27-32.

4) Q&As on hypertension: (WHO) World Health Organization; 2015 [cited 2016

March]. Available from: http://www.who.int/features/qa/82/en/.

5) Health Annual Report- Palestine 2014. General Directorate of Planning and Health Policies - Palestinian Health Information Center - Ministry of Health; 2015.

6) Palestine health profile 2015. World Health Organization. Regional Office for the Eastern Mediterranean, 2016.

7) Motter FR, Olinto MTA, Paniz VMV. Avaliação do conhecimento sobre níveis tensionais e cronicidade da hipertensão: estudo com usuários de uma Farmácia Básica no Sul do Brasil. Cadernos de Saúde Pública. 2015;31(2):395-404.

8) Schapira MM, Fletcher KE, Hayes A, Eastwood D, Patterson L, Ertl K, et al. The development and validation of the hypertension evaluation of lifestyle and management knowledge scale. J Clin Hypertens (Greenwich). 2012;14(7):461-6.

9) Erkoc SB, Isikli B, Metintas S, Kalyoncu C. Hypertension Knowledge-Level Scale (HK-LS): a study on development, validity and reliability. Int J Environ Res Public Health. 2012;9(3):1018-29.

10) Khdour MR, Hallak HO, Shaeen M, Jarab AS, Al-Shahed QN. Prevalence, awareness, treatment and control of hypertension in the Palestinian population. J Hum Hypertens. 2013;27(10):623-8.

11) Charan J, Biswas T. How to calculate sample size for different study designs in medical research? Indian J Psychol Med. 2013;35(2):121-6.

12) Eshah NF, Al-Daken LI. Assessing Public's Knowledge About Hypertension in a Community-Dwelling Sample. J Cardiovasc Nurs. 2016;31(2):158-65.

13) Zinat Motlagh SF, Chaman R, Ghafari SR, Parisay Z, Golabi MR, Eslami AA, et al. Knowledge, Treatment, Control, and Risk Factors for Hypertension among Adults in Southern Iran. Int J Hypertens. 2015;2015:897070.

14) Grad I, Mastalerz-Migas A, Kilis-Pstrusinska K. Factors associated with knowledge of hypertension among adolescents: implications for preventive education programs in primary care. BMC Public Health. 2015;15(1):463.

15) Viera AJ, Cohen LW, Mitchell CM, Sloane PD. High blood pressure knowledge among primary care patients with known hypertension: a North Carolina Family Medicine Research Network (NC-FM-RN) study. J Am Board Fam Med. 2008;21(4):300-8.

16) Abed El-Hay S, El Mezayen S. Knowledge and Perceptions Related to Hypertension, Lifestyle Behavior Modifications and Challenges That Facing Hypertensive Patients. IOSR J Nurs Health Sci. 2015;4(6):2320-1940.

17) Oskay E, Onsuz M, Topuzoglu A. Assesment of hypertension knowledge, attitude and throught of policyclinic patients at a primary health care center in Izmir. J Adnan Menderes Univ Med Fac. 2010;11:3-9.

18) Familoni B, Ogun S, Aina A. Knowledge and awareness of hypertension among patients with systemic hypertension. J Natl Med Assoc. 2004;96(5):620.

19) Sanne S, Muntner P, Kawasaki L, Hyre A, DeSalvo K. Hypertension knowledge among patients from an urban clinic. Ethn Dis. 2008;18(1):42.

20) Darvishpour J, Omidi S, Farmanbar R. The Relationship between Health Literacy and Hypertension Treatment Control and Follow-up. Caspian J Health Res. 2016;2(1):1-8.