A CLINICAL STUDY ON THE PREVALANCE AND RISK FACTORS ASSOCIATED WITH HYPERTENSION IN DIABETES MELLITUS

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ABSTRACT : The prevalence of risk factors for diabetes and hypertension in Saudi school children has achieved epidemic proportions because of enriched lifestyles. The aim of this study is to conduct a baseline study of such risk factors in a young population at the cusp of high-end technology and material comfort.A cross-sectional study was done among school children using parental assisted self-questionnaires and anthropometric assessment of their vital statistics. This study, including planning, data collection and analysis, and the writing of the first draft, was conducted from December 2018 to March 2019 after ethical approval was obtained. Cluster sampling was done for the schools, and stratified randomized sampling was performed to choose a total of 124 male and female school children. SPSS software was used for data analysis.It was found that 11.6% of the children had a body mass index (BMI) above the normal range. The waist-to-height ratio was elevated in 16.8% of the children. Other risk factors of note were a high prevalence of sedentary habits (43%), daily consumption of carbonated sugary drinks (36.4%), and eating at fast food restaurants most days of the week (17%).This gradual buildup of risk factors for diabetes and hypertension at an early age is a morbid indicator of an epidemic whose outcome has been determined. Most of these modifiable risk factors are amenable to change through concentrated efforts to educate, train and inculcate healthy habits among children and their families.

Keywords:cross-sectional, prevalence, sedentary habits, risk factors

I.INTRODUCTION

Hypertension (HTN or HT), also known as high blood pressure (HBP), is a long-termmedical condition in which the blood pressure in the arteries is persistently elevated. High blood pressure typically does not cause symptoms.[1] Long-term high blood pressure, however, is a major risk factor for coronary artery disease, stroke, heart failure, atrial fibrillation, peripheral vascular disease, vision loss, chronic kidney disease, and dementia.

High blood pressure is classified as either primary (essential) high blood pressure or secondary high blood pressure. About 90–95% of cases are primary, defined as high blood pressure due to nonspecific lifestyle and genetic factors. Lifestyle factors that increase the risk include excess salt in the diet, excess body weight, smoking, and alcohol use. The remaining 5–10% of cases are categorized as secondary high blood pressure, defined as high blood pressure due to an identifiable cause, such as chronic kidney disease, narrowing of the kidney arteries, an endocrine disorder, or the use of birth control pills.

Blood pressure is expressed by two measurements, the systolic and diastolic pressures, which are the maximum and minimum pressures, respectively. For most adults, normal blood pressure at rest is within the range of 100–130 millimeters mercury (mmHg) systolic and 60–80 mmHg diastolic. For most adults, high blood pressure is present if the resting blood pressure is persistently at or above 130/80 or 140/90 mmHg. Different numbers apply to children. Ambulatory blood pressure monitoring over a 24-hour period appears more accurate than office-based blood pressure measurement.

Lifestyle changes and medications can lower blood pressure and decrease the risk of health complications. Lifestyle changes include weight loss, physical exercise, decreased salt intake, reducing alcohol intake, and a healthy diet. If lifestyle changes are not sufficient then blood pressure medications are used. Up to three medications can control blood pressure in 90% of people. The treatment of moderately high arterial blood pressure (defined as >160/100 mmHg) with medications is associated with an improved life expectancy. The effect of treatment of blood pressure between 130/80 mmHg and 160/100 mmHg is less clear, with some reviews

finding benefit and others finding unclear benefit. High blood pressure affects between 16 and 37% of the population globally. In 2010 hypertension was believed to have been a factor in 18% of all deaths (9.4 million globally).

Hypertension is rarely accompanied by symptoms, and its identification is usually through screening, or when seeking healthcare for an unrelated problem. Some people with high blood pressure report headaches (particularly at the back of the head and in the morning), as well as lightheadedness, vertigo, tinnitus (buzzing or hissing in the ears), altered vision or fainting episodes. These symptoms, however, might be related to associated anxiety rather than the high blood pressure itself.

On physical examination, hypertension may be associated with the presence of changes in the optic fundus seen by ophthalmoscopy. The severity of the changes typical of hypertensive retinopathy is graded from I to IV; grades I and II may be difficult to differentiate. The severity of the retinopathy correlates roughly with the duration or the severity of the hypertension.

Hypertension with certain specific additional signs and symptoms may suggest secondary hypertension, i.e. hypertension due to an identifiable cause. For example, Cushing's syndrome frequently causes truncal obesity, glucose intolerance, moon face, a hump of fat behind the neck/shoulder (referred to as a buffalo hump), and purple abdominal stretch marks. Hyperthyroidism frequently causes weight loss with increased appetite, fast heart rate, bulging eyes, and tremor. Renal artery stenosis (RAS) may be associated with a localized abdominal bruit to the left or right of the midline (unilateral RAS), or in both locations (bilateral RAS). Coarctation of the aorta frequently causes a decreased blood pressure in the lower extremities relative to the arms, or delayed or absent femoral arterial pulses. Pheochromocytoma may cause abrupt ("paroxysmal") episodes of hypertension accompanied by headache, palpitations, pale appearance, and excessive sweating.

Severely elevated blood pressure (equal to or greater than a systolic 180 or diastolic of 110) is referred to as a hypertensive crisis. Hypertensive crisis is categorized as either hypertensive urgency or hypertensive emergency, according to the absence or presence of end organ damage, respectively.

The main aim of the study was to assess the prevalence of hypertension and diabetes and the status of known risk factors .The objective of this study was to generate data on the status of hypertension and diabetes.

II.MATERIALS AND METHODS

STUDY SITE: Om sai hospital
STUDY POPULATION: 124 patients
STUDY DURATION: Dec 2018- March 2019
STUDY CONDITION: Hypertension in diabetes
STUDY TYPE: Observational

This study was conducted in the city of Om sai hospital Hyderabad. The study was initiated on 1st March 2018 and ended on 30th March 2019.

Review of previous lifestyle studies indicated the approximate prevalence of risk factors for diabetes and hypertension among the school children was 20%. A total sample size of 950 (rounded off from 983) students was calculated using the formula $n = \{Z^2 p (1-p)\}/d^2$ (z=1.96, P=0.20, 1 - P=0.80, d=0.05, design effect=4). The study population was further determined by choosing male and female each through cluster sampling. Taking into consideration the duration of data collection required before the beginning of the examinations. Participants were chosen from each random sampling to maintain homogeneity of representation. Thus, a total of 80 male and 44 female were chosen for the study. Female investigators were trained to gather data from female children since mixing of males and females is not allowed in culture.

Parents or guardians filled in a semi-structured, close-ended questionnaire at home. A two-step evaluation of the questionnaire was used to validate it. First, the questionnaire was given to public health and epidemiology experts in the Om sai Hospital to ensure that the questions were consistent with the objectives of the study and that no confusing, leading or inappropriate questions were included, that would need to be modified or removed. Secondly, This was done to determine whether the respondents would pay attention to the questionnaire content, and provide responses to all the items. The questionnaires were again scrutinized and assessed for their validity based on these pilot study responses before initiating the actual survey. Finally, a form in Arabic and English with a brief explanation about the objectives of the study was attached to the questionnaire, to seek informed consent from the parents/guardians. Risk factors used in the study were based on both physical measurements and presence of dietary and lifestyle habits.

Body mass index (BMI) was calculated as body weight in kg/height in meters. We applied cut off points as given

in the WHO guidelines for participants with ages ranging from 6 to 14 years for the assessment of overweight and obesity. Those ≥85th percentile were considered overweight, and ≥ 95thpercentile were obese, while those <85th percentile were considered to be of desirable weight or lean. A qualified physician measured the waist circumference (exerting the same standard pressure on the tape) at the midpoint of the lowest rib cage and the iliac crest, to the nearest 0.1 cm, in a standing position during end-tidal expiration. If a student was absent or refused to participate in the study, the next student in the register was taken with his or her consent. A total of 124 subjects completed the study. Since there are quite rigid cultural and religious values followed by the citizens of Hyderabad, the number of female participants was less than male participants.
Informed written and signed consent was obtained from the parent/guardians of all participants included in the study.
All the data was entered in SPSS version 22 software and analyzed for statistically significant

III.RESULTS AND DISCUSSION

In total, 124 subjects This study was done to assess the prevalence of risk factors like body mass index (BMI), weight-to-height ratio (WHR), positive family history for diabetes and hypertension, food and drink intake habits and sedentary lifestyle among male and female I Om sai hospital. Since this is a baseline study being done, these risk factors were considered as optimal indicators for the risk of developing diabetes or hypertension. The total response among the selected participants was 83.6%. Table 1 shows the demographic characteristics of the participants. The study group was comprised of 64.4% male and 35.6% female students by the end of the research project.

Table 1: Baseline demographics characteristics of participants

Variables	Participants (n=124)	Number	%
Age in years	36	2	1.6
	37	9	7.3
	38	18	14.7
	39	18	14.4
	40	31	25.4
	41	24	19
	42	19	15.6
	43	1	1.5
	44	1	0.3
	45	1	0.1
Gender	Males	80	64.4
	Females	44	35.6

Graph 1: Baseline demographics characteristics of participants

Table 2 shows the distribution of waist to height ratios over the recommended (> 0.5) level in 16.8% of the children, which represents a risk for cardiovascular diseases and diabetes. Also, a positive family history of diabetes, hypertension, or both was found in 38.9% of the participants. About 43% of the participants habitually watched television or played video games for more than 3 hours a day, every day, which is regarded as a risky sedentary habit. Risky dietary habits included the consumption of carbonated drinks or sugary fruit juices daily (36.4%). Also 17% of the children admitted to having food outside the home, particularly fast food from branded outlets, on more than 3 days of the week instead of consuming homemade food.

Table 2. Distribution of the risk factors associated with development of diabetes and hypertension

Risk factors	No. participants (n=124)	Percentage

Waist-to-height ratio (WHR>0.5)	21	16.8
Positive family history for diabetes and/or hypertension	48	38.9
Mostly outside food intake	22	17.5
Sedentary activities for more than 3 hours per day	53	43
Carbonated drinks/fruit juice	45	36.4

Group 2. Distribution of the risk factors associated with development of diabetes and hypertension

Table 3 shows the BMI of school children differentiated by gender. Regardless of age and gender there were 11.6% (92) children who were having their BMI more than the normal range. Around 37% of the students were underweight (BMI<18.5). More boys (6.0% and 1.8%) were overweight and obese respectively than girls (3.4% and 0.4%). This was statistically significant at 95% confidence interval (P<0.001).

BMI	**Gender, No (%)**		**Total**
	Male	**Female**	
<18.5	25 (20.3)	21(16.9)	46 (37.2)
18.5-24.99	45(36.3)	19(15.0)	64 (51.3)
25.0-29.99	8(6.0)	3 (3.4)	11 (9.4)
>30	2(1.8)	1 (0.4)	3(2.1)
Total	80 (64.4)	44 (35.6)	794 (100.0)

The overall prevalence of diabetes (CBG ≥126 mg/dl) was 5.4% and 9.8% in women and men, respectively. However, these differences were not statistically significant. Overall prevalence of diabetes (pooled data of both sexes) was 7.3%. The prevalence was not influenced by age in women (χ^2 analysis for trend) and only weakly so in men. Overweight did not affect prevalence of diabetes in both sexes.

Awareness about the hypertension was very low. Only 4 out of 80 men (2.1%) and 6 out of 44 women (2.7%) were aware that they were suffering from hypertension. Situation about diabetes was worse as no affected subject was aware that he/she was suffering from the disease

Sex	**BMI (kg/m^2)**	**Systolic hypertension (SBP >140 mmHg)**		**Diabetes (CBG >126 mg/dl)**	
		Total number	**Hypertensive, *n* (%)**	**Total number**	**Diabetes, *n* (%)**
Women	<18.5	107	15 (14)	102	11 (10.8)
	18.5-24.9	94	13 (13.9)	82	6 (7.3)
	>25	18	6 (33.3)	17	4 (23.5)
Men	<18.5	70	9 (12.6)	57	8 (14)
	18.5-24.9	103	16 (15.5)	89	15 (16.9)
	>25	18	9 (50)	16	6 (37.5)
Overall	<18.5	177	24 (13.6)	159	19 (11.9)
	18.5-24.9	197	31 (15.7)	171	21 (12.3)
	>25	36	15 (41.7)	33	10 (30.3

IV.DISCUSSION

The increasing prevalence of risk factors like excessive unhealthy food and drink consumption, a high BMI and sedentary lifestyles are ominous signs indicating that the precursors exist for an incoming pandemic of lifestyle diseases like diabetes and hypertension. Organizations like the United Nations, World Health Organization, and World Bank emphasize the need to focus on younger generations now to control the of non-communicable diseases in the future.28-30 Our study showed that 11.5% of the participants had a BMI above the normal range (18.5-24.9) which was a lower percentage than that reported in other similar studies done (14-28%). Other principal risk factors explored in this study showed that the waist-to-height ratio (WHtR) was more than the recommended limit in 16.8% of the children. Many studies have supported the use of WHtR inclusively in identifying at risk populations with prevalence ranging from 10-23%.

This study also revealed that 38.9% of the participants had a positive family history for diabetes and hypertension which independently is a strong predictor of its occurrence in later years. This finding is supported by studies such as an epidemiological profile of diabetes in Saudi Arabia by Tarik *et al.* hat points to an overwhelming genetic predisposition towards this disease while El-Hazmi *et al.* pointed out consanguinity as one of the primary reasons for it. Al Mouzan *et al* also found an association of consanguinity with diabetes in children though it was not statistically significant (P=0.92). Other risk factors such as sedentary activities like watching television or playing video games (>3 hours per day) was prevalent among 43% of the participants. Studies such as those of Al Hazza and Al-Nuaim *et al.* have found that there is an association of physical inactivity with obesity and cardiovascular diseases later in life. In fact, the World Health Organization has declared physical inactivity to be one of the top five risk factors for premature mortality. Dietary choices like preference for food outside the home (fast food, restaurant meals, etc.) was found among 11.5% of the participants, coupled with a higher intake of carbonated drinks or sugary fruit juices (36.4%) signaling a high risk for obesity and overweight among children in this study. Collison *et al* showed that there was a significant increase in the consumption of sugar sweetened carbonated beverages among children 10 to 19 years as compared to non-sugar sweetened beverages. Basciano *et al*. and James *et al.* have shown the association of carbonated beverages with obesity and overweight which are precursors of diabetes and hypertension. Likewise, El Mouzan *et al.* and Amin *et al.* showed a positive correlation between frequency of fast food intake among Saudi school children and increasing obesity and development of metabolic syndrome later in life. In our study, the measurements of systolic and diastolic blood pressure showed an increasing trend with age among both boys and girls at a higher level than the percentile reference it was compared with.18 We found that the children were at a higher risk of developing hypertension associated with the prevailing risk factors. Studies by Ataei *et al.* on children found elevated blood pressure among 281 students and Koura *et al* screened 310 young females in Dammam and found 13.5% of them to be pre-hypertensive.

This study highlights the prevalent risk factors for diabetes and hypertension at an early age which can potentially lead over time to the development of the disease. Primarily, it was observed that unhealthy diets, sedentary lifestyles and elevated BMIs are quite prevalent among the study population. In the present scenario, there are very few health warnings attractive enough to garner attention by the population against these risk factors. Rather, there is a constant assault of advertisements, banners, posters, promotional campaigns for a glitzy lifestyle, and consumption of fast food, alcohol and tobacco as well as use of electronic gadgets that overwhelm the senses of many people. It is also seen that parents need more awareness about these risk factors and need to encourage their children to lead a healthy and active life. Even the website of the Ministry of Health of Om sai hospital provides very little information on the prevalence, awareness and consequences of risk factors for diabetes and hypertension among the population.Based on the findings of this study, we recommend a collaborative effort by the government agencies and non-government organizations to promote healthy behavior and lifestyle within schools and home environments. Regular promotional campaigns at key public places and social media should be the norm while appropriate legislative measures should be implemented nationally. Importantly, international cooperation among countries for disease prevention at an early stage of life should be a long-term goal.

REFERENCES

1. "Obesity and overweight Fact sheet N°311". WHO. January 2015. Retrieved 2 February 2016.
2. Haslam DW, James WP (2005). "Obesity". Lancet (Review). **366** (9492): 1197–209.
3. Luppino, FS; de Wit, LM; Bouvy, PF; Stijnen, T; Cuijpers, P; Penninx, BW; Zitman, FG (March 2010). "Overweight, obesity, and depression: a systematic review and meta-analysis of longitudinal studies". Archives of General Psychiatry. **67** (3): 220–29.
4. Yazdi, FT; Clee, SM; Meyre, D (2015). "Obesity genetics in mouse and human: back and forth, and back again". PeerJ. **3**: e856.

5. Yanovski SZ, Yanovski JA (Jan 1, 2014). "Long-term drug treatment for obesity: a systematic and clinical review". JAMA: the Journal of the American Medical Association (Review). **311** (1): 74–86.
6. Colquitt, JL; Pickett, K; Loveman, E; Frampton, GK (Aug 8, 2014). "Surgery for weight loss in adults". The Cochrane Database of Systematic Reviews (Meta-analysis, Review). **8** (8): CD003641.
7. Afshin A (12 June 2017). "Health Effects of Overweight and Obesity in 195 Countries over 25 Years". New England Journal of Medicine. **377** (1): 13–27.
8. Kanazawa, M; Yoshiike, N; Osaka, T; Numba, Y; Zimmet, P; Inoue, S (2005). "Criteria and classification of obesity in Japan and Asia-Oceania". World review of nutrition and dietetics. World Review of Nutrition and Dietetics. **94**: 1–12.
9. Bleich S, Cutler D, Murray C, Adams A (2008). "Why is the developed world obese?". Annu Rev Public Health (Research Support). **29**: 273–95
10. Oxford Handbook of Medical Sciences (2nd ed.). Oxford: OUP Oxford. 2011. p. 180. ISBN 9780191652295.
11. Kushner, Robert (2007). Treatment of the Obese Patient (Contemporary Endocrinology). Totowa, NJ: Humana Press. p. 158. ISBN 1-59745-400-1. Retrieved April 5, 2009.
12. Imaz I, Martínez-Cervell C, García-Alvarez EE, Sendra-Gutiérrez JM, González-Enríquez J (July 2008). "Safety and effectiveness of the intragastric balloon for obesity. A meta-analysis". Obes Surg. **18** (7): 841–46.
13. Encyclopedia of Mental Health (2 ed.). Academic Press. 2015. p. 158. ISBN 9780123977533.
14. Dibaise JK, Foxx-Orenstein AE (July 2013). "Role of the gastroenterologist in managing obesity". Expert Review of Gastroenterology &Hepatology (Review). **7** (5): 439–51.
15. Woodhouse R (2008). "Obesity in art: A brief overview". Front Horm Res. Frontiers of Hormone Research. **36**: 271–86.
16. Pollack, Andrew (June 18, 2013). "A.M.A. Recognizes Obesity as a Disease". New York Times. Archived from the original on June 23, 2013.
17. Weinstock, Matthew (June 21, 2013). "The Facts About Obesity". H&HN. American Hospital Association. Retrieved June 24, 2013.
18. "BMI classification". World Health Organization. Retrieved 15 February 2014.