Section: Community Medicine

Original Research Article

EARLY DETECTION AND RISK ASSESSMENT OF NON-COMMUNICABLE DISEASES AMONG BENEFICIARIES ATTENDING NCD CLINIC IN A TERTIARY CARE CENTRE IN MUMBAI: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Noncommunicable diseases (NCDs) is a significant global health challenge. A screening tool for assessing the risk of NCDs in communities is the Community-Based Assessment Checklist (CBAC) score. The objective is to Identify risk factors of NCDs among the study participants and to assess their NCD risk score.

Materials and Methods: A cross-sectional study was conducted among 30 years and above attending the Non-Communicable Diseases (NCD) Clinic at a tertiary care center in a metropolitan city between September and November 2024 using using CBAC form.

Results: Among 367 beneficiaries, 161 (44%) were found to have an NCD risk score greater than 4. Advancing age, [p<0.001, OR=3.622, (2.304–5.695)], positive family history [p<0.001, OR=13.217, (7.184–24.316)], reduced Physical activity were seen to have high NCD risk scores [p<0.001, OR =0.247 (0.16 – 0.38)]. Abstinence from alcohol consumption was found to be protective, [p=0.003, OR=3.935, (1.514–10.227)], a history of tobacco non-use was associated with a lower risk [p<0.001, OR=0.376, (0.238–0.601)].

Conclusion: NCD clinics provide comprehensive screening for the risk factors should be utilized and Individuals attending these clinics must receive timely interventions.

Keywords: Noncommunicable diseases (NCDs), CBAC.

INTRODUCTION

Noncommunicable diseases (NCDs) is a significant global health challenge. A combination of genetic, physiological, environmental, and behavioral factors contributes to these long-lasting conditions. Diabetes mellitus, heart diseases, stroke, cancer, chronic respiratory diseases like COPD and asthma are 4 main types of NCDs. Every year around 17 million people die prematurely before the age of 70 due to NCDs, of which 86% of these deaths occur in low- and middle-income countries. Risk factors like tobacco use, alcohol consumption, physical inactivity, unhealthy diets, and air pollution significantly increase the likelihood of dying from an NCD. Therefore, early detection, screening, treatment, and palliative care are very crucial.[1]

As per NFHS 5 data, the prevalence of NCDs has increased notably. Various studies have highlighted the increase in cases of hypertension & Diabetes.[2,3]

National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD) by Government of India provide technical, financial and logistics support to the State Governments. It mainly focuses on health promotion, screening and early diagnosis, management of individuals and addressing their risk factors. A number of risk scoring systems has been developed but majority of them are for

individual diseases.[5-7] The Community-Based Assessment Checklist (CBAC) score is one such screening tool which is designed to evaluate the risk of NCDs within communities, (includes hypertension, diabetes, and the three most common cancers: oral, breast, and cervical cancer).[8]

In terms of impact on global health, mainly in low- and middle-income countries, NCDs have a significant role. Despite initiatives such as the National Programme for Non-Communicable Diseases (NPNCD) in India, gaps are seen, such as inaccessibility to healthcare and disease prevention, as evidenced by low NCD screening participation rates. They also contribute to substantial economic burden foreseeing their long-term treatment and management costs, also reducing the quality of life, individuals' productivity and societal contributions. By addressing the behavioral and environmental risk factors such as tobacco use, unhealthy diets, and physical inactivity, the study can identify effective interventions to promote healthier lifestyles. With this view, the present study is planned.

Objectives

- To study socio-demographic factors of the study participants.
- To identify risk factors of NCDs among the study participants.
- To assess NCD risk score of the study participants.
- To suggest suitable recommendations based on study findings.

MATERIALS AND METHODS

A cross-sectional study was conducted among adults aged 30 years and above attending the Non-Communicable Diseases (NCD) Clinic at a tertiary care center in a metropolitan city. The study was carried out between September and November 2024, and participants were enrolled until the required sample size of 367 was reached. This sample size was calculated based on an expected prevalence of 57.7% for adults at risk of developing NCDs, as indicated by a CBAC of > 4 from, according to a previous study9. All individuals who attended the clinic during the study period and were willing to participate were included. However, individuals already diagnosed with hypertension, diabetes, breast cancer, oral cancer, cervical cancer, or those who were severely ill were excluded.

Data collection was done using predesigned, pretested and semi-structured questionnaire. The study was conducted after obtaining approval from the Institutional Ethics Committee and written informed consent from all participants. Confidentiality of the participants was assured and maintained throughout the study

Study tools:

- A pre-tested, semi structured questionnaire consisting of 2 Sections was used for the study.
- Section A: Socio-Demographic Information

This section gathered basic demographic data, including name, gender, educational level, place of residence, occupation, and socio-economic status.

Section B: Community-Based Assessment Checklist

This section consisted of a checklist addressing various health-related factors. It includes questions on lifestyle habits, medical history, and symptoms of NCDs. It has three parts:

Part A: CBAC risk assessment

This section collects information related to age, family history, waist circumference, and risk factors such as physical inactivity, tobacco use, and alcohol consumption. It includes a checklist with five questions and one anthropometric measurement. Each question contains sub-options scored between 0 and 2, resulting in a total possible score ranging from 0 to 10. An aggregate score below 4 indicates a low risk for NCDs, while a score above 4 signifies a high risk.

Based on individual responses, each participant's total score was calculated. Those with a score above 4 were referred to the appropriate specialists for further evaluation.

Part B: Early detection symptoms for oral, breast and cervical cancer

This section aims to identify symptoms suggestive of these cancers at an early stage for timely referral and diagnosis.

Part C: PHQ 2 (Patient Health Questionnaire-2)

The PHQ-2 screens for depression by assessing the frequency of depressed mood and anhedonia over the past two weeks. It consists of two questions, each scored from 0 to 3, with a total score ranging from 0 to 6.

A total score of 3 or higher suggests the likelihood of major depressive disorder. Participants who scored at or above this threshold were referred to a psychiatrist for further assessment.

Analysis

Data analysis was done by using statistical software Microsoft office excel 2013, Epi info 7.1.4,2014, and SPSS Version 22. The qualitative data was expressed in terms of number and percentage while the quantitative data was expressed in terms of mean and standard deviation. Chi square test was applied to observe the differences between proportions and P-value less than 0.05 was taken as statistically significant. Logistic Regression Analysis was done to determine association of NCD Risk Score with various corelates. Backward elimination method was used to select the final model, after adjusting for various confounders.

RESULTS

A cross-sectional study was conducted among 367 beneficiaries attending the NCD clinic at a tertiary care center in a metropolitan city. Of the total participants, 161 (44%) were found to have an NCD risk score greater than 4.

Table 1: Distribution of Study Participants as per their Socio Demographic Profile.

Socio Demographic Profile		Frequency	Percentage
Age Group	30-39 40-49 50-59	110 131 126	30.0 35.7 34.3
Gender	Female Male	167 200	45.5 54.5
Marital status	Married Single Widower	341 012 014	92.9 03.3 03.8
Education	Professional degree	017	04.60
	Graduate /PG	024	06.50
	Intermediate/Diploma	024	06.50
	High School Certificate	107	29.20
	Middle School Certificate	113	30.80
	Primary School Certificate	042	11.40
	Illiterate	040	10.90
Occupation	Professionals/ Technicians & Associate Professional	033	08.99
	Clerical/ Sales/ Skilled worker & sales	030	08.17
	Craft & related trade worker	081	22.07
	Plant & machine operators	052	14.17
	Elementary Occupation	063	17.17
	Unemployed	108	29.43
Socioeconomic class	Class I Class II Class III Class IV Class V	025 264 047 030 001	06.8 71.9 12.8 08.2 00.3

[Table 1] illustrates the distribution of study participants based on their socio-demographic and work profiles. It was observed that 35.7% (131) of the study participants belonged to the age group within 40 - 49 years. The majority of participants 54.5% (200) were Males and a substantial proportion 92.9% (341) were Married. Most of the study participants 30.80% (113) had their education up to Middle School. According to Kuppuswamy scale11, it was seen that 29.43% (108) were Unemployed and 71.9% (264) belonged to Socioeconomic class II.

Table 2: Correlation of various socio demographic factors with NCD Risk Score.

Sociodemographic factors		NCD Risk Score <4 >=4 No. (%) No. (%)	Chi Square P value	OR (95%CI)
Gender	Female	098(47.6) 069 (42.9)	0.810	1.210
	Male	108 (52.4) 092 (57.1)	0.368	(0.799 – 1.832)
Marital Status	Married	194 (94.2) 147 (91.3)	1.131	1.540
	Single	012 (05.80) 014 (08.70)	0.286	(0.692 – 3.428)
Socioeconomic class	1 &2	167(81.1) 122(75.8)	1.512	1.369
	3,4,5	039 (19) 039 (24.2)	0.219	(0.829 – 2.260)
Type of Family	Nuclear	141 (68.45) 120 (74.53)	1.630	1.349
	Non-Nuclear	065 (31.55) 041 (25.47)	0.202	(0.851 – 2.138)
Diet	Vegetarian	038 (18.4) 022 (13.7)	1.511	0.700
	Mixed	168 (81.6) 139 (86.3)	0.219	(0.395 – 1.239)
Fruits Consumption	<4/weeks	079 (38.3) 075 (46.6)	2.516	0.713
	>= 4/weeks	127 (61.7) 086 (53.4)	0.113	(0.470 – 1.083)
Green leafy Vegetables	<4/weeks	064 (31.1) 057 (35.5)	0.769	0.822
	>=4/weeks	142 (68.9) 104 (64.5)	0.381	(0.531 – 1.274)
Salt Consumption	Yes	093 (45.15) 084 (52.17)	1.788	1.326
	No	113 (54.85) 077 (47.83)	0.181	(0.877 – 2.004)
Consumption of Papad & Pickle	Yes	130 (63.11) 113 (70.19)	2.025	1.376
	No	076 (36.89) 048 (29.81)	0.155	(0.886 – 2.138
H/o Food from outside	Yes	106 (51.46) 073 (45.34)	1.362	0.783
	No	100 (48.54) 088 (54.66)	0.245	(0.518 – 1.183)

[Table 2] shows correlation of various sociodemographic factors with the NCD Risk score. It was observed that among participants with an NCD risk score of ≥ 4, 57.1% (92) were male, and 91.3% (147) were married. As per Kuppuswamy scale, a majority, 75.8% (122), belonged to Socioeconomic Class I and II. According to the Family distribution, 74.53% (120) belonged to nuclear family and 86.3% (139) reported following a mixed diet.

In terms of dietary habits, 53.4% (86) participants reported consuming fruits ≥ 4 times per week, and 64.5% (104) consumed vegetables more than 4 times per week. A history of extra salt consumption was reported by 52.2% (84), while 70.2% (113) reported regular intake of papad and pickles. Additionally,

45.3% (n = 73) reported frequently eating food outside the home.

However, none of the above findings were seen to be significant.

Table 3: Risk Factors correlation with NCD risk score.

Risk Factor			NCD Risk Score <4 >=4 No. (%) No. (%)	Chi Square Value P value	OR (95%CI)
Age	<50 >=50		161 (78.16) 80(49.69) 045 (21.84) 81 (50.31)	32.480 00.000	3.622 (2.304 – 5.695)
Family History	0 2		191 (92.72) 079 (49.07) 015 (7.28) 082 (50.93)	88.551 00.000	13.217 (7.184 – 24.316)
Physical Activity	0 (<150 mins) 1 (>150 mins)		069 (33.50) 108 (67.08) 137 (66.50) 053 (32.92)	40.826 00.000	0.247 (0.16-0.38)
BMI	Normal & below Overweight & above		94 (45.63) 56 (34.78) 112 (54.37) 105 (65.22)	4.401 0.036	1.574 (1.029 – 2.406)
Waist Circumference	Female <=80 >80	Male <=90 >90	110 (53.40) 25 (15.53) 96 (46.60) 136 (84.47)	55.735 00.000	6.233 (3.755 – 10.347)
Alcohol	Yes No		006 (2.91) 017 (10.56) 200 (97.09) 144 (89.44)	8.995 0.003	3.935 (1.514 – 10.227)
Tobacco	Daily/ Sometimes Never		042 (20.39) 065 (40.37) 164 (79.61) 096 (59.63)	17.474 00.000	0.376 (0.238 – 0.601)

[Table 3] presents the associations between various risk factors and non-communicable disease (NCD) risk scores. Advancing age was significantly associated with increased NCD risk, with 50.31% (81) of participants aged over 50 years exhibiting high risk scores (≥4) [p<0.001, OR=3.622, (2.304–5.695)].

A positive family history of NCDs emerged as a strong risk factor, with 50.93% (82) exhibiting high scores [p<0.001, OR=13.217, (7.184–24.316)]. Physical activity is an important factor in assessing the NCD risk score as seen here that 67.08% (108) of those having reduced Physical activity were seen to have high NCD risk score & this was seen to be statistically significant [p<0.001, OR =0.247 (0.16 – 0.38)].

Overweight and obesity were also associated with increased risk, with 65.22% (105) of overweight participants having high scores. Furthermore, increased waist circumference was significantly associated with high NCD risk, affecting 84.47% (136)

Abstinence from alcohol consumption was found to be protective, with 97.09% (200) of non-drinkers demonstrating low risk scores; this association was statistically significant [p=0.003, OR=3.935, (1.514–10.227)]. Similarly, a history of tobacco non-use was associated with a lower risk, as 79.61% (164) of never-users had lower NCD scores [p<0.001, OR=0.376, (0.238–0.601)].

Table 4: Multiple Logistic Regression Analysis of various variables of risk score.

Factors	Unadjusted OR	P value	Adjusted OR	P value
Family history of NCD	4877.115 (598.860 - 39719.194)	0.000	4939.295 (602.274 - 40507.534)	0.000
Age	328.592 (60.953 - 1771.411)	0.000	327.325 (60.424 - 1773.167)	0.000
Waist circumference	262.002 (51.712 – 1327.441)	0.000	273.376 (54.258 - 1377.382)	0.000
Tobacco use	85.735 (20.306 - 361.985)	0.000	82.607 (19.916 - 342.639)	0.000
Physical activity	60.359 (15.008 - 242.756)	0.000	61.492 (15.272 - 247.597)	0.000
Alcohol use	17.388 (1.707 - 177.066)	0.016	16.160 (1.639 - 159.367)	0.017

The above table shows Multiple Logistic Regression analysis for the various variables of NCD Risk Score. Among the factors analysed, it was observed that age was highly statistically significant risk factor with OR of 327.325 & a p value of < 0.001.

Individuals were screened for symptoms suggestive of cancer; however only two participants reported postmenopausal bleeding, and no other symptoms indicative of cancer were reported by the remaining participants

Table 5: PHQ 2 score correlation with NCD risk score.

Variables	NCD risk score > 4		NCD risk score ≤ 4	Total		Odds Ratio
PHQ 2 score	≤3	189 (91.7%)	157 (97.5%)	346 (94.3%)	X2Value: 5.573 df: 1 P-Value: 0.018	3.530 (1.164-10.708)
	>3	17 (8.3%)	4 (2.5%)	21 (5.7%)		

[Table 5] shows that a total of 346 participants (94.3%) had a PHQ score of less than 3. There is a statistically significant association seen between higher PHQ-2 scores and increased NCD risk ($p = 0.018$). Individuals with PHQ-2 scores >3 have 3.53 times higher odds of having an NCD risk score >4 compared to those with PHQ-2 scores <3.

DISCUSSION

This study highlights the use of the Community-Based Assessment Checklist (CBAC) for assessing the risk of non-communicable diseases (NCDs). The findings revealed that a significant proportion 161(44%) of the study population were identified as being at 'high risk' for developing NCDs based on the CBAC assessment. It is well established that the presence of risk factors often leads to disease development over time. Considering the lag between exposure and disease onset, identifying these risk factors at the earliest becomes a critical component for preventing & controlling of the disease. Early detection of NCDs contributes to improved health outcomes, and implementing cost-effective strategies for early risk identification is essential in reducing the overall burden of NCDs. The CBAC serves as a high-risk screening tool introduced in India to support this preventive approach.

In our study, 35.7% (131) belonged to the age group between 40 - 49 years, which aligns with the findings of Nabi S. et al,[12] where 38.6% of participants fell withing the same age group. However, in study by Yadav S. et al.,36.7% of participants were on the younger side (30–39 years) this finding was consistent with that of Debata I. et al,[13] who reported that 44.25% (177) had a similar age distribution in their study.

In this study, males comprised the majority of participants at 54.5% (200), which is consistent with the findings of Kalidoss V.K. et al,[14] (69%) and Choudhary N. et al. 64%. In contrast, studies by Nabi S. et al,[12] (57.0%), Yadav S. et al,[9] (51.1%) and Kaur M.P. et al. (70.08%) reported a higher proportion of female participants.

A total of 260 participants (70.8%) reported never using tobacco, a finding that aligns with the results of Debata I. et al,[13] (177, 44.25%), Kalidoss V.K. et al,[14] (70, 63.6%), and Choudhary N. et al,[15] (29, 86.09%), who also documented a history of no tobacco use among their study participants. This trend could be attributed to the fact that a considerable number of participants in the study had attained education up to middle school level or higher. Alternatively, the low reported tobacco use could be influenced by participants' reluctance to disclose their actual tobacco consumption.

In our study significant relationship was seen between age and risk of NCD. This finding was supported by study conducted by Dhungana RR et al,[16] Yadav S. et al,[9] and Nelson et al.[17] Also, we found that abstinence from alcohol consumption as well a history of tobacco non-use was associated with a lower risk. Similar findings were reported in studies by S M. et al,[18] and Mishra V K. et al,[19] where higher rates of NCDs were observed among individuals who consumed alcohol and tobacco. Among older adults, aging itself is a major non-modifiable risk factor for NCDs and is universally present. This highlights the need for behavior change strategies targeting modifiable risk factors during this stage of life, in order to reduce both the risk of disease onset and its progression.

Physical activity plays a crucial role in determining the risk of non-communicable diseases (NCDs). In our study, 67.08% (108) of participants with reduced physical activity were found to have a high NCD risk score, a relationship that was statistically significant. Similar results were reported in studies by El Haidari R. et al,[20] and Salam A. et al.[21] Furthermore, Momma H. et al,[22] observed that regular physical activity is associated with a lower risk of, and reduced mortality from, major NCDs. The physical inactivity observed in our study may be explained by the fact that most of the participants were older, so individuals do not find time and right circumstances for exercise. Notably, physical inactivity is a well-established risk factor for premature mortality and the development of various non-communicable diseases. Overweight and obesity were also linked to a higher risk of non-communicable diseases, with 65.22% (105) of overweight individuals showing high NCD risk scores. Additionally, increased waist circumference was significantly associated with elevated NCD risk, observed in 84.47% (136) of participants. These findings are consistent with those reported in studies by Debata I. et al,[13] Roy S. et al,[23] and Nelson F. et al.[17] Dyslipidemia, characterized by abnormal lipid profiles, further amplifies the impact of obesity by contributing to metabolic dysfunction and systemic inflammation, thereby elevating the risk of NCDs. Obesity has been strongly associated with a higher incidence of conditions such as hypertension and hypercholesterolemia, with studies indicating that overweight individuals face nearly twice the risk of developing these conditions.

A positive family history of non-communicable diseases (NCDs) emerged as a significant risk factor in our study, with 50.93% (n=82) of such individuals showing high NCD risk scores [$p<0.001$, OR=13.217, 95% CI: 7.184–24.316]. These findings are consistent with those reported by S M. et al,[18] Debata I. et al,[13] and Kaur M.P. et al.[24] Family history plays a crucial role in the risk assessment and management of NCDs. Evidence suggests that individuals with a familial background of conditions such as hypertension, diabetes, and obesity are at a substantially higher risk of developing these diseases. This highlights the importance of early screening, preventive measures, and lifestyle interventions to address the elevated risk associated with genetic and familial predisposition.

CONCLUSION

This study highlights a significant burden of non-communicable disease (NCD) risk among adults in the study participants above 50 years of age, overweight, those with a positive family history and reduced physical activity exhibiting high NCD risk scores. Utilizing the opportunity provided by the NCD clinics, comprehensive screening for the risk factors should be done and Individuals attending these clinics must receive timely interventions, including focused health education. Regular follow-up of beneficiaries is essential to ensure continuity of care. Overweight, obesity, substance abuse should no longer be treated merely as a lifestyle conditions. Instead, structured medical management appropriate de-addiction support, nutritional counseling, personalized diet plans, must be ensured by the treating community physician.

Limitation: The study was limited by its exclusion of other non-communicable diseases beyond those assessed, which narrows the overall scope of the findings. It also relied on self-reported symptoms, introducing the possibility of underreporting or recall bias. Furthermore, since participants were recruited from a tertiary care facility, the results may not be representative of the broader community.

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