

ABSTRACT

INTRODUCTION: Non-communicable diseases are the leading cause of death worldwide than all other causes combined. Contrary to what people generally believes, almost 80% of NCDs deaths occur in low & middle income countries. India is experiencing a rapid health transition from communicable to non communicable diseases. According to World Health Organization an Indian today has over twice the odds of dying of a non-communicable disease than a communicable disease.

RATIONALE OF THE STUDY: An increasing trend in NCDs risk factors has been observed globally during the two decades from 1990 to 2010; blood pressure (27% increase), smoking (3% increase), alcohol use (28% increase), low fruit (29% increase), high body-mass index (82% increase), and high fasting plasma glucose (58% increase). An increase in such risk factors may lead to raised NCDs’ burden.

In order to take effective prevention measures for chronic diseases, identification of the risk factors is an essential prerequisite. There is paucity of data about the prevalence of risk factors of NCDs, especially in this region of the state. With this background, this study was conducted with the aim of assessing the prevalence and correlates of risk factors of non-communicable diseases in urban Varanasi.

OBJECTIVES: The specific objectives of the study were:

1. To determine the prevalence of risk factors of NCDs.
2. To measure the association between socio demographic, behavioural, anthropometric and biochemical risk factors.
3. To assess the dietary pattern of study subjects and its association with socio-demographic, behavioural, anthropometric and biochemical risk factors.
4. To assess the self- perceived health and its association with the presence of the risk factors.

MATERIALS AND METHODS: A community based cross-sectional study was carried out among the people aged 25 to 64 years living in the selected study area. The sample size for the present study was calculated by taking prevalence at 50% and 5% permissible error with 95% CI, the sample size came out to be 384. Considering design effect (multistage sampling) at 1.5 and non response rate of 10%, the final sample size...
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was 640. A multistage sampling was used and there were three stages and for each stage different sampling design was used. At first stage, out of 90 wards, 5 wards were selected by using simple random sampling. At second stage, from each selected ward the households were further selected by using systematic random sampling and probability proportional to size was done. At the third stage, one member of target age group was interviewed from selected household. If the selected family has more than one available eligible person then one was chosen randomly by using lottery method. In case of non availability of eligible person in a selected household, at the time of survey, the adjacent household was selected. After obtaining approval by Institute Ethical Committee, Institute of Medical Sciences, Banaras Hindu University and taking consent from the participants, study subjects were interviewed for socio-demographic characteristics, which served as basis for assessing social determinants of risk factors of NCDs. A modified & pre-tested WHO Steps approach instrument was used to collect information on risk factors of NCDs. Biochemical parameters were done to subsample only due to logistic constraints and lack of voluntary participation of the study subjects. In addition to this, dietary intake and dietary pattern was assessed by using 24 – Hour recall method and food frequency questionnaire (FFQ) respectively. In addition to objective measurement of health status subjective measurement of health was also done. To get a complete picture of health, self perceived health was also assessed.

DATA PROCESSING: The information obtained from the survey was entered into a database developed for the study, using SPSS 16.0 program. Descriptive statistics (mean and standard deviation) were calculated for continuous variables and frequencies and percentages were calculated to summarize qualitative data. Other statistical tests like chi-square test and ANOVA were applied. Logistic regression was applied to identify the correlates of risk factors of NCDs. A significance level of 0.05 was used.

RESULTS AND CONCLUSION: Following are the salient findings of the present study:

- **Socio-demographic profile:** A total of 640 study subjects were interviewed for the survey. Out of these, 301 (47%) were male subjects and 339 (53%) were female. The median age (±SD) of the study subjects was 39.0 (±11.9) years and for male
and female it was 40.0 (±11.9) years and 38 (±11.8) years, respectively. Regarding religion and caste of the study subjects, around 96% subjects were Hindu and majority of the subjects were in general category, respectively. More than half of the study subjects belonged from the joint family and were educated up to graduate &/or above. Majority of the study subjects were married and one-third of the subjects belonged to the upper socioeconomic class.

- **Prevalence and correlates of risk factors of non-communicable diseases among the study subjects:** Around one third subjects (31%) were taking tobacco in any form either smoked or smokeless. Tobacco use was found significantly associated with all the socio-demographic characteristics. The odds of tobacco use was higher among male (AOR: 9.36), advancing age (AOR: 3.02), illiterate (AOR: 7.98) and subjects from lower socio-economic status. Around 11% subjects were alcoholic and only one woman was consuming alcohol. Alcohol use was significantly associated with sex, occupation, and tobacco consumption. None of the subjects were consuming ≥5 servings of fruits and vegetables per day. One out of ten subjects (9.5%) was found to be physically inactive. Caste, higher socio-economic status, education were significantly associated to physical activity. As per BMI, approximately one third subjects were overweight & every 9th subject was obese. The independent predictors of overweight/obesity were gender female (AOR: 1.99), increasing age (AOR: 4.39), and low education (AOR: 3.01). None of the behavioral risk factors were associated to overweight/obesity. According to waist circumference, 40% subjects were centrally obese. The independent predictors of abdominal obesity in the present study were female (AOR: 8.08), 45-54 years age group (AOR: 2.23), upper socio-economic status (AOR: 4.41) and physical inactivity (AOR: 2.13). Surprisingly, tobacco and alcohol use were proved to be protective factors for abdominal obesity in the present study. Hypertension was prevalent in 32.97% study subjects. Independent predictors of hypertension were being male (AOR: 1.95), advancing age (AOR: 6.09), tobacco use (AOR: 1.79) & obesity (AOR: 2.80). Out of total hypertensive (211), only 81 (38.4%) were aware about their hypertension status, out of those, 57 (70.4%) were seeking treatment and 20 (35.08%) had their blood pressure adequately controlled. Out of 104 subjects, 18 (17.31%) were found to be diabetic. The results of this study interprets that advancing age, sedentary occupation, alcohol consumption,
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hypertension and high blood triglyceride were significantly associated to diabetes. Increased blood triglyceride level was found in 10 (9.62%) subjects out of 104 subjects. Although advancing age, tobacco use and hypertensive subjects had more chances of abnormal lipids but not significantly associated. Factors found to be significantly associated to raised blood triglyceride were BMI and diabetes. As the number of risk factors increases so does the prevalence of diabetes and hypertriglyceridemia.

- **Dietary pattern of the study subjects and its association with socio-demographic, behavioural, anthropometric and biochemical risk factors:** As per RDA by ICMR, insufficient dietary intake of calorie (80%), sodium (95%) and potassium (72%) were observed in males & calorie (83%), protein (95%), carbohydrate (96%), sodium (81%), potassium (82%) & iron (80%) were observed in females. Intake of carbohydrate more than the RDA was recorded among 58% male and 25% female, protein in 45% male and 27% female, fat in 86.4% male and 86.7% female and total calories in 15% male and 29% female subjects. There was significant difference observed in nutrients intake with respect to caste, education and socio-economic status (p <0.05). Nutrient intake was higher in alcohol users, physically inactive subjects and among those who consumed unhealthy diet. Overweight and obese subjects and pre hypertensive and hypertensive subjects had significantly higher intake of major nutrients as compared to their normal counterparts. Around 41% subjects were vegetarian and 14% had fixed timing of meals. 78% subjects were consuming three meals a day and around 70% subjects preferred spicy and fried food. Regarding food frequency, wheat and rice consumption was very frequent (daily) by 100% and 95% subjects respectively. Consumption of pulses was also very frequent among all the study subjects. Consumption of milk and curd was very frequent among 47% and 21% subjects respectively. There was significant gender difference observed with respect to milk and curd consumption (p <0.001). Consumption of non-vegetarian products was found once or twice a month by majority of the subjects. Roots and tubers and green leafy vegetables were consumed almost daily by all the study subjects (99%) while fruits were consumed frequently only by 57% subjects. 7% subjects consumed fruits and vegetables rare or never. Fast food consumption was not much frequent among the study subjects. Consumption of pizza, burger and french fries
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was never done by 95%, 88% and 98% subjects respectively. This shows that only wheat, rice, pulses and roots and tubers intake was frequent or almost daily by the study subjects.

- **Self-perceived health and its association to the presence of risk factors:** Almost 80% subjects reported to perceive their health as good while 20% subjects perceived their health poor. Regarding general health issues, majority of the participants reported tiredness (31%) followed by pain (22%), weakness (18%), dizziness (14%), digestive complaints (9%) and then breathlessness (3%). All the health issues were significantly higher among female than their male counterparts (p <0.05). Association between self-perceived health status and socio-demographic characteristics revealed that gender, caste, marital status, education, occupation and socio-economic status were significantly associated (p <0.05). Overall, being female (AOR: 1.96, CI: 1.02 – 3.78), being married (AOR: 3.30, CI: 1.02 – 10.63), illiteracy (AOR: 2.75, CI: 1.24 – 6.20) and unemployment (AOR: 2.68, CI: 1.01 – 7.13) were the determinants of poor self perceived health. None of the risk factors, except hypertension & waist-hip ratio were significantly associated to self-perceived health (p <0.05). Fortunately, a majority of the factors associated with self-perceived health examined in this study are modifiable (eg, hypertension, WHR) and can be prevented or reversed with changes in lifestyle. Dietary intake of all the major nutrients (carbohydrate, protein, energy) & minerals (phosphorus, sodium, iron) were significantly higher in those who perceived their health good (p <0.05). A positive and significant association was observed between self reported NCDs and number of risk factors among the study subjects. Prevalence of NCDs was reported by 4.7%, 11%, 28% and 30% study subjects among no risk, one or two risk factors, three or four risk factors and more than four risk factors respectively.

**RECOMMENDATIONS:** Based on the conclusions drawn from the present study following recommendations were made:

**Service Recommendations:**

- As the results indicated, the prevalence of NCDs risk factors were gender related, gender sensitive preventive measures should be taken into consideration.
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- Data on multiple risk factors should be used as the baseline foundation for legislation and intervention by the public health authorities and policy planners.

- Clinicians, including medical doctors, physiotherapists and nurses in both public and private health care sectors, should incorporate enquiries on modifiable health risk behaviours in order to ensure early detection at the primary health care level.

- Establishment of alternative, low cost and feasible strategies for screening and early diagnosis of NCDs for their optimal use in health system settings.

- Formulation and strengthening of policies to control the incidence of tobacco use in schools, workplaces and other public places to minimize the effects of smoking on smokers, passive smokers or the general public as a whole.

- Routine public education on awareness through educational campaigns for promoting healthy life styles.

- Establishment and strengthening of a stepwise surveillance system for NCDs to monitor the trend of the diseases over time.

- Build capacity and mechanisms for optimal utilization of collected data through timely dissemination of information, linking to policy, planning, and program implementation and providing research impetus.

Research Recommendations:

- In order to account for seasonal variation in physical activity and dietary pattern, a prospective study will be useful.

- Longitudinal assessments of social, cultural, and economic determinants of behavioral risk factors to characterize their relationship and impact to NCDs and to plan interventions accordingly.

- To study behaviour management strategies for modifying risky behaviors at individual, family, and community level.

- Further research in this area with larger sample size is needed to create baseline data of risk factors of NCDs for policy makers, especially incorporating Step 3 of the WHO STEPSwise protocol to give a more comprehensive profile.

- For wider applicability it is proposed to undertake multi-centric studies on risk factors of NCDs to assist in taking preventive steps in right direction.