Section: Community Medicine

Original Research Article

COMMUNITY-LEVEL BURDEN OF HYPERTENSION AND TYPE 2 DIABETES MELLITUS AMONG ADULTS IN RURAL UTTAR PRADESH: A CROSS-SECTIONAL EPIDEMIOLOGICAL STUDY

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ABSTRACT

Background: Non-communicable diseases such as hypertension and type 2 diabetes mellitus are major contributors to morbidity and mortality in India. Although the burden of non-communicable diseases (NCDs) is well established in urban populations, there is a paucity of community-level evidence from rural populations. The objective is to assess the burden of hypertension and type 2 diabetes mellitus among adults in rural Bareilly district, Uttar Pradesh.
Materials and Methods: A community-based cross-sectional epidemiological study was conducted among adults aged 18 years and above residing in villages adopted under the Family Adoption Programme. Blood pressure and random blood sugar were measured using standard protocols.
Results: Of 2,826 adults screened, 567 (20.1%) had raised blood pressure and 395 (14.0%) had deranged random blood sugar levels. A high prevalence of adverse anthropometric indicators was also observed.
Conclusion: The study highlights a substantial burden of hypertension and diabetes in rural Bareilly, underscoring the need for strengthened community-based screening and preventive strategies.
Keywords: Hypertension, Type 2 Diabetes Mellitus.

INTRODUCTION

Hypertension (HTN) and diabetes mellitus (DM) both are rapidly emerging as public health problems in developing countries. It account for more than two-thirds of global deaths and represent a growing public health challenge, particularly in low- and middle-income countries. Hypertension and type 2 diabetes mellitus are among the most prevalent NCDs.[1-4]
HTN can lead to cardiovascular disease, stroke, myocardial infarction, congestive heart failure, and chronic kidney diseases.[5-7] Likewise, DM increases the risk of coronary heart disease, cerebrovascular disease, peripheral vascular disease, retinopathy, nephropathy, and neuropathy. The prevalence of chronic disease is showing an upward trend in most of the countries and for several reasons this trend is likely to increase.8 The rapid change in life style and behavior patterns of people are favorable to the onset of these diseases. The impact of these non-communicable disease on life of person is serious when measured in term of loss of life, disability, poverty and economic loss to the country. Developing countries are now warned to take appropriate step to avoid the epidemic of non-communicable disease likely to come with socio-economic status and health developments.
The majority of epidemiologists acknowledge that a significant portion of adult non-communicable disease morbidity and early death are caused by a collection of risk factors. The non-communicable disease epidemic is influenced by these risk factors as well as other underlying causes, such as obesity, dyslipidemia, hypertension, poor diet, and insufficient physical activity. Urbanization,

population aging, dietary changes, and a decrease in physical activity are all contributing factors to India's rapid epidemiological transformation.

Recent data shows that the burden of NCDs is increasing in rural populations, despite the fact that urban areas first suffered the most from this shift. Limited awareness, inadequate access to preventive health services, delayed diagnosis, poor treatment compliance and lost follow-up further exacerbate the problem in rural settings. World Health Organization (WHO) in their report titled 'Invisible Numbers reveals that 66% of deaths in India in 2019 were attributed to NCDs. The report also suggests that 22% of individuals aged 30 or older in India would be a victim to NCDs before reaching their 70 years.[6,8]

Uttar Pradesh, the most populous state in India, has a predominantly rural population and faces a dual burden of communicable and non-communicable diseases. Despite the implementation of national programmes such as the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS), district- and community-level data from rural areas remain scarce. The Sustainable Development Goal targets for NCD include the reduction of prevalence of HT by 25% between 2010 and 2025, and India, as a developing nation, aims one-third reduction in the premature deaths due to NCDs by 2030.[9] A National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke was launched by the Ministry of Health and Family Welfare, Govt. of India in 2010 and a component of population-based screening was added subsequently for achieving the committed targets. With age standardization, HT was higher in males (31.9%) than females (30.1%). Likewise, HTN is 31.9% in low- and middle-income countries (LMICs) compared to 28.5% in high-income countries.[10]

This study was therefore undertaken to generate robust community-level evidence on the burden of hypertension and type 2 diabetes mellitus among adults in rural Bareilly district.

MATERIALS AND METHODS

A community based cross section study of one year duration was conducted to know the burden of hypertension and diabetes in rural communities adopted by Rohilkhand Medical College & Hospital, Bareilly, Uttar Pradesh under the umbrella of "Family Adoption Programme" launched by National Medical council of India.

After the clearance of Institutional Ethics Committee, the study was done on adults aged 18 years and above residing in the selected villages for more than six months and gave consent to take part in study, while Individuals who were severely ill, pregnant female and unwilling to provide consent were excluded.

Sample Size Calculation: Sample size was calculated using the standard formula for estimating prevalence in cross-sectional studies: $n = Z^2PQ/d^2$. Assuming an expected hypertension prevalence of 20%, absolute precision of 5%, and 95% confidence level, the minimum sample size was 246. To improve precision and account for non-response, the final sample size was rounded to 400 participants.

Sampling Technique: A household-based systematic random sampling technique was employed. A complete list of households was obtained from Family Adoption Programme records. Every second household was selected, and one eligible adult from each household was chosen using the lottery method.

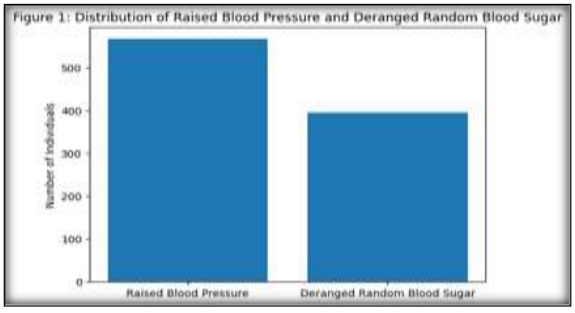
Operational Definitions: Hypertension was defined as systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg or current use of antihypertensive medication. Type 2 diabetes mellitus was defined as random blood sugar ≥200 mg/dl or self-reported diabetes on treatment.

Data Collection: Data were collected through face-to-face interviews using a pre-designed and pre-tested questionnaire. Blood pressure was measured by using a standard sphygmomanometer, and random blood sugar was estimated using a calibrated glucometer following standard operating procedures.

Data Analysis: Data were entered and analyzed using appropriate statistical software. Results were expressed as frequencies and percentages.

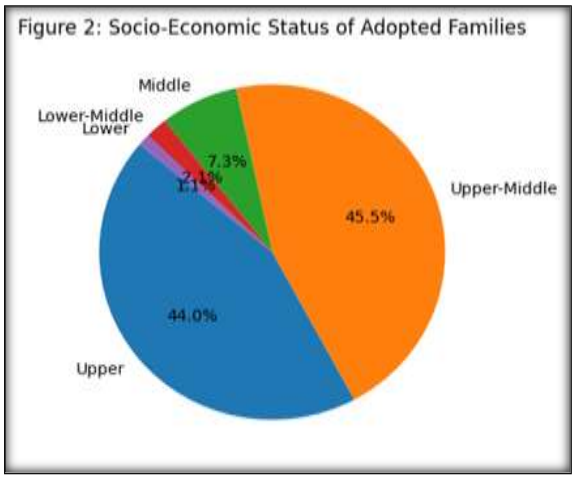
RESULTS

A total of 807 households comprising 3,971 individuals were covered under the Family Adoption Programme. Overall, 2,826 adults underwent screening for hypertension and diabetes mellitus. The number of newly detected hypertensive cases were 567 (20.7%), and hyperglycemia or deranged blood sugar levels seen in 395 (13.98%) cases, while the burden of known hypertensive and diabetic cases were 236 (8.35%) and 228 (8.1%) respectively. The study also showed that most of the participant were belonging to upper and upper middle class, and it has also observed that majority of the cases were residing in nuclear family. The percentage of over- weight / obese was slighter higher in male (365) as compared to female (357) participants. These findings indicate a considerable burden of NCDs in the rural study population, with both newly detected and known cases contributing to the overall prevalence.

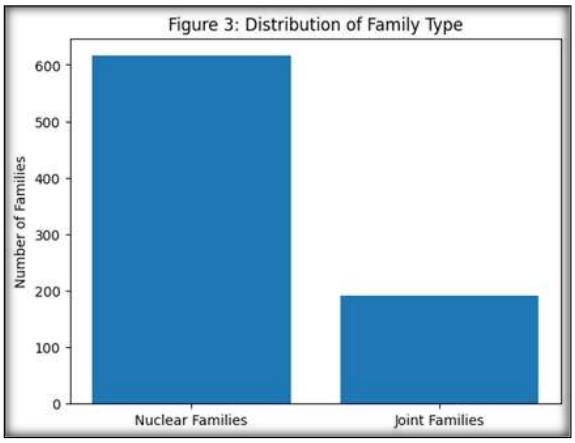


[Figure 1] illustrates the distribution of individuals with raised blood pressure and deranged random

blood sugar levels detected during community-based screening.



[Figure 2] depicts the socio-economic distribution of families adopted under the Family Adoption Programme, with a predominance of upper and upper-middle socio-economic groups.



[Figure 3] shows the distribution of family types among the adopted households, with nuclear families forming the majority.

Table 1: Summary of Community Characteristics and NCD Screening Outcomes

Category	Indicator	Number
Coverage	Households covered	807
Coverage	Total population covered	3971
Screening	Adults screened for BP and RBS	2826
Screening	Raised blood pressure	567 (20.7%)
Screening	Deranged random blood sugar	395 (13.98%)
Screening	Known hypertensives	236 (8.35%)
Screening	Known diabetics	228 (8.1%)
Socio-economic status	Upper class families	355
Socio-economic status	Upper-middle class families	367
Family type	Nuclear families	616
Family type	Joint families	191

Table 2: Distribution of Participants According to Biological Risk Indicators

Indicator	Sex	Number
BMI <18.5 kg/m²	Women	384
BMI ≥25 kg/m²	Women	357
BMI <18.5 kg/m²	Men	428
BMI ≥25 kg/m²	Men	365
High-risk waist–hip ratio	Women	954
High-risk waist–hip ratio	Men	1076
Blood sugar >140 mg/dl / on treatment	Women	79
Blood sugar >140 mg/dl / on treatment	Men	129
Elevated blood pressure / on treatment	Women	108
Elevated blood pressure / on treatment	Men	128

DISCUSSION

The present study demonstrates a substantial burden of hypertension and type 2 diabetes mellitus among adults residing in rural Bareilly district. It showed that the newly detected hypertensive cases were 567 (20.7%), and hyperglycemia or deranged blood sugar levels seen in 395 (13.98%) cases, a study done by Venkatesh U et al. also showed that HT was found in over 17% of the Indian population aged 15–49 years.10 Another study conducted by Muninarayana C et al suggested that the percentage of diabetic patients were high in young adult i.e.54.8%.[11] The prevalence of raised blood pressure and deranged random blood sugar observed in this study is comparable to findings reported from other rural regions of India, highlighting the expanding rural footprint of non-communicable diseases.

The high prevalence of adverse anthropometric indicators, including overweight, obesity, and increased waist–hip ratio, underscores the role of central obesity as a major risk factor for both hypertension and diabetes. These findings are consistent with previous studies demonstrating a strong association between abdominal obesity and cardio metabolic risk in South Asian populations.

The distribution of NCDs across socio-economic strata suggests that the risk of hypertension and diabetes is not limited to economically disadvantaged groups. This pattern reflects ongoing lifestyle

transitions and emphasizes the need for population-wide preventive strategies. The integration of NCD screening into the Family Adoption Programme facilitated early detection of undiagnosed cases and highlights the potential of leveraging existing community outreach platforms for NCD control.
Despite its strengths, the study has certain limitations, including its cross-sectional design and reliance on random blood sugar measurements. Nonetheless, the study provides valuable community-level epidemiological evidence from a rural district of Uttar Pradesh, where such data remain limited.

CONCLUSION

Among individuals in the rural Bareilly district, type 2 diabetes and hypertension represent a substantial public health burden. Non-communicable diseases (NCDs) are becoming more common, which calls for prompt care. To lessen the rising burden of non-communicable illnesses in rural India, it is crucial to improve community-based screening, encourage healthy behaviors, and provide continuity of care through primary healthcare systems
(NCDs) are becoming more common, which calls for prompt care. To lessen the rising burden of non-communicable illnesses in rural India, it is crucial to improve community-based screening, encourage healthy behaviors, and provide continuity of care through primary healthcare systems. In these areas, the shift from communicable to non-communicable diseases is becoming more noticeable, with disorders like diabetes and hypertension becoming more prevalent. Rapid urbanization and lifestyle changes, which are frequently unaccompanied by sufficient healthcare infrastructure or health practice education.

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