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Awareness of hypertension prevention among high school students of Riyadh, Saudi Arabia

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ABSTRACT

Introduction: Hypertension is widely spread in Saudi Arabia, often individuals do not know they are suffering from this disease or the implications. This study aims to determine the level of awareness stemming from youth residents of Riyadh, Saudi Arabia when it comes to hypertension and preventable actions. *Methods:* This is a community-based, cross-sectional study conducted among high school students studying in different regions of Riyadh, Saudi Arabia. Questionnaires were distributed among students and included demographic characteristics, attitude towards hypertension and a 20-item questionnaire to measure the hypertension awareness and prevention. *Results:* 503 students took part (54.7% males). Overall mean awareness scores were 12.8 (SD 3.85) out of 20 points. 60% were considered having moderate awareness, 25.2% good awareness and the remaining had poor awareness levels (15.3%). Factors associated with increased awareness scores were female, attending private schools, and undergoing screening tests. While being diagnosed with hypertension was the only factor associated with decreased awareness scores. *Conclusion:* The awareness of the students regarding hypertension and its prevention was adequate. Female students who were studying at private schools and who had undergone screening tests demonstrated better awareness levels compared to others.

Keywords: Hypertension, youth, awareness, prevention

1. INTRODUCTION

Hypertension is a disease that is widely spread among the global community and especially in Saudi Arabia; many times individuals do not know whether they are suffering from this disease or the implications of having hypertension. From a physiological point of view, blood pressure is the force of blood against the walls of the arteries when the heart is pumping, as the blood moves through the capillaries and exists into the veins we then have a drop in the blood volume in the arteries and thus a lower pressure against the

artery walls (Staessen et al., 2003). These two differences in pressures are referred to as Systolic and Diastolic blood pressure, hypertension in its easiest forms is the rising of these arterial blood pressures (Staessen et al., 2003). With advancements in modern medicine, hypertension is not a permanent disease but can be prevented (Champagne, 2006).

Dietary approaches to stop hypertension (DASH) emphasize the consumption of vegetables, fruits, whole grains, low-fat and low-sodium foods, whereas vegetables and whole foods are very rich in fiber that help with food absorption and better digestion (Champagne, 2006). Exercise helps to reduce extra body weight and reduce fat percentage in the human body composition (Champagne, 2006). There are numerous lifestyle changes that can prevent and cure hypertension, such as smoking cessation, stress management and relaxation techniques, in addition to the use of medications which can also prevent further disease progression. Thus, hypertension awareness, as well as preventative measures is an integral point in the reduction of disease progression and pharmaceutical dependence. While there might be a large amount of research regarding awareness of hypertension globally, there is a lack of research from within Saudi Arabia and particularly regarding the level of awareness among youth. Previous studies were limited to participants aged 30 and above.

Research conducted by Umm Al-Qura University noted that there was a low level of awareness among those aged 30 and above and that could be due to insufficient role of health care suppliers in raising the level of awareness as well as deep rooted culture of low physical activity and unhealthy nutrition (Mirza & Elmorsy, 2016). Another study funded by the Saudi Ministry of Health in conjunction with the WHO was a cross sectional research regarding the level of hypertension awareness among 4758 Saudis aged 15-64. The study determined that less than half of those surveyed with hypertension were aware that they had hypertension all together and were unaware of the risk behind it (Saeed et al., 2011). It was evident at the end of the research that females had a significantly higher awareness of hypertension prevention compared to males, as well as specific regions within The Kingdom of Saudi Arabia (Saeed et al., 2011). Furthermore, the study indicated that those who have co-morbidities such as Diabetes Mellitus and an increasing level of physical activity were among the top tier of individuals who understood hypertension and understood the need to apply preventive measures (Saeed et al., 2011).

Compilation of research showed there are limitations when it comes to participant age, with a large majority of research focusing on those who are in the direct range of hypertension risk (approximately the ages of 35-65). Moreover, studies focused on hypertension patients themselves while this article intended to include all participants regardless of hypertension diagnosis. This studies' significance is to gauge the level of awareness stemming from youth residents of Riyadh, Saudi Arabia when it comes to hypertension and preventable actions.

2. MATERIALS AND METHODS

Study Design and Participants

A community based cross-sectional study conducted from February 2021 - February 2022 concerning the awareness of high school students in urban Riyadh, Saudi Arabia with relation to hypertension prevention. Participants in this study were selected using random design sampling and restricted to ages between 16-19 who are Saudi in nationality and currently enrolled in a school that is situated in Riyadh city. Data was retrieved from the Ministry of Education regarding the population of high school students in Riyadh; in 2017 the report indicated 258,198 students were currently enrolled. With this information considering that the confidence interval is 95% and a 5% margin of error, an estimated sample size was determined to be between 400 - 500 participants. Written assent was taken from each participant under the age of 18 through a form of agreement, including explanation of the aim of the study and ensuring the privacy of the data collected prior to receiving the questionnaire. The questionnaire was distributed in Arabic due to the majority of Arabic speakers in Saudi Arabia and was back translated from Arabic to English to validate the context. Data was collected from 10 high schools, 5 male and 5 female, situated in the North, South, East, West, and Central regions of Riyadh to ensure a representative sample and an even coverage.

Data Collection

Trained Data collectors were extended to various high schools, computer labs were set up with questionnaires and strict precautionary and preventive measures against COVID-19 were put in place. A questionnaire composed of six sections: (1) Demographic Data (age, gender, and nationality); (2) Definition of Hypertension; (3) Screening; (4) Family history; (5) Disease information; (6) Prevention was distributed. A pilot questionnaire was distributed to 110 individuals consisting of 20 items and was validated by three experts in the field of family medicine and public health before distribution.

Statistical Analysis

The criteria for the Awareness regarding hypertension were drawn from 20 questions, where the correct answers were coded with 1 while the incorrect answers were coded with 0. Participants total awareness score has been calculated by adding all 20 questions. A possible score range from 0 to 20 has been generated, which indicates that the higher the score the higher the awareness regarding hypertension. Participants were classified on their level of awareness by analyzing the scoring of the questionnaire, those who scored less than 50% were classified as having poor awareness, those scoring between 50%-75% classified as moderate, and participants who scored above 75% were considered as having good awareness. Descriptive statistics were presented using numbers, percentages, mean and standard deviation, whenever appropriate. The comparison between the score of awareness and the socio-demographic characteristics and their attitude about it had been carried out using Mann Whitney Z-test. A P- value of <0.05 was considered statistically significant. Normality tests were conducted using the Shapiro Wilk test as well as Kolmogorov and Smirnov tests. The awareness score follows the non-normal distribution; therefore, non-parametric tests were applied. All statistical analyses were carried out using Statistical Packages for Software Sciences (SPSS) version 26 Armonk, New York, IBM Corporation.

3. RESULTS

Table 1 described the basic demographic characteristics of the students. In total, 503 Saudi high school students were recruited. The most common age group was 18 to 19 years old (56.9%) with more than half (54.7%) being males. Students who were enrolled in public school were (56.3%). In addition, 22.5% of the students indicated that their schools were situated in the East of Riyadh while 21.7% reported in the North, followed by Center of Riyadh (21.5%) after which West of Riyadh (18.9%) and South of Riyadh (15.5%).

Table 1 Demographic Characteristics of Saudi High School Students Living in Riyadh, KSA (n=503)

Study variables	N (%)
Age group	
16 – 17 years	217 (43.1%)
18 – 19 years	286 (56.9%)
Gender	
Male	275 (54.7%)
Female	228 (45.3%)
Type of school	
Public	283 (56.3%)
Private	220 (43.7%)
School region	
North of Riyadh	109 (21.7%)
East of Riyadh	113 (22.5%)
South of Riyadh	78 (15.5%)
West of Riyadh	95 (18.9%)
Center of Riyadh	108 (21.5%)

Table 2 describes the attitude of students towards hypertension. 66.2% of participants had knowledge about the definition of hypertension, yet only 19.7% of participants regularly undergo a screening test. The prevalence of students who were diagnosed with hypertension was 3.6%. Of them, 10 out 18 (55.5 %) were visiting their attending physician regularly and 66.7% of those students received adequate information about their condition. The prevalence of students who reported a family history of hypertension was 41%.

Table 2 Attitude of High School Students towards Hypertension (n=503)

Study variables	N (%)
Regularly do the screening test	
Yes	99 (19.7%)
No	404 (80.3%)
Diagnosed with hypertension	

Yes	18 (3.6%)
No	485 (96.4%)
If yes, do you follow up with your doctor regularly? (n=18)	
Yes	10 (55.5 %)
No	08 (44.5%)
If yes, did your doctor provide you enough information about the disease? (n=18)	
Yes	12 (66.7%)
No	06 (33.3%)
Family history of hypertension	
Yes	206 (41.0%)
No	206 (41.0%)
I don't know	91 (18.0%)
Knowledge about the definition of hypertension	
Yes	333 (66.2%)
No	170 (33.8%)

Table 3 Assessment of Awareness towards Hypertension (*n*=503)

Statement	N (%)
Blood pressure of 115/75	
High	09 (01.8%)
Low	99 (19.7%)
Normal *	251 (49.9%)
I don't know	144 (28.6%)
Blood pressure of 160/100	
High *	313 (62.2%)
Low	11 (02.2%)
Normal	43 (08.5%)
I don't know	136 (27.0%)
Appropriate age to start screening for hypertension	
16 years old	130 (25.8%)
17 years old	26 (05.2%)
18 years old *	144 (28.6%)
19 years old	57 (11.3%)
I don't know	146 (29.0%)
Number of times needed to screen for blood pressure	
Once every 6 months	304 (60.4%)
Once every year *	71 (14.1%)
Once every 2 to 3 years	24 (04.8%)
No need to screen	16 (03.2%)
I don't know	88 (17.5%)
People diagnosed with hypertension can live a normal life	
Yes *	309 (61.4%)
No	127 (25.2%)
I don't know	67 (13.3%)
Hypertension is contagious	
Yes	10 (2.0%)
No *	469 (93.2%)

I don't know	24 (4.8%)
Hypertension is a hereditary disease	
Yes *	326 (64.8%)
No	96 (19.1%)
I don't know	81 (16.1%)
Hypertension is a chronic illness	
Yes *	304 (60.4%)
No	109 (21.7%)
I don't know	90 (17.9%)
Hypertension can be completely cured	
Yes	174 (34.6%)
No *	189 (37.6%)
I don't know	140 (27.8%)
Hypertension can lead to complications of the heart, brain, and kidneys	
Yes *	376 (74.8%)
No	35 (7.0%)
I don't know	92 (18.3%)
Smoking is related to hypertension	
Yes *	307 (61.0%)
No	81 (16.1%)
I don't know	115 (22.9%)
People who have hypertension suffer from it for:	
A few years	53 (10.5%)
5-10 years	28 (05.6%)
All their lives *	275 (54.7%)
I don't know	147 (29.2%)
Hypertension can be treated without medications	
Yes	104 (20.7%)
No *	255 (50.7%)
I don't know	144 (28.6%)
Which of the following do you think is a complication of hypertension? †	
Heart attack *	361 (71.8%)
Cancer	51 (10.1%)
Stroke *	221 (43.9%)
I don't know	123 (24.5%)
Consuming salts will lead to:	
Increase in blood pressure *	372 (74.0%)
Decrease in blood pressure	30 (6.0%)
Has no relation with blood pressure	24 (4.8%)
I don't know	77 (15.3%)
Increasing fruit and vegetable intake and decreasing meat intake help in controlling blood pressure	
Yes *	389 (77.3%)
No	25 (5.0%)
I don't know	89 (17.7%)
Obesity is related to hypertension	

Yes *	373 (74.2%)
No	62 (12.3%)
I don't know	68 (13.5%)
Losing weight in obese people will lead to:	
Increase in blood pressure	27 (05.4%)
Decrease in blood pressure *	225 (44.7%)
Has no relation with blood pressure	122 (24.3%)
I don't know	129 (25.6%)
Exercise can help in controlling blood pressure	
Yes *	437 (86.9%)
No	14 (02.8%)
I don't know	52 (10.3%)
Patients diagnosed with hypertension must take their medications regularly.	
Yes *	461 (91.7%)
No	06 (01.2%)
I don't know	36 (07.2%)
Awareness total score (mean ± SD)	12.8 ± 3.85

† Variable with multiple response answers.

* Indicates correct answer.

Table 3 revealed the student's awareness of hypertension. According to the results approximately half of the students (49.9%) were correct that 115/75 was the normal blood pressure, while 62.2% of participants answered 160/100 was high blood pressure. 28.6% were sure that the age of 18 was the appropriate age bracket to start screening for hypertension and 14.1% had the correct knowledge regarding annual screening. 61.4% of students believed that a patient who had been diagnosed with hypertension could live a normal life. The proportion of students who believed that hypertension is not contagious, has a hereditary component, is a chronic illness, cannot be completely cured and could lead to complications of the heart, brain, and kidneys were 93.2%, 64.8%, 60.4%, 37.6%, and 74.8%, respectively.

Approximately 61% of participants answered that smoking is related to hypertension. 54.7% believed that people who have hypertension could suffer from this disease for the rest of their lives. More than half (50.7%) were aware that hypertension cannot be treated without medications. Students were aware that the most common complication of hypertension was heart attack (71.8%) and stroke (43.9%). The proportion of students who knew that consuming salt would lead to an increase in blood pressure was 74%. Furthermore, 77.3% were aware that increasing fruit and vegetable intake and decreasing meat intake could help in controlling blood pressure. The prevalence of students who believed a correlation between obesity and hypertension was 74.2%. Only 44.7% of students were aware that losing weight in obese people could lead to a decrease in blood pressure whereas 86.9% were confident that exercise can help in controlling blood pressure. The proportion of students who believed that hypertensive patients must take regular medication was 91.7%. Based on the given criteria, the overall mean awareness score was 12.8 (SD 3.85).

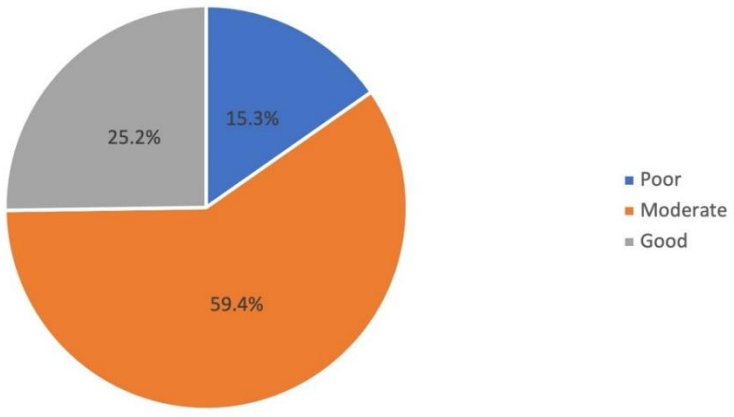

Figure 1 Level of Awareness towards Hypertension

Figure 1 depicts the level of awareness toward hypertension; it was observed that moderate, good and poor awareness were detected among 59.4%, 25.2% and 15.3%, respectively. In Table 4, a higher awareness score was more associated with the female gender(Z=3.012; p=0.003), being in a private school (Z=2.148; p=0.032), undergoing screening tests regularly (Z=3.007; p=0.003) not having hypertension (Z=2.178; p=0.029), having a family history of hypertension (Z=2.255; p=0.024) and were aware of the definition of hypertension (Z=8.585; p<0.001).

Table 4 Statistical Differences between the Total Awareness Score and the Socio-demographic Characteristics of Participants (n=503)

Factor	Awareness Score (20) Mean ± SD	Z-test	P-value §
Age group			
16 – 17 years	12.8 ± 3.71	0.184	0.854
18 – 19 years	12.8 ± 3.96		
Gender			
Male	12.2 ± 4.16	3.012	0.003 **
Female	13.4 ± 3.33		
Type of school			
Public	12.4 ± 3.91	2.148	0.032 **
Private	13.2 ± 3.73		
Regularly do screening test			
Yes	13.7 ± 3.69	3.007	0.003 **
No	12.6 ± 3.85		
Diagnosed with hypertension			
Yes	11.3 ± 3.08	2.178	0.029 **
No	12.8 ± 3.86		
Family history of hypertension †			
Yes	13.6 ± 3.51	2.255	0.024 **
No	12.8 ± 3.72		
Knowledge about the definition of hypertension			
Yes	13.9 ± 2.98	8.585	<0.001 **
No	10.6 ± 4.38		

* Students who do not have an idea about a family history of hypertension were excluded from the analysis.

§ P-value has been calculated using Mann Whitney Z-test.

** Significant at p<0.05 level.

4. DISCUSSION

The present study attempted to evaluate the awareness of high school students regarding hypertension and its prevention. The awareness of the students regarding hypertension prevention was sufficient. Approximately 59.4% were considered moderate knowledge, 25.2% were good and 15.3% were considered as a poor awareness level (mean score: 12.8; SD 3.85, out of 20 points). These findings are consistent with the study of Parvin et al., (2020) whereas the study measures the awareness of secondary school children regarding hypertension. Based on their reports, the adolescent showed a high level of awareness regarding hypertension; however, some students appeared to have low awareness specifically on the basic concept of hypertension, risk factors and prevention.

On the contrary, Grad et al., (2015) reported that among the 250 adolescents enrolled, 49.2% demonstrated a low level of knowledge about hypertension, 38% were medium and only 13% were shown to have a good knowledge level. In our study, female students tend to possess better awareness compared to their male counterparts. Consistent with our findings, Saeed et al., (2011) revealed that gender showed a significant association with the level of awareness, however, a similar study conducted in Makkah, Saudi Arabia discovered that both age and gender were not relevant to the level of knowledge (Alharbi et al., 2017). Gender differences in the level of hypertension awareness have not been studied well in Saudi Arabia. Thus, more studies are needed to establish its influence. Students with a family history of hypertension exhibited a higher level of awareness. Several studies have

shown the effect of having a family history of hypertension in regards to the awareness levels such as the study published by Grad, Akter, and Lugo-Mata, respectively (Grad et al., 2015; Akter et al., 2014; Lugo-Mata et al., 2017). It is likely true that individuals who have a family diagnosed with hypertension might exhibit better awareness levels since they are more prone to exposure and are more in contact with them every day.

Our results also indicate that students who were studying in private schools are likely to have higher awareness levels than the students studying in public schools. Other relevant factors of increased awareness levels were regularly doing screening tests and knowledge about the definition of hypertension. This is almost similar to the study conducted in Poland; the study suggests that urban youth demonstrated better knowledge about hypertension than youth from rural areas. They argued that the diversification of learning progress varied among children of different regions and multi-social backgrounds stating that individuals in rural locations tend to possess lower rates of the learning process than those in urban locations (Grad et al., 2015). Surprisingly, our study has shown that students who were diagnosed with hypertension had significantly lower ratings in awareness compared to healthy students. The true effect of hypertension diagnosis on the level of awareness is subjected to further investigations since we only have fewer respondents who had been diagnosed with hypertension (3.6%).

On the other hand, among the primary care patients in Venezuela, a previous diagnosis of hypertension showed a positive association with hypertension awareness, but they found no association with gender or educational level, which contradicted our result (Lugo-Mata et al., 2017). In the specific assessment of hypertension awareness, our students showed varying degrees of awareness levels. For instance, in the general knowledge and complications of hypertension, 62.2% of the students correctly recognized 160/100 as high blood pressure but their knowledge about normal blood pressure was deficient (49.9%). They also showed a lack of awareness about the appropriate age for hypertension screening tests (28.6%) and the frequency to do the screening per year (14.1%). However, the majority exhibited adequate knowledge about different beliefs of the disease such as beliefs that patient with hypertension can live a normal life (61.4%), belief that it is not a contagious disease (93.2%), that it is a hereditary disease (64.8%), that it is a chronic illness (60.4%) and that it can lead to complications including heart, brain, and kidney (74.8%). Similarly, 61% of the students were of the opinion that smoking is related to hypertension and 54.7% believed that individuals who were diagnosed with hypertension might suffer from the disease for the rest of their lives.

Compared to our reports, a study conducted among Venezuelan patients, documented that 86.2% recognized the normal blood pressure correctly (Lugo-Mata et al., 2017). Venezuelan patients also agreed that hypertension increases the risk of heart attacks and increases the risk of a stroke. However, 87.8% wrongly indicated that the majority of people with hypertension might also suffer from headaches or dizziness (89.9%) (Lugo-Mata et al., 2017). The awareness level between hypertensive patients and high school students was variable. However, in general, they agreed at some points, specifically regarding the complications of hypertension. Regarding the treatment and prevention, our results revealed that although students were shown to have a better awareness of the effect of consuming salts on blood pressure (74%) and the benefits of eating fruits and vegetables regularly (77.3%) along with regular exercise (86.9%) and medications (91.7%), however, deficient knowledge was seen when asked about the effect of losing weight to patients (44.7%).

In UAE, a study reported gaps in hypertension awareness related to the following domains such as general knowledge (not curable, 35.4%, classification, 42.9%), complication (kidney 40.4%), risk factors (smoking cessation) (Akter et al., 2014). The deficit in the awareness about the treatment and control is a worldwide issue, but it is even more serious in Saudi Arabia and the rest of the developing countries, which require urgent solutions (Saeed et al., 2011).

5. CONCLUSION

The awareness of the high school students regarding hypertension and its prevention was adequate. Of all the students, female students who were studying at a private school and who had undergone screening tests demonstrated a better awareness level than the rest of the students. Awareness campaigns are necessary to educate students regarding hypertension and its prevention. Teachers should teach students how to adopt a healthy lifestyle with emphasis on the prevention of hypertension. Healthcare providers have a vital role to improve the awareness of youth in the community and in the school. Further research is needed to determine the hypertension awareness level of young people in other regions in Saudi Arabia.

Limitations

Study was conducted only in Riyadh City

Informed Consent

Written assent was taken from each participant under the age of 18.

Ethical approval

Ethical approval was obtained from the Institutional Review Board at Al Imam Mohammad Ibn Saud Islamic University, Riyadh via reference number: 78-2021 Dated: 01-06-2021.

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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