

## Hypertension in Adolescent School Girls in Riyadh City, KSA

Furat Abdulrahman Almayouf, Noha Dekhail Aldekhail

College of Medicine, Qassim University, Almulida, Saudi Arabia

### ABSTRACT

**Background:** Recent data from large samples of healthy adolescents show that the rates of hypertension and prehypertension in adolescents are greater than expected and are increasing. Children with elevated blood pressure can develop target organ damage. This work aimed to estimate the prevalence of hypertension and to describe some related characteristics of cases in adolescent preparatory and secondary school girls of Riyadh city, KSA. **Methods:** A cross-sectional study conducted among a cluster sample of adolescent preparatory and secondary school girls of Riyadh city, KSA during the academic year 2016-2017. Data collected via a predesigned and pretested questionnaire to collect the relevant data. **Results:** In the studied adolescent girls, 6 (3.8%) were hypertensive; previously diagnosed and on treatment, 0.6% were ex-smoker and 1.9% were smokers. Two girls (1.2%) had renal disease, 2.4% had bronchial asthma, one girl (0.6%) had hypothyroidism and 0.6% had depression. Half of the cases aged 18 years, 33.3% aged 17 years and 16.7% aged 19 years (Mean ( $\pm$ SD) age of cases was 15.3 ( $\pm$  2.8)). **Conclusion:** in adolescent preparatory and secondary school girls of Riyadh city, KSA, 3.8% were hypertensive. So health-care providers should recognize the increased risk of prehypertension and hypertension and should seek to identify and manage the modifiable risk factors in those adolescent girls.

**Keywords:** Hypertension; Adolescent; School Girls; Riyadh City, KSA.

### INTRODUCTION

Hypertension is a persistent elevation of arterial blood pressure (BP) above levels arbitrarily defined as normal. It is the most common cardiovascular disease, and a public health challenge for societies in socioeconomic and epidemiological transition, and one of the most important risk factors for cardiovascular death, accounting for 20- 50% of all deaths around the world <sup>[1]</sup>. The importance of hypertension in the pediatric population has not been as well appreciated as in adults. Children with elevated blood pressure (BP) can develop target organ damage <sup>[2]</sup>. Adolescence in girls has been recognized as a special period which signifies the transition from girlhood to womanhood. Globally, adolescent girls constitute about 1/5th of total female population <sup>[3]</sup>. Recent data from large samples of healthy adolescents show that the rates of hypertension and prehypertension in adolescents are greater than expected and are increasing <sup>[4]</sup>. A cross-sectional study was conducted among 146 boys and girls attending intermediate and secondary schools in 2 regions (Al-Mallaha and Al-Mubarraz) in the Eastern Province of Saudi Arabia found that 30% had systolic blood pressure (SBP) of  $\geq 140$  mm Hg and 22% had diastolic blood pressure of  $\geq 90$  mm Hg. For girls between 13 and 16 years old, the SBP was greater than the 95th percentile of

Saudi national norms <sup>[5]</sup>. Another cross-sectional study of hypertension in adolescent girls of district Moradabad, Uttar Pradesh, India found that; nearly 15.8% adolescents were found prehypertensive, 1.5% were having stage I hypertensive and 0.7% of the girls were stage II hypertensive <sup>[6]</sup>.

### OBJECTIVE

This work aimed to estimate the prevalence of hypertension and to describe some related characteristics of cases in a sample of adolescent preparatory and secondary school girls of Riyadh city, KSA.

### SUBJECTS AND METHODS

A cross-sectional study was conducted among a sample of adolescent preparatory and secondary school girls of Riyadh city, KSA during the academic year 2016-2017. The sample size was calculated using the sample size equation  $n = z^2 * p(1-p) / e^2$  considering the prevalence of type I diabetes in Riyadh is 50%, target population less than 1000 and study power 95%.

**Data collection:** participant students were given a predesigned and pretested questionnaire to collect the relevant data on Socio-demographic characteristics including grade, mother and father

education and work and mean family income/month (in SR).

Using of hormonal contraception, smoking status and certain types of diseases that may be prevalent among adolescent suggested to affect cardiovascular system diseases such as diabetes millets and thyroid gland diseases.

Questions regarding the previously diagnosed hypertension and its determinants.

**Ethical considerations**

Permission to conduct the study was obtained from the Research and Ethics Committee at the College of Medicine, King Saud University, Riyadh , Saudi Arabia. Data collector gave a brief written introduction to the participants by explaining the aims and benefits of the study. Anonymity and confidentiality of data was maintained throughout the study. There was no conflict of interest.

**Statistical Analysis**

We utilized the Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) version 16 to analyze the study data. Results are displayed as counts and percentages. The chi square and independent sample t tests was used as a tests of significance, and differences were considered significant at P value less than 0.05.

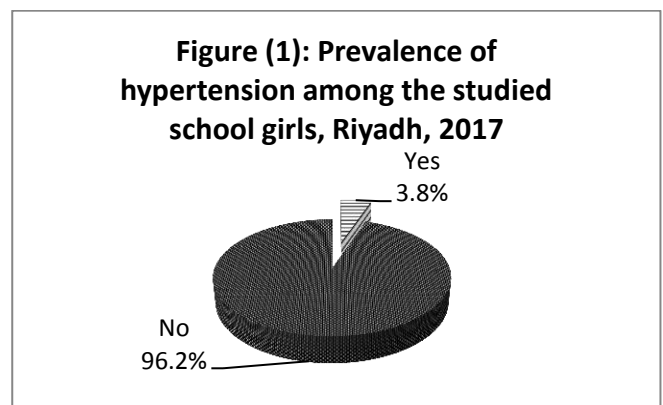
**RESULTS**

**Table 1** discusses prevalence of hypertension, age group, nationality, average family income, using of hormonal contraception, smoking history and other chronic diseases in the studied school for girls. Mean age of studied girls was 12.08 (± 6.8), 94.8% were Saudi; the average family income for 32.5% of sample was (5000-10000) SR/month. Only 3.2% of the studied girls used hormonal contraceptive. Regarding smoking history; 97.4% weren't smokers, 0.6% were ex-smokers and 1.9% were smokers. 2 girls (1.2%) had renal disease, 4 girls (2.4%) had bronchial asthma, one girl (0.6%) had hypothyroidism and one (0.6%) had depression. **Hypertension was found in 3.8% of the studied girls.**

**Table (1):** Prevalence of hypertension, age group, nationality, average family income, using of hormonal contraception, smoking history and

other chronic diseases in the studied school girls, Riyadh, KSA, 2017.

Variables	Frequency (n=154)	Percent
<b>Presence of hypertension</b>		
Yes	6	3.8
No	148	96.2
<b>Age group (in years)</b>		
≤ 15	38	9.4
15 – 19	116	38.0
Mean age (± SD)	12.08 (± 6.8)	
<b>Nationality</b>		
Saudi	146	94.8
Non Saudi	8	5.2
<b>Average family income/month (SR)</b>		
< 5000	26	16.9
5000 – 10000	50	32.5
10000-15000	36	23.4
15000-20000	22	14.3
> 20000	20	13.0
<b>Using of hormonal contraception</b>		
No	149	96.8
Yes	5	3.2
<b>Smoking history</b>		
No	150	97.4
Ex-smoker	1	.6
• Smoker	3	1.9
<b>Other chronic diseases</b>		
• Renal disease	2	1.2
• hypothyroidism	1	0.6
• Bronchial asthma	4	2.4
• depression	1	0.6



**Figure (1):** show prevalence of hypertension among the studied school girls. Hypertension was found in 3.8% of the studied girls.

**Table (2):** illustrates sociodemographic characteristics, average family income, using of hormonal contraception, smoking history and other chronic diseases in the studied hypertension cases. 50% of cases aged 18 years, 33.3% aged 17 years and 16.7% aged 19 years (Mean age = 15.3 (± 2.8) ). 100% of the cases were Saudi. Regarding mother another educational status; 66.7% of the cases mothers were secondary educated and one third of the fathers were primary educated, one third secondary educated and the other third were highly educated (university or more). The average family income ranged between 5000-10000 SR in 33.3% of the cases. 100% of the cases reported negative history of smoking, using hormonal contraceptives or other chronic diseases.

**Table (2): Sociodemographic characteristics, average family income, using of hormonal contraception, smoking history and other chronic diseases in the studied hypertension cases, Riyadh, KSA, 2017**

Variable	Frequency (n=6)	Percent
Age (in years)		
• 17	2	33.3
• 18	3	50
• 19	1	16.7
Mean age (± SD)	15.3 (± 2.8)	
Nationality		
• Saudi	8	100
• Non Saudi	0	0
Educational level of the mother		
• Primary	1	16.7
• Secondary	4	66.7
• Preparatory	1	16.7
Educational level of the father		
• Primary	2	33.3
• Secondary	2	33.3
• University or more	2	33.3
Father's work		
• Private	1	16.7
• Governmental	2	33.3
• Army forces	3	50
Working status of the mothers		
• Working	2	33.3
• House wife	4	66.7
Average family income/month (SR)		

• < 5000	1	16.7
• 5000 – 10000	2	33.3
• 10000-15000	1	16.7
• 15000-20000	1	16.7
• > 20000	1	16.7
Using of hormonal contraception		
• No	6	100
Smoking history		
• No	6	100
Other chronic diseases		
• No	6	100

**DISCUSSION**

Hypertension is the most common non-communicable disease and the most prevalent cardiovascular disease risk factor worldwide. Hypertension (HTN) in childhood and adolescence contributes to the early development of cardiovascular disease (CVD) [7]. This is a cross-sectional study was conducted among a sample of adolescent primary and secondary school girls of Riyadh city, KSA during the academic year 2016-2017 to estimate the prevalence of hypertension and to describe some related characteristics of cases in a sample of adolescent primary and secondary school girls of Riyadh city, KSA.

In our study; hypertension was prevalent among 3.8% of the studied girls. A study of blood pressure levels among primary school students in Kuwait found that the overall prevalence of hypertension was 5.1% [8], 3.6% among school children in Jordan [9], and 4.30% among preparatory school children in Alexandria [10]. These figures were lower than those among Iranian adolescent girls (13.9%, and 19.4%) [11], and figures among US adolescents (15.7%, and 3.2%) [12]. A study on high school girls in Tabriz, Iran reported prevalence rates of prehypertension and hypertension were 13.9% and 19.4%, respectively [11]. A study conducted on 622 adolescent high school girls in Mashad, another province of Iran, indicated that 6.1 % of the subjects were hypertensive [13]. Juarez-Rojas et al. reported prevalence rates of hypertension and prehypertension of 10.6% and 10%, respectively, in male and female Mexican adolescents 12 to 16 years of age [14]. In another study by Chiolero et

al. in Seychelles, African region, the prevalence of elevated blood pressure was 7.8% in male and female children and adolescents 4 to 18 years of age <sup>[15]</sup>. In another study in Tehran, 12.7% of children and adolescents (male and female) were hypertensive <sup>[16]</sup>. Antal et al. found elevated blood pressure in 1.1% of Hungarian female students aged 15 to 18 years, based on the mean of three consecutive measurements taken at least 2 weeks apart <sup>[17]</sup>. This was much lower than the findings of Nkeh-Chungag et al who reported that the overall prevalence of hypertension and pre-hypertension was 21.2% and 12.3%, respectively (prevalence of hypertension and pre-hypertension in males was 22.0% and 13.6% compared to 20.9% and 16.5% in females) <sup>[18]</sup>. In Brazil, Alves et al. investigated the frequency of arterial hypertension in a group of 989 infants and children in Recife, all of whom had a good socioeconomic status, and found a rate of 2.12% of hypertensive children <sup>[19]</sup>. Another study on 13-year-old adolescents in Porto, Portugal reported that the prevalence of hypertension was 22.0% and prehypertension was 13.3% (higher in males 25.4% vs. 18.8% in females) <sup>[20]</sup>.

## CONCLUSION

In adolescent preparatory and secondary school girls of Riyadh city, KSA, 3.8% were hypertensive. So health-care providers should recognize the increased risk of prehypertension and hypertension and should seek to identify and manage the modifiable risk factors in those adolescent girls.

## ACKNOWLEDGMENT

The success and outcome of this work required support and assistance of many people and we are fortunate to have this all along the completion of the work. Our thanks go to **Wafaa Mohamed Bakr Ali** (Faculty of Pharmacy Sohag University, Egypt), **Muaz Bilal Wali** (Student, Faculty of Medicine, Northern Border University) and **Omar Mohamed Bakr Ali** for their help in different steps of the research.

## REFERENCES

1. **Adrogué H and Sinaiko A (2001)**: Prevalence of hypertension in junior high school-aged children: effect of new recommendations in the 1996 Updated Task Force Report. *Am J Hypertens.*, 14:412-14.

2. **Lande M, Carson N, Roy J, and Meagher C (2006)**: Effects of childhood primary hypertension on carotid intima media thickness: a matched controlled study. *Hypertension*, 48(1):40-44.
3. **Dey I, Biswas R, Ray K, Bhattacharjee S, Chakraborty M and Pal P (2011)**: Nutritional status of school going adolescents in a rural block of Darjeeling, West Bengal, India. *The Health*, 2(3):75-7.
4. **Hansen M, Gunn P and Kaelber D (2007)**: Underdiagnosis of hypertension in children and adolescents. *JAMA.*, 298(8):874-879.
5. **Alkahtani S (2015)**: Pediatric hypertension in the Eastern Province of Saudi Arabia. *Saudi Medical Journal*, 36(6):713-719.
6. **Kumar R, Sharma M and Srivastava A (2016)**: A cross sectional study of hypertension in adolescent girls of district Moradabad, Uttar Pradesh, India. *Int J Community Med Public Health*, 3: 1388-92.
7. **Flynn J, Kaelber D, Baker-Smith C et al. (2017)**: Clinical Practice Guideline for Screening and Management of High Blood Pressure in Children and Adolescents. *Pediatrics*, 140:11-22.
8. **Saleh E, Mahfouz A, Tayel K, Naguib M and Bin-AL-Shaikh N (2000)**: Study of blood pressure levels among Kuwaiti primary school children," *Eastern Mediterranean Health Journal*, 6: 333-337.
9. **Jaddou H, Bateiha A, Khawaldeh A, Goussous Y and Ajlouni K (2001)**: Blood pressure profile in schoolchildren and adolescents in Jordan," *Annals of Saudi Medicine*, 21(2): 123-126.
10. **Darwish O, El Ghamry A, Hussein M, and Omara S (1985)**: Prevalence and some etiological factors of hypertension in school children," *Bulletin High Institute of Public Health*, 15(3) :97-110.
11. **Rafraf M, Gargari B, and Safaiyan A (2010)**: Prevalence of prehypertension and hypertension among adolescent high school girls in Tabriz, Iran. *Food and Nutrition Bulletin*, 31(3) : 461-465.
12. **McNiece K, Poffenbarger T, Turner J, Franco K, Sorof J, and Portman R (2007)**: Prevalence of hypertension and pre-hypertension among adolescents. *Journal of Pediatrics*. 150(6) : 640-644.
13. **Mirhosseini N, Yusoff N, Shahar S, Parizadeh S, Mobarehen M and Shakery M (2009)**: Prevalence of the metabolic syndrome and its influencing factors among adolescent girls in Mashad, Iran. *Asia Pac J Clin Nutr.*, 18:131-6.
14. **Juarez-Rojas J, Cardoso-Saldana G, Posadas-Sanchez R, Medina-Urrutia A and Yamamoto-Kimura L (2008)**: OsadasRomero C. Blood

pressure and associated cardiovascular risk factors in adolescents of Mexico City. *Arch Cardiol Mex* ., 78:384–91.

15. **Chiolero A, Paradis G, Madeleine G, Hanley J, Paccaud F and Bovet P (2009):** Discordant secular trends in elevated blood pressure and obesity in children and adolescents in a rapidly developing country. *Circulation*, 3;119:558–65
16. **Azizi F, Rahmani M, Emami H, Mirmiran P, Hajipour R et al. (2007):** Cardiovascular risk factors in an Iranian urban population: Tehran lipid and glucose study (phase 1). *Soz Praventiv med.*, 47:408–26
17. **Antal M, Regoly-Merei A, Nagy K, Greiner E, Biro L, Domonkos A et al. (2004):** Representative study for the evaluation of age- and gender-specific anthropometric parameters and blood pressure in an adolescent Hungarian population. *Ann Nutr Metab.*, 48:307–13.
18. **Benedicta N, Chungag N, Sekokotla A and Sewani-Rusike C et al. (2015):** Prevalence of Hypertension and Prehypertension in 13–17 Year Old Adolescents Living in Mthatha – South Africa: a Cross-Sectional Study. *Cent Eur J Public Health*, 23 (1): 59–64
19. **Alves J, Neto R, Pacheco T and Silva L (1988):** Hipertensão arterial em pré-escolares e escolares da cidade do Recife. *J Pediatr (Rio J)*, 64:336-8.
20. **Ramos E and Barros H (2007):** Family and school determinants of overweight in 13-year-old Portuguese adolescents. *Acta Paediatr.*, 96:281–286.