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Research Article

Healthcare Evaluation Study of Community Workers residing in Gurgaon with respect to Blood Pressure, Blood Glucose Level, Blood Hemoglobin Level and Obesity

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Abstract: High blood pressure, diabetes mellitus, obesity and anemia are a major public health in India and prevalent all over the world. Hypertension exerts a significant public health burden on healthcare systems in India. Diabetes mellitus is a major clinical and public health problem. Diabetes is a complex and chronic illness requiring continuous medical care. Overweight and obesity are rapidly increasing in countries like India. Anemia is the most common nutritional deficiency disorder in the world. The present study evaluated the general health status with respect to blood pressure, blood glucose level, blood hemoglobin level and obesity of adults living in the community. The blood pressure, blood glucose level, obesity status and blood hemoglobin level parameters of 52 male subjects were evaluated and analyzed. The results suggest that the overall prevalence of hypertension in the study population was 69.2%. The mean systolic BP was 131.68 (±17.12) mm Hg while the mean DBP was 83.4 (±10.64) mm Hg. The blood glucose level >200mg/dl in the study population was 1.8% and blood glucose level >150 to <200 mg/dl was 5.5%. There were 22, 29 and 3 subjects with Body mass index (BMI) of <18, 18 to 25 and >25 respectively. The blood hemoglobin level between 10-12 mmHg in the study population was 5.5%, between >12-14 mmHg was in 50% and between >14 to 16 was 44.5% in the population. Early detection and treatment can reduce the incidence and complications of hypertension, diabetes and obesity. In India increased awareness, control and treatment of high blood pressure, diabetes, obesity and anemia are required and are important for the reduction of further complications and associated burden of illness.

INTRODUCTION

High blood pressure also called hypertension (HTN) is a major public health problem of worldwide distribution and prevalent all over the world. It is one of the major causes of cardiovascular morbidity [1, 2] and cerebrovascular accident [3]. In most of the cases hypertension remains asymptomatic for long time, hence also labeled as "silent killer". Awareness, treatment, and control of hypertension remain major challenges worldwide [1]. Because of weak health systems, the numbers of people with hypertension who are undiagnosed, untreated and uncontrolled are also higher in low- and middle income countries compared to high income countries [1]. Hypertension exerts a significant public health burden on healthcare systems in India [4]. The economic losses are projected to outstrip public spending on health if no action is taken to tackle hypertension [1]. Prevention of HTN is possible. Early detection and treatment can reduce the incidence of complications of hypertension including stroke, coronary heart disease, heart failure and kidney disease etc. [2, 5]. In developing countries as well as in India increased awareness, control of high blood pressure and treatment are important for the reduction of cardiovascular disease risk [6] and prevention of the associated burden of illness [1].

Hypertension has emerged as a foremost risk factor for mortality in India. Several studies over the years have shown increasing prevalence of hypertension in India (Table 1). The burden of hypertension in India is expected to almost twice from 118 million in 2000 to 213.5 million by 2025 [8]. A systematic review and meta-analysis concluded that about 33% urban and 25% rural Indians are hypertensive [4]. Non-pharmacologic interventions for prevention and treatment of hypertension includes weight loss, healthy diet, reduced intake of dietary sodium, physical activity and moderation in alcohol intake.

Diabetes mellitus is a major clinical and public health problem [9]. Diabetes is a chronic disease, which occurs when

the pancreas does not produce enough insulin (type 1 diabetes), or when the body cannot effectively use the insulin it produces (type 2 diabetes). This leads to raised blood glucose (sugar) level and over time, serious damage to many of the body's systems especially the nervous and blood vessels [10]. Table 2 lists the criteria for diagnosis of diabetes. Occurrence of type 2 diabetes mellitus (T2DM) is increasing globally. China tops the list with 90.0 million followed by India which has 61.3 million persons affected by diabetes [11]. The number of diabetics in the India is expected to increase to 109 million cases by 2035 [10]. Asian Indian individuals have a high predisposition to type 2 diabetes mellitus [12]. Diabetes is a complex and chronic illness requiring continuous medical care. Patient self-management education, physical exercise, diet and support are critical to prevent acute complications and reduce the risk of long-term complications [13].

Table 1: Categories of Blood Pressure in Adults [7]

BP Category	**SBP** (mm Hg)		**DBP** (mm Hg)
Normal	<120	and	<80
Elevated	120-129	and	<80
Hypertension			
Stage 1	130–139	or	80–89
Stage 2	≥140	or	≥90

(BP: Blood Pressure; SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure)

Overweight and obesity are rapidly increasing in countries like India. Obesity and overweight emerged as an important public health problem in India [14]. Obesity is a disease characterized by excessive body fat. Overweight individuals are at risk for developing health problems, such as hypertension, heart disease, stroke, diabetes, certain types of cancer, gout and gallbladder disease. Obesity are also associated with the activation of microglia and astrocytes, resulting an inflammatory state in the CNS. Neuroinflammation is considered to be one of the principal causes of neurodegenerative disorders such as Alzheimer (AD), Parkinson (PD), and Multiple sclerosis (MS) [15-17].

Table 2: Criteria for the diagnosis of diabetes [13]

FPG ≥126 mg/dL (7.0 mmol/L).
Or
2-h PG ≥200mg/dL(11.1mmol/L) during OGTT.
Or
A1C ≥6.5% (48 mmol/mol).
Or
Classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥200 mg/dL (11.1 mmol/L).

(FPG: fasting plasma glucose; PG: plasma glucose; A1C: Glycated hemoglobin)

Anemia is the most common nutritional deficiency disorder in the world. It is a condition that occurs when the red blood cells do not carry enough oxygen to the tissues of the body [18]. Anemia is a major public health problem in India. Anemia and iron deficiency lead to substantial physical productivity losses in adults [19]. The objectives of the present study were to evaluate the general health status with respect to blood pressure, blood glucose level, blood hemoglobin level and obesity of male adults' subjects working and living in the sector 53 Gurgaon.

EXPERIMENTAL DESIGN

A healthcare camp was setup in sector 53 Gurgaon. The study included participants who were willing to participate in this healthcare evaluation study. A total of 52 male participants (low income family) aged more than 20 years were included in this study. Written informed consent was taken from all study participants and ethical clearance was obtained from ethics committee prior to initiation of study.

Study period

The study data was collected from October 2017 to March 2018.

Inclusion criteria

All adults of age group more than 20 years and who were livi Gurgaon, and willing to participate.

Exclusion criteria

Subjects who were not willing to participate and who were having any medical illness. Females subjects were also excluded from the study as the number of female subject availability were too low at the time of recruitment.

Data collection

We used a structured data-abstraction form in Microsoft excel. Subjects age, body weight, alcohol consumption, smoking status, physical activity, current disease status, and family history of hypertension and diabetes was collected. Further, collected information was complied, processed and analyzed (Table 3).

Parameters measured

Each subjects blood pressure, blood glucose level and blood hemoglobin levels were measured. On the basis of blood pressure subjects were categorized in four groups i.e., normal, prehypertension, hypertension-stage 1 and hypertension-stage 2 according to the JNC VII classification [24]. On the basis of blood glucose levels subjects were categorized in four group i.e., subjects with <100, >100 to 150, >150-200 and >200 mg/dl.

RESULTS

Prevalence of hypertension

The overall prevalence of hypertension in the study population was 69.2%. The mean systolic BP was 131.68 (±17.12) mm Hg while the mean DBP was 83.4 (±10.64) mm Hg. The prevalence of hypertension was 65.3% See below table 4. Among the total study subjects who gave a family history of hypertension, 12.9% (7) of them had hypertension whereas among those without a family history of hypertension, 3.7% (2) had hypertension.

Blood glucose level

American Diabetes Association Guideline, 2018 defined criteria for the diagnosis of diabetes is fasting blood glucose ≥126 mg/dL (7.0 mmol/L) or in a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥200 mg/dL (11.1 mmol/L). The blood glucose level >200mg/dl in the study population was 1.8% and blood glucose level >150 to <200 mg/dl was 5.5%. See below table 5.

Table 3: Demographic characteristics of study subjects

Characteristics	Values
Age group (years)	
20-34	22 (42.3)
35-49	24(46.1)
50-60	6 (11.6)
Sex	
Male	52 (100%)
Smoking	
Yes	23
No	29
Alcohol consumption	
Yes	15
No	37
BMI, kg/m²	
<18	22 (42%)
18-25	27 (52%)
>25	3 (6%)
Diabetes mellitus in overall population*	4
Hypertension in overall population*	5
Physical activity	
Sedentary	12
Mild	34
Moderate	6
Family history of hypertension	9
Family history of diabetes	-
* subjects were already aware of their disease condition	

Table 4: Distribution of study subjects based on classification of hypertension

Blood pressure classification	Total	
	N	%
Normal	3	5.6
Prehypertension	15	27.8
Hypertension-stage 1	19	35.2
Hypertension-stage 2	15	31.4
Total	**52**	**100**

Normal: <120/<80
Prehypertension: 120-139/80-89
Hypertension-stage 1: 140-159/90-99
Hypertension-stage 2: ≥160/≥100
JNC VII classification

Table 5: Distribution of study subjects based on random blood glucose level

Blood glucose level (mg/dl)	Total	
	N	%
<100	40	77.8
>100 to 150	8	14.9
>150-200	3	5.5
>200	1	1.8
Total	**52**	**100**

Obesity

Generalized obesity was defined using the cut offs BMI of >25 kg/m2. There were 22, 27 and 3 subjects with BMI of <18, 18 to 25 and >25 respectively. See below table 6.

Table 6: Distribution of study subjects based on body weight

BMI (kg/m²)	Total	
	N	%
<18	22	(40.7%)
18-25	27	(53.7)
>25	3	(5.6%)
Total	**52**	**100**

Blood Hemoglobin Level

The blood hemoglobin level between 10-12 mmHg in the study population was 5.5%, between >12-14 mmHg was in 50% and between >14 to 16 was 44.5% in the population. See below table 7.

Table 7: Distribution of study subjects based on blood hemoglobin level

Blood haemoglobin level (g/dl)	Total	
	N	%
10-12	1	2
>12-14	27	51
>14-16	24	47
Total	**52**	**100**

DISCUSSION

The overall prevalence of stage 1 and stage 2 hypertension in a study population was 35.2 and 31.4 respectively. The overall prevalence of hypertension in a study conducted by [1] was 48.2%. The higher prevalence noted among males was similar to other reported literature [1]. Most of the studies reported a prevalence ranging between 20%– 30% [1]. In another study reported 21.0% prevalence of hypertension [20] and cited that other researchers have found a prevalence of hypertension in the rural Indian population ranging 7.0-19.0 % [20]. Recently conducted cross-sectional surveys in urban and rural areas (survey 1 (1991-1994); survey 2 (2010-2012)) of India's National Capital Region (NCR) concluded that there was marked increase in prevalence of hypertension over two decades with no improvement in management [8]. A Jaipur Heart Watch (2017) conducted in India concluded that hypertension prevalence, awareness, treatment and control rates are increasing among urban populations in India [21].

Better awareness is associated with greater control. The blood glucose level >200mg/dl in the study population was 1.8% and blood glucose level >150 to <200 mg/dl was 5.5%. Results from a STEPS survey in Punjab, India concluded that the overall prevalence of DM among the study subjects was found to be 8.3% whereas prevalence of prediabetes was 6.3% [22]. The study also showed that age group obesity, hypertension and family history of diabetes were found to be the risk factors significantly associated with DM [22]. Heavy drinking may increase blood glucose levels. Diabetes and Hypertension are often associated and closely linked diseases, and one cannot be properly managed without attention to the other disease. Subjects with hypertension were advised regarding appropriate medical care. Obesity, coexistence of diabetes mellitus/high blood glucose level and family history of hypertension could be some of the potential reasons for the high prevalence of hypertension [1]. Awareness, treatment, and control of HTN have shown considerable improvement over time but are still below the optimal levels [2]. Overall 7.4 % (4) subjects were there with BMI of >25 and 5.6 % (3) subjects with blood hemoglobin level between 10-12 mmHg in the all study population. The INDIAB Study (2015) concluded that the prevalence of abdominal obesity was higher than the generalized obesity and urban residents had a higher prevalence of both forms of obesity than the rural residents [23].

A retrospective observational study of patients attending the out-patient clinics of a rural hospital in India, collected routine clinical data. In majority of children <10 years, women after the onset of puberty, and older adults' anemia was present [18].

CONCLUSION

The epidemic of hypertension and diabetes is growing at an alarming rate in India. Knowledge and awareness about hypertension and diabetes is required in India. Prevention and control of hypertension and diabetes mellitus can be achieved by relatively inexpensive means in low-resource settings, such as, by encouraging physical activity and healthier diet options. Successful containment of the hypertension and diabetes mellitus requires commitment on the part of all stakeholders in both the governmental and nongovernmental sectors in India.

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