Section: Community Medicine

Original Research Article

PREVALENCE OF RISK-FACTORS OF NON-COMMUNICABLE DISEASES AMONG ADULTS IN MANIPUR

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Corresponding Author:
Dr. Usha Devi Thounaojam,
Email: commedjnims1@gmail.com

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Bishwalata Rajkumari[1], Wangkhem Jibol Singh[1], Usha Devi Thounaojam[1], Senjam Binita Devi[2], Thoudem Pooja[1], Rajkumar Ranalcis[1]

[1]Department of Community Medicine, JNIMS, Imphal, Manipur, India
[2]Department of Community Medicine, RIMS, Imphal, Manipur, India

ABSTRACT

Background: Effective prevention of NCDs is possible through identification of major common risk factors and their prevention and control. The objective is to estimate the prevalence of risk factors for non-communicable diseases among the adult population. Also to determine the association between risk factors and some socio-demographic variables of interest. **Materials and Methods:** A community-based cross-sectional study was conducted among adults (18 years and above) residing in Manipur. Two urban and two rural areas were selected using purposive sampling. Face to face interview method was done using pretested, validated, semi-structured questionnaire. Descriptive statistics, univariate and multivariate logistic regression analysis were used to test for association taking all variables with $p < 0.1$ for model building of the adjusted analysis. P-value of less than 0.05 was considered statistically significant. **Result:** Out of 392 participants, prevalence of current smokers (9.7%), current smokeless tobacco users (15.8%), current alcohol users (15.8%), hypertension (34.9%), overweight (50.7%) and central obesity (59.2%) were found. Female had increased risk of being current smoker (AOR: 84.70, 95% CI 11.29 TO 635.48), current alcohol users (AOR: 29.3, 95% CI 10.8-78.84) and overweight (AOR: 1.90, 95% CI 1.16-3.11). Urban resident had increased risk of being a current smoker (AOR: 2.36, 95% CI 1.08-5.18). **Conclusion:** Prevalence of NCD risk factor was found to be high in Manipur. These calls for concerted primary and secondary prevention strategies to address the future burden of NCDs.

INTRODUCTION

The modern lifestyle we have, has radically revolutionized the way we live and has led to the emergence and spread of lifestyle diseases, also known as chronic non-communicable diseases (NCD).[1] NCDs have become a key contributor to the morbidity, mortality and disability in both developed and developing countries.[2] Globally in 2021, Cardiovascular diseases, cancers, chronic respiratory diseases and diabetes account for 80% of all premature NCD deaths. Of all NCD deaths, 73% are in low- and middle-income countries.[1] As per the WHO – NCD India profile - 2018, NCDs are estimated to account for 63% of all deaths of which the cardiovascular diseases lead with 27% overall mortality, followed by chronic respiratory diseases (11%), cancers (9%), diabetes (3%) and others (13%).[3] A few common and preventable risk factors underlie most NCDS. Effective prevention of NCDs is possible through identification of major common risk factors and their prevention and control. The leading behavioural risk factors for NCDs are tobacco use, harmful alcohol consumption, unhealthy diet including high salt and sodium intake, physical inactivity, overweight and obesity and the physiological risk factors are raised blood pressure, raised blood glucose and abnormal blood lipids.[4,5]

Knowing the sociodemographic patterns of non-communicable disease risk factors is important not only for predicting the future course of the epidemic and planning relevant policies for prevention and disease control, but may also provide new etiological insights through their juxtaposition to known variations in disease patterns.[6,7]

While the estimates of disease burden based on modelling of routine health data are useful in planning resource allocation, strategic investments in prevention and management of NCDs require accurate assessment of their prevalence and risk factors.8 Hence, we conducted this study to estimate the current prevalence of NCD risk factors in Manipur.

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Objectives

This study was undertaken to estimate the prevalence of risk factors for non-communicable diseases among the adult population. And also to determine the association between risk factors and some socio-demographic variables of interest.

MATERIALS AND METHODS

A community-based cross-sectional study was conducted in Manipur during the period between October-December 2023. Study population comprises of adult population (≥18 years) in Manipur and residing in the area for at least one year. Those individuals who refused to participate or could not be contacted even after two consecutive visits were excluded from the study. Also those who were pregnant, seriously ill or with any bony deformity which might hamper the anthropometric measurements were excluded.

Sample size and sampling: Sample size was calculated after taking the prevalence of risk factors of NCD as 32%.9 By taking absolute error as 5% at 95% significance level and after adding 15% for non-responders, the calculated size was 400. Purposive sampling was used to select two rural and two urban wards or villages. The calculated sample size was distributed equally to the selected areas. From the selected ward or village, the first household was selected using a random technique. The researcher stood in the geographical centre location of the ward/village and spun a bottle and wherever the bottle pointed was chosen as the first household. Among eligible participants from a selected household, only one participant was chosen by simple random sampling using lottery method. The next household with the door nearest to the first house was selected and all eligible participants were consecutively sampled till the required sample size was reached.

A pre-tested, structured questionnaire was adapted from the WHO STEPS Instrument. The questionnaire consisted of the following domain: Demographic information, Behavioural measurements and Anthropometric measurements which included weight, height and waist circumference. Basal Metabolic Index (BMI) was calculated by the formula = Weight in kg/ (Height in metre).[2]

Operational Definitions: Current smokers were defined as those reported to smoke at least once in past six months

Current smokeless tobacco users as those reported to consume smokeless tobacco at least once in past six months

Current alcohol drinkers as those reported to consume alcohol at least once in past one year

Hypertension: Systolic Blood Pressure above 140 and Diastolic Blood Pressure above 90 mm Hg (according to JNC -7)

Overweight: BMI 23 and above (according to Asia-Pacific BMI classification)

Central obesity: was defined for men having waist circumference ≥94 cm and for women having waist circumference ≥80 cm (according to the WHO criteria)

Data collection: Before starting the data collection, purpose of the study was clearly explained and informed consent was taken from the study participants. House to house survey was done and eligible participants were included in the study. Data was obtained by face-to-face interview method using the questionnaire. Anthropometric measurements which included weight, height and waist circumference were also taken. Blood pressure were also measured.

Statistical analysis: All collected data were entered in MS Excel and data cleansing was performed. The collected data were then transferred to SPSS version 20 for data analysis. Descriptive statistics like mean, standard deviation, frequencies and proportions were used to summarize the data. Univariate logistic regression analysis was conducted with 'risk factor of non-communicable diseases' as dependant variable with selected independent variables. Variables with $p<0.10$ in the univariate analysis were entered into a multivariate logistic regression for categorical as well as for continuous variables for model building for the adjusted analysis. Finally, findings were reported as Odds ratios (ORs) with 95% Confidence intervals and p-value of less than 0.05 was considered statistically significant.

Ethical clearance was obtained from the Institutional Ethics before conducting the study vide proposal No.465/83/2023 version 02. During the survey, informed written consent was taken from the study subjects. The confidentiality concerning their information was maintained strictly.

RESULTS

The total number of respondents was 392. Response rate was 98%. The mean age (+SD) of respondents was 45.6 ±16.2 years, with a range of 18 to 76 years. Majority (66%) were females. Half of them (49.2%) belonged to Hindu religion. Maximum (78%) of them were married. Majority (41%) had completed graduation and above. Most of them were unemployed (58%). Almost half of them (58%) belonged to Upper and Upper middle class (Modified BG Prasad scale 2024).

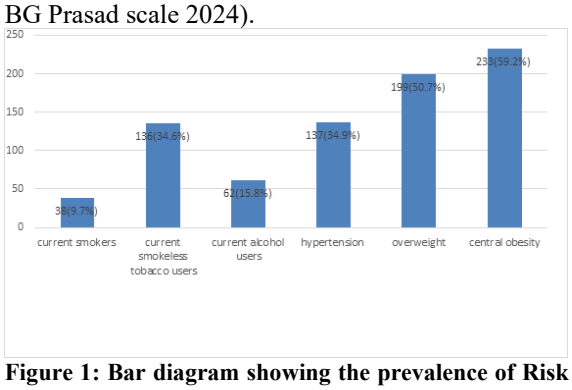

Figure 1: Bar diagram showing the prevalence of Risk factors of NCD.

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[Figure 1] shows the prevalence of risk factor of NCD. Central obesity (59%) and overweight (51%) were found to be the most prevalent risk factor of NCD.

Table 1: Univariate and Multivariate Logistic regression analysis of current smokers with socio-demographic variables (N=392)

Variable	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Age	0.99 (0.97 - 1.01)	0.763		
Gender				
Male	1		1	0.001*
Female	86.5(11.72 to 639.16)	0.001*	84.70 (11.29 – 635.48)	
Religion				
Hinduism	1		1	0.089
Others*	0.57(0.28-1.13)	0.111	0.50(0.23 – 1.11)	
Address				
Rural	1		1	0.031*
Urban	1.72(0.85 to 3.46)	0.131	2.36 (1.08 – 5.18)	
Educational level				
Primary school & below	1		-	
Secondary school	0.70(0.24-1.69)	0.437		
Graduate & above	1.22(0.48-3.12)	0.671		
Occupation				
Employed	1		-	
Unemployed	3.35 (1.64 to 6.86)	0.001*	1.81(0.80 – 4.12)	0.152
Marital status				
Married	1		-	-
Unmarried	0.944 (0.41 to 2.14)	0.890		
Socio-economic status				
Upper	1			
Lower	0.491 (1.28 to 2.55)	0.491	-	-

*Significant COR – crude odds ratio CI – Confidence interval AOR – Adjusted odd ratio

[Table 1] shows that being female (AOR: 84.70, 95% CI 11.29 to 635.48) and residing in urban area (AOR: 2.36, 95% CI 1.08 to 5.18) were found to have increased risk of being a current smoker (p<0.01).

Table 2: Univariate and Multivariate Logistic regression analysis of current smokeless tobacco consumers with socio-demographic variables (N=392).

Variable	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Age	0.99 (0.97 - 0.99)	0.019*	1.00(0.98 – 1.02)	0.807
Gender				
Male	1		-	0.001
Female	0.38 (0.23 to 0.60)	0.001*	0.356(0.20 – 0.61)	
Religion				
Hinduism	1	0.665	-	
Others*	1.09 (0.72-1.66)			
Address				
Rural	1		1	0.776
Urban	1.47 (0.96 to 2.24)	0.073	1.070 (0.67 – 1.70)	
Educational level				
Primary school & below	1		1	
Secondary school	1.87 (1.09 - 3.20)	0.023*	1.38 (0.76 – 2.54)	0.289
Graduate & above	3.22 (1.85 - 5.59)	0.001*	2.15 (1.14 – 4.03)	0.017*
Occupation				
Employed	1		1	0.001*
Unemployed	1.79 (1.18 to 2.73)	0.006*	2.42(1.48 – 3.95)	
Marital status				
Married	1		1	0.029*
Unmarried	0.26 (0.14 to 0.49)	0.001*	0.42 (0.19 – 0.91)	
Socio-economic status				
Upper	1		1	
Lower	0.67 (0.44 to 1.02)	0.060	0.91 (0.57 – 1.45)	0.685

*Significant COR – crude odds ratio CI – Confidence interval AOR – Adjusted odd ratio

[Table 2] shows that being female (AOR: 0.356, 95% CI 0.20 to 0.61) and unmarried respondents (AOR: 0.42, 95% CI 0.19 to 0.91) were significantly associated with a lower risk of smokeless tobacco use (p<0.001). Conversely, having a graduate and above level of education (AOR: 2.15, 95% CI 1.14 to 4.03) and being unemployed (AOR: 2.42, 95% CI 1.48 to 3.95) were significantly associated with a higher risk of smokeless tobacco use (p<0.01).

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Table 3: Univariate and Multivariate Logistic regression analysis of current alcohol users with socio-demographic variables (N=392)

Variable	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Age	0.99 (0.98 - 1.01)	0.837	-	
Gender				
Male	1		1	0.001*
Female	32.34 (12.55 to 83.35)	0.001*	29.3 (10.8 – 78.84)	
Religion				
Hinduism	1			-
Others*	1.41(0.81-2.43)	0.217	-	
Address				
Rural	1		-	-
Urban	1.21(0.70 to 2.09)	0.493		
Educational level				
Primary school & below	1		1	
Secondary school	0.60(0.26-1.37)	0.229	1.28(0.46 – 3.60)	0.633
Graduate & above	0.49(0.22-1.08)	0.079	1.66(0.60 – 4.62)	0.328
Occupation				
Employed	1		1	
Unemployed	4.22 (2.33 to 7.63)	0.001*	2.59 (1.31 – 5.09)	0.006*
Marital status				
Married	1		-	-
Unmarried	1.04 (0.54 to 2.00)	0.894		
Socio-economic status				
Upper	1		1	
Lower	1.51 (0.85 to 2.67)	0.155	1.45 (0.72 – 2.91)	0.293

*Significant COR – crude odds ratio CI – Confidence interval AOR – Adjusted odd ratio

[Table 3] shows that female gender (AOR: 29.3, 95% CI 10.8–78.84, p=0.001) and unemployment (AOR: 2.59, 95% CI 1.31–5.09, p=0.006) were significantly associated with a higher risk of current alcohol use.

Table 4: Univariate and Multivariate Logistic regression analysis of hypertension with socio-demographic variables (N=392)

Variable	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Age	0.96 (0.94 - 0.97)	0.001*	0.96(0.95-0.98)	<0.001*
Gender				
Male	1		1	0.606
Female	1.15 (0.75 - 1.77)	0.506	1.13(0.70 – 1.80)	
Religion				
Hinduism	1		-	-
Others*	1.02 (0.67-1.55)	0.907		
Address				
Rural	1		-	-
Urban	0.99 (0.65 - 1.51)	0.984		
Educational level				
Primary school & below	1		1	
Secondary school	2.24 (1.28-3.92)	0.005*	2.26 (1.2 – 4.01)	0.005*
Graduate & above	1.31 (0.77- 2.22)	0.313	1.37 (0.78 – 2.41)	0.270
Occupation				
Employed	1		1	
Unemployed	1.399 (0.92 to 2.12)	0.116	1.32(0.85 – 2.06)	0.208
Marital status				
Married	1			
Unmarried	0.35 (0.19 to 0.63)	0.001*	0.81(0.39-1.67)	0.566
Socio-economic status				
Upper	1		1	
Lower	0.89 (0.59 to 1.37)	0.617	0.95 (0.61 – 1.47)	0.829

*Significant COR – crude odds ratio CI – Confidence interval AOR – Adjusted odd ratio

[Table 4] shows that increasing age have a significant protection against hypertension (AOR:0.96, 95%CI 0.95-0.98, p<0.001). Having a secondary school education was significantly associated with a higher risk of hypertension (AOR: 2.26, 95% CI 1.2–4.01, p=0.005).

Table 5: Univariate and Multivariate Logistic regression analysis of overweight with socio-demographic variables (N=392)

Variable	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Age	1.02 (1.01 – 1.03)	0.001*	1.00(0.98 – 1.02)	0.475
Gender				
Male	1		-	
Female	2.00 (1.32 - 3.04)	0.001*	1.90(1.16 – 3.11)	0.010*
Religion				

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Hinduism Others*	1 1.22 (0.82-1.82)	 0.315	- 	
Address Rural Urban	 1 0.74 (0.49 - 1.09)	 0.135	 1 1.00(0.65 – 1.56)	 0.970
Education Primary school & below Secondary school Graduate & above	 1 0.72 (0.42-1.24) 0.52 (0.30- 0.88)	 0.245 0.015*	 1 1.20 (0.66 – 1.56) 1.01(0.55 – 1.85)	 0.546 0.955
Occupation Employed Unemployed	 1 0.71 (0.47 to 1.06)	 0.092	 1 0.69 (0.44 – 1.10)	 0.121
Marital status Married Unmarried	 1 4.65 (2.68 to 8.06)	 0.001*	 1 3.2(1.64 – 6.56)	 0.001*
Socio-economic status Upper Lower	 1 1.74 (1.16 to 2.62)	 0.007*	 1 1.42 (0.92 – 2.22)	 0.114

*Significant COR – crude odds ratio CI – Confidence interval AOR – Adjusted odd ratio

[Table 5] shows that increasing age did not show a significant association with overweight in the adjusted model (AOR: 1.00, 95% CI 0.98–1.02, p=0.475), despite being significant in the univariate analysis (p=0.001). Female gender (AOR: 1.90, 95% CI 1.16–3.11, p=0.010) and unmarried individuals (AOR: 3.2, 95% CI 1.64–6.56, p=0.001) were significantly associated with a higher risk of being overweight.

DISCUSSION

The present cross-sectional study assessed the prevalence of modifiable behavioural risk factors like current smoking, current smokeless tobacco consumption, current alcohol consumption and biological/metabolic risk factors like overweight, central obesity and raised blood pressure among adults in Manipur.

The prevalence of current smoker was 9.7% in our study. Higher prevalence of smokers were reported by other studies.[11-13] Our study showed that female (AOR: 84.70, 95% CI 11.29 to 635.48) had a statistically significant increased risk of being a current smoker (p<0.01) which is in contrast to studies conducted by Kuruvilla,[12] and Sivanantham,[14] where males were more likely to smoke. This disparity could be because our sample may reflect a society where female smoking is more prevalent, potentially due to community-specific norms, targeted cigarette marketing or increased stress exposure. Residing in an urban area was associated with a significantly increased risk of being a current smoker (AOR: 2.36; 95% CI: 1.08 to 5.18; p < 0.01) which is similar to a study conducted by Htet.[15] The study finding contrasts with study conducted by Ruhil.[16] The difference may be because in urban, people have greater access to cigarette due to many outlets. Urban people might often experience stress more than rural people, because of which they use smoking as a coping mechanism.

Prevalence of current smokeless tobacco consumption in our study was found to be 35%. It was found to be similar to that of study conducted by Poffte M,[10] Salvi A,[17] and Rupani MR.[18] According to Global Adult Tobacco Survey conducted by the Ministry of Health & Family Welfare, Govt. of India, the prevalence of smokers in India was 10.7% and that of smokeless tobacco users was 21.4%.[19] Use of tobacco can be attributed to psycho-social reasons like stress, anxiety and to cope-up with daily hardships. Ease of access and lack of awareness about the harmful effects of tobacco may be the hurdles in controlling tobacco usage in the community. Necessary interventions to support the activities of Cigarettes and Other Tobacco Products Act (COTPA) in the state can be promoted. Our findings revealed that being female was significantly associated with a lower risk of smokeless tobacco use (AOR: 0.356; 95% CI: 0.20–0.61; p=0.001). This result is consistent with the findings from Puducherry,[14] and Gujarat.[12] These findings suggest gender-specific strategies should be tailored in tobacco control program. Also unmarried respondents (AOR: 0.42, 95% CI 0.19 to 0.91) was significantly associated with a lower risk of smokeless tobacco use. The result aligns with study from the Global Adult Tobacco Survey-2 (GATS-2).[19] The findings may be because unmarried women are less stressed as compared to married women probably due to lesser responsibility, lifestyle habits or less socio- economic pressures. Conversely, having a graduate and above level of education (AOR: 2.15, 95% CI 1.14 to 4.03) were significantly associated with a higher risk of smokeless tobacco use (p<0.01) which aligns with other studies.[12,19] This may be because educated people rely on tobacco for stress relieve or maybe due to peer pressure.

Prevalence of current alcohol users was found to be 16% in our study. Another study done among women tribal population in Manipur, reported a higher prevalence of alcohol consumption among females at 9.7%.[20] Higher prevalence of alcohol consumption was also seen amongst the Mishing tribes of Assam (67%).[21] This may be attributed to the difference in cultural aspects compared to our present study. Easy availability of alcohol and the traditional use of alcohol in social gatherings may be some of the reasons for the high prevalence of alcohol users.

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Also, female (AOR: 29.3, 95% CI 10.8–78.84, p=0.001) were significantly associated with a higher risk of current alcohol use, which is in contrast to other study conducted in central India.[22] Our study found that being unemployed was significantly associated with a higher risk of current alcohol use (AOR: 2.59; 95% CI: 1.31–5.09; p=0.006). The study finding contrast with finding from studies.[23,24] The differences in finding may be because unemployment may be associated with stress, failure and use of alcohol as a coping mechanism.

The present study reported the prevalence of hypertension as 35%. Another study conducted among Muslim population in Manipur, found the prevalence of hypertension as 18%.[25] Singh PS reported prevalence of hypertension as 18.3% among females and 15.8% among males.[22] Lower prevalence of hypertension were also reported in studies conducted by Vijayakarthikeyan M (15%),[13] Anchala R (30%),[26] Oommen(28%),[27] and Zaman (21%).[28] Also, it was found that increasing age have a significant protection against hypertension (AOR:0.96, 95%CI 0.95-0.98, p<0.001). The finding contrast with findings from studies.[29,30] While blood pressure tends to rise with age, there's a noticeable trend of young people with raised blood pressure which might be explained by the adoptions of unhealthy lifestyles and increased stress levels.

Half the respondents was found to be overweight in our study which is more than that seen in the study conducted in Puducherry.[14] Similarly, lower prevalence of obesity was reported in studies conducted by Deepa M (46%),[31] Meshram II(29%),[32] Bindhu A (40.7%),[33] Masoodi (5.1%),[34] Sen (19.5%).[35] Female (AOR:1.90, 95% CI 1.16-1.02, p=0.010) were significantly associated with a higher risk of being overweight. The finding contrast with study conducted in Kerala.[8] Overweight in females can be attributed to a combination of factors including physiological differences, sociocultural influences, and psychological influences. Societal norms and gender roles can influence eating habits, physical activity levels and body image, potentially leading to unhealthy behaviours in women. Also our study found unmarried individuals (AOR: 3.2, 95% CI 1.64–6.56, p=0.001) with higher risk of increased BMI. This could be because unmarried individuals may stay away from their families and hence skipped their meal or binge eat due to stress or academic commitments. They might spend their time mostly on screen. They might lack emotional support, feel lonely which in turn leads to stress- eating.

In our study, more than half (59.2%) were found to have central obesity which is similar to the study conducted by Sharma PS (60%).[8] Higher prevalence of central obesity was seen in studies conducted in Nepal (78%),[11] North India (69%),[36] and Andhra Pradesh (71%).[37] Obesity is one of the major risk factors for cardiovascular diseases. So, awareness campaigns to educate the public about the different risk factors of non-communicable diseases and how to prevent them should be a priority.

Our study showed only two participants with adequate consumption of vegetables and fruits, which needs to be addressed with proper health education and awareness programmes to improve the dietary habits of the population. Use of different channels like media, public health campaigns & various outreach activities should also be undertaken.

The strength of our study was the use of validated questionnaire and inclusion of both rural and urban residents of Manipur. However, the limitation of our study lies in that the biochemical measurement could not be include in our study due to resource constraint.

CONCLUSION

Prevalence of NCD risk factor was found to be high. Being female was found to have increased risk of being current smoker, alcohol use and overweight. Community based interventions like walking clubs, yoga classes or cooking demonstration that promote healthy food choices needs to be adopted. Advocacy for policies that promote healthy food options in schools, workplaces and other public settings is needed. Ban of food advertising that promote unhealthy fast foods and drinks. Local authorities should support the development of parks, walking trails and other recreational facilities that encourage physical activities. The high prevalence of NCD risk factors in Manipur calls for concerted primary and secondary prevention strategies to address the future burden of NCDs.

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