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Hypertension and Nutritional Status of Rural Population in Birbhum District, West Bengal

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ABSTRACT

Introduction: Non-communicable diseases (NCDs) are the leading cause of adult mortality and morbidity globally. Hypertension is a major public health problem and a leading cause of death and disability in developing countries. One-quarter of the world's adult population has hypertension, and this is likely to increase to 29% by 2025. Among the NCDs, hypertension and obesity both are the important components which are a major chronic lifestyle disease and most prevalent NCD in India. With the socio-demographic and nutrition transition, non-communicable diseases are the most important cause of morbidity and mortality throughout the world and also in India

Objective: The present study intends to find out the socio economic determinants for hypertensive and nutritional status for adult population in Birbhum district, West Bengal

Materials and Methods: This study was carried out based upon of the NFHS-4, 2015-16 series. In the study 1564 data have been taken from study population in rural Birbhum district, West Bengal. Anthropometric measures were taken, and nutritional indicators such as Body Mass Index (BMI), Hypertension (Systolic>= 140 mmHg and/or diastolic>=90 mmHg) were calculated.

Results: Undernutrition was highest among low socioeconomic Stata (23.21%) and illiterate population in study area. Asthama patient percentage was 5.31%, but 8.70 % of population were not award regarding hypertension in study area. Simple logistic regression (SLR) revealed that socioeconomic variables had an impact on nutritional status.

Conclusion: Studies showed that the prevalence of overweight/obesity and hypertension (HTN) is increasing in India over the past two decades. While the problem of underweight persists overweight and associated hypertension are on the rise amongst adolescents in our country especially in the rural areas.

Keywords: Hypertension, NCD, obesity, BMI, Overweight

Introduction

India is the second most populous country and is leading with other western countries in having increased number of people suffering from non-communicable disease, such as type 2 diabetes mellitus, Cardio Vascular Disease (CVD), overweight and obesity etc. Metabolic syndrome is a part of sedentary life style, poor cardio-respiratory fitness, unhealthy diet and increased overweight and obesity. Both observational and interventional studies suggest an important role for physical activity and higher fitness in mitigating the metabolic syndrome. (**Jonathan Myers et al 2019**).

High blood pressure (BP) is a major public health problem in developing countries and is one of the most important modifiable risk factor for cardiovascular diseases (CVDs). In India, cardiovascular diseases (CVDs) are estimated to be responsible for 1.5 million deaths annually (**WHO Report, 2012**). Indeed, it is estimated that by 2020, CVDs will be the largest cause of mortality and morbidity in India. (**O'Donnell MJ et al, 2010)**. Previously identified risk factors for hypertension in Indians include higher body mass index (BMI), abdominal obesity, greater age, greater alcohol consumption, sedentary lifestyle and stress. Other important reported risk factors include age, smoking, and chewing tobacco, alcohol consumption, raised BMI, consumption of low vegetables/fruits, high consumption of dietary fat and salt, and a sedentary lifestyle. In a large-scale pooled cohort study of an Asian population, hypertension was a significant risk factor for stroke and ischemic heart disease. It is becoming an increasingly common health problem because of increasing longevity and prevalence of contributing factors such as obesity, physical inactivity and an unhealthy diet. According to **Oliver et al. (1975)**, the etiologic factors contributing to raise in the general level of blood pressure in a population the factors may be many but the important are salt intake and degree of obesity, physical activities and psychological stress. **Klatsky et al., (1986)** have suggested a linear relationship between alcohol intake and blood pressure. **Shaper et al., (1998**) stated that the British Regional Heart study estimated that approximately 10% of hypertension could be attributed to moderate or heavy drinking of alcohol.

Understanding whether the associations between BMI and blood pressure have changed across time is important to inform future public health responses to obesity, the prevalence of which has increased markedly since the 1980s (**Ng et al., 2014**; **Finucane et al., 2012**; **NCD Risk Factor Collaboration, 2016**) and may continue to increase (**Wang et al., 2011**). Complications and comorbidities that are associated with hypertension, including obesity, increase the likelihood of hospitalization. Abnormal nutritional status is also associated with higher chances of complications, longer LOS, and higher mortality rates.Under Sustainable Development Goal (**SDGs 3**), the United Nations (UN) member states has set the target of reducing premature mortality from non-communicable diseases (NCDs) by one-third by 2030 (**UNDP).**

Objective

The aim of this study was to identify the prevalence and risk factors for hypertension and nutritional status in rural areas of Birbhum district, West Bengal.

Methodology

Measurement of Blood Pressure:

This study used data of hypertensive and nutritional status failure for adult population indices from district level fact sheets of West Bengal state published by the National Family Health Survey (NFHS), India.This study was carried out based upon two-time frames of the NFHS-4, 2015–2016 series. The fact sheets are publicly available on the respective website (http://rchiips.org/nfhs/) and one can access the data set without any prior request. Hypertension is diagnosed if, when measured twice on different days, systolic blood pressure on both readings is ≥140 mmHg and/or diastolic blood pressure on both readings is ≥90 mmHg. The criteria from the Word Health Organization were used to classify patients as underweight (BMI < 18.5), normal weight (BMI 18.5–24.9), pre-obese (BMI 25–29.9), and obese (BMI ≥ 30).But for logistic regression BMI has been divided into three groups, normal, undernutrition and Overweight or Obese. All data were analyzed with STATA software.

Variables

Inclusion

In the study 1564 data have been taken in lieu of 1609, 45 data were omitted for not de jure resident respondents because these data not indicate proper information of the area. In the study drinking water has been divided into protected and unprotected groups. For simplicity, piped into dwelling, piped into yard/plot, public tap and tube well has been included as protected and unprotected well & other has been included as unprotected. Houses made from mud, thatch, or other low-quality materials are called kuccha houses, houses that use partly low-quality and partly high qualitymaterials are called semi-pukka houses, and houses made with high quality materials throughout, including the floor, roof, and exterior walls, are called pukka houses.Again, in the study, toilet facility has been divided into hygienic and unhygienic. Pit latrine without slab, open defecation and unimproved facility have been included at unhygienic and sanitary latrine with flush water and pit latrine with slab included in hygienic process.. In the formation of wealth index, three groups have been created in lieu of five, poorer & poorest has been included at poor and richer & richest has been represented as rich.

The hypertensive indicator is generated as a binary variable by categorizing the original question (hypertensive) such as normal <90 mmHg and/or <140 mmHg as 0 and hypertensive ≥140 mmHg and/or diastolic blood pressure on both readings is ≥90 mmHg as 1.

Ethical statement

The study is based on a secondary data set from the recent NFHS-4 survey with no identifiable information on the survey participants. NFHS-4 obtained the consent before and during the survey. This dataset is available in the public domain for research use and, hence, no ethical approval was needed specifically for the present study. The data can be freely accessed from the NFHS website at http://rchiips.org/nfhs/

Results:

Table-1: **Hypertension among Adults (age 15 years and above)**

Indicators	**NFHS-5(2019-20)**
Hypertension among Adults (age 15 years and above)	
Women	
Mildly elevated blood pressure (Systolic 140-159 mm of Hg and/or Diastolic 90-99 mm of Hg) (%)	10.7
Moderately or severely elevated blood pressure (Systolic ≥160mm of Hg and/or Diastolic ≥100mm of Hg) (%)	4.0

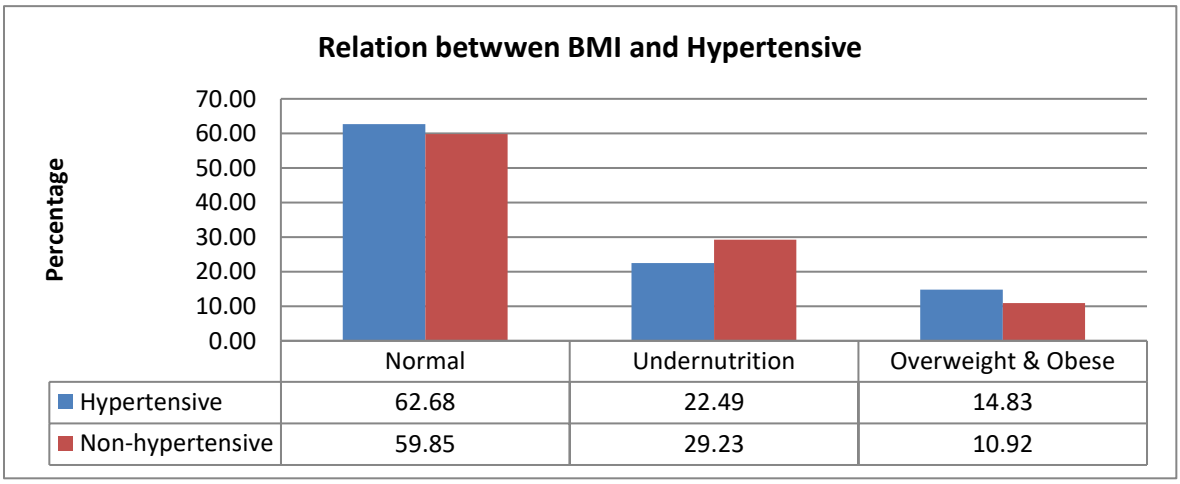
Elevated blood pressure (Systolic ≥140 mm of Hg and/or Diastolic ≥90 mm of Hg) or taking medicine to control blood pressure (%)	17,5
Men	
Mildly elevated blood pressure (Systolic 140-159 mm of Hg and/or Diastolic 90-99 mm of Hg) (%)	9.9
Moderately or severely elevated blood pressure (Systolic ≥160mm of Hg and/or Diastolic ≥100mm of Hg) (%)	2.1
Elevated blood pressure (Systolic ≥140 mm of Hg and/or Diastolic ≥90 mm of Hg) or taking medicine to control blood pressure (%)	14.2

Table-2: Relation between BMI & Hypertension

Indicators	**Hypertensive(209)**		**Non hypertensive (n=1355)**		Total (n=1564)
Body Mass Index	n	%	n	%	
Normal	131	62.68	811	59.85	60.23
Undernutrition	47	22.49	396	29.23	28.32
Overweight & Obese	31	14.83	148	10.92	11.45

In table-2, for Body Mass Index, 60.23% are normal, 28.32 % undernutrition and 11.45% are overweight and obese.

Chart-1 **Relation Body Mass Index with Hypertensive**



The above chart shows the association between BMI and hypertensive. In chat-1, among hypertensive, 62.68% are normal, 22.49% undernutrition and 14.83% are overweight and obese regarding nutritional status in study population.

Table-3: **Socio Economic Backgrounds of Respondents and Body Mass Index**

Indicators	Normal(n=942)		Obese & Overweight(n=179)		Undernutrition(n=443)		Total(n=1564)
	n	%	n	%	n	%	
Education							
Able to read	431	45.75	115	64.25	180	40.63	46.42
Blind/Other	3	0.32	0	0.00	0	0.00	0.19
Cannot Read	508	53.93	64	35.75	263	59.37	53.39
Type of Toilet Facility							
Hygienic	343	36.41	109	60.89	110	24.83	35.93
Unhygienic	599	63.59	70	39.11	333	75.17	64.07
Type of Cooking Fuel							
LPG	101	10.72	57	31.84	22	4.97	11.51
Agricultural crop	202	21.44	27	15.08	100	22.57	21.04
straw/shrubs/grass	126	13.38	28	15.64	59	13.32	13.62
wood	361	38.32	46	25.70	186	41.99	37.92
Dung cake	89	9.45	10	5.59	43	9.71	9.08
Other	63	6.69	11	6.15	33	7.45	6.84
Type of House							
Floor Material							
Kuccha	604	64.12	72	40.22	332	74.94	64.45
Semi pukka	4	0.42	0	0.00	1	0.23	0.32
Pukka	334	35.46	107	59.78	110	24.83	35.23
Type of Wall							
Kuccha	553	58.70	65	36.31	295	66.59	58.38
Semi pukka	19	2.02	9	5.03	6	1.35	2.17
Pukka	370	39.28	105	58.66	142	32.05	39.45
Type of Roof							
Kuccha	270	28.66	32	17.88	175	39.50	30.50
Semi pukka	20	2.12	4	2.23	5	1.13	1.85
Pukka	652	69.21	143	79.89	263	59.37	67.65
Diabetics							
Yes	5	0.53	4	2.23	3	0.68	0.77
No	884	93.84	165	92.18	401	90.52	92.71
Don't Know	53	5.63	10	5.59	39	8.80	6.52
Asthama							
Yes	42	4.46	22	12.29	19	4.29	5.31
No	848	90.02	148	82.68	393	88.71	88.81
Don't Know	52	5.52	9	5.03	31	7.00	5.88
Heart Disease							

Yes	17	1.80	0	0.00	11	2.48	1.79
No	847	89.92	165	92.18	388	87.58	89.51
Don't Know	78	8.28	14	7.82	44	9.93	8.70
Alcohol User							
Yes	17	1.80	0	0.00	11	2.48	1.79
No	925	98.20	179	100.00	432	97.52	98.21
Wealth Index							
Lower	675	71.66	83	46.37	363	81.94	71.68
Middle	152	16.14	26	14.53	60	13.54	15.22
Upper	115	12.21	70	39.11	20	4.51	13.12

The table 3 shows the association between BMI and Socio Economic characteristics. In study population 53.39% cannot read or illiterate. Literate population was only 46.42 %. In this area 64.07% used unhygienic Toilet facility. Floor material with mud, thatch, or other low-quality materials i.e. kuccha was 64.46%. Type of kuccha wall was 58.38% and kuccha roof (used low quality material) was 30.50%. Most of the people belong to the lower quintile in wealth index. Few percentages of people suffered from asthma, diabetics and heart disease.

Table-4: Socio Economic Characteristics of Normal and Hypertensive Respondents

Socio Economic Characteristics of Hypertensive Respondents					
Indicators	**Normal(n= 1355)**		**Hypertensive (n=209)**		Total(n= 1564)
Type of Toilet Facility	**Normal**	**%**	**N**	%	
Hygienic	482	35.57	80	38.28	35.93
Unhygienic	873	64.43	129	61.72	64.07
Type of Cooking Fuel					
LPG	147	10.85	33	15.79	11.51
Agricultural crop	289	21.33	40	19.14	21.04
straw/shrubs/grass	192	14.17	21	10.05	13.62
wood	519	38.30	74	35.41	37.92
Dung cake	118	8.71	24	11.48	9.08
Other	90	6.64	17	8.13	6.84
Type of House					
Floor Material					
Kuccha	884	65.24	124	59.33	64.45
Semi pukka	468	34.54	83	39.71	35.23
Pukka	3	0.22	2	0.96	0.32
Type of Wall					
Kuccha	796	58.75	117	55.98	58.38
Semi pukka	531	39.19	86	41.15	39.45
Pukka	28	2.07	6	2.87	2.17
Type of Roof					
Kuccha	431	31.81	46	22.01	30.50
Semi pukka	901	66.49	157	75.12	67.65
Pukka	23	1.70	6	2.87	1.85
Alcohol User					
Yes	20	1.48	8	3.83	1.79
No	1335	98.52	201	96.17	98.21
Wealth Index					
Lower	981	72.40	140	66.99	71.68
Middle	206	15.20	32	15.31	15.22
Upper	168	12.40	37	17.70	13.11

The above table-4 shows that most of population belongs to the low socio economic status and upper quintile population was 13.11%. Most of the respondents were low quality fuel products such as agricultural crop, straw/shrubs/grass, wood, Dung cake etc. and only 11.51 % use LPG as a fuel.

Table-5: Binary logistic regression model that indicates the role of explanatory factors of Hypertensive

Explanatory factors	**Hypertensive**	
	COR (95% C.I)	p-value
Body Mass Index		
Normal (Reference)		
Undernutrition	-.662 .046	0.088
Overweight & Obese	-.169 .688	0.235
Type of House		

Floor		
Kuccha (Reference)		
Semi pukka	-.240 3.35	0.089
Pukka	-.0651 .5342	0.125
Wall		
Kuccha (Reference)		
Semi pukka	-.525 1.279	0.413
Pukka	-.202 .396	0.525
Roof		
Kuccha (Reference)		
Semi pukka	-.0547 1.842	0.065
Pukka	.1421 .8382	0.006
Type of Fuel		
Animal Crop(Reference)		
Dung cake	-.985 .018	0.059
LPG	-1.306 -.1312	0.016
Wood	-.9031 -.0046	0.048
straw/shrubs/grass	-.6776 .4802	0.738
Other	-.8139 .4685	0.598
Type of Toilet Facility		
Hygiene(Reference)		
Unhygienic	-.416 .1840	0.448
Alcohol		
Used(Reference)		
Not used	-1.810 -.1438	0.022
Wealth Index		
Poor(Reference)		
Middle	-.327 .497	0.687
Rich	.0363 .8314	0.032

In table-5 crude odd ratio and 95% confidence interval from logistic regression analyse with hypertension as the dependent variable in sample population. Crude odd ratio of unadjusted of hypertension: undernutrition (95% confidence interval: -.662 .046, p-value 0.088), overweight & obese (95% confidence interval: -.169 .688, p-value 0.235), wealth index middle (95% confidence interval: -.327 .497, p-value 0.687). In most of the cases p-values are not significant.

Discussion

The present study aims to investigate the differences in Socio economic variables and health status between two groups (normal and hypertensive) .This paper deals with the assessment of socio-economic status through socio economic variables, nutritional status through body mass index (BMI) and hypertension through blood pressure among adult population in Birbhum district.

Table-1 shows that women populations are more hypertensive than men population (NFHS-5). Education is one of the most important indirect variables affecting socio-economic behaviour of a population. Table 2 shows the percentage of literate population (46.42 %) is very low and there is huge deviation from national literacy rate (77.70%) (2023), state literacy rate (76.3%)(2023) and district literacy rate (81.07) (2011)). Education is supposed to be the spine of any community and it is such a process which help to learn or acquisition knowledge, skills and habits etc. The development of any villages depends on the literacy rate of dwellers (Mandal and Sengupta, 2016).

Awareness regarding heart disease and diabetes were very poor among study population. 8.70% has no idea for heart disease and 5.88 % were not award for asthama disease (Table-3).

Our findings suggest that we can use BMI and hypertension in identifying individuals who are experiencing nutritional stress. The majority of people who were undernourished came from the family with low wealth index and monthly family income, both of which suggest a poor economic condition 71.68 % population belongs to low socioeconomic status in the area. However, it must be mentioned here that some limitations of the present study were the small sample size and the no availability of data on dietary intake.

Conclusion

Indian health system is challenged with increasing prevalence of non-communicable diseases and HTN being one of the major. This urges a strong need to improve health care at all levels incorporating prevention, surveillance, treatment and appropriate management. One factor which can help is by regular re-training, regular enhancement and upgrading skills of health care professionals providing hypertension related care. Given the rising burden of HTN in India, population based interventional approaches like reduction of salt intake, tobacco avoidance and regular physical activity can be incorporated in the control programmes.

This study illustrated that considerably high proportion of adults were malnourished in Birbhum district. Socio-economic characteristics (wealth index and toilet facility, type of house) were significantly associated with malnutrition.

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Conflict of interest:

The author declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

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