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Original Research Article

Dietary risk factors of non-communicable diseases among industrial common workers: a cross-sectional study

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ABSTRACT

Background: Non-communicable diseases (NCDs) are the leading cause of death and morbidity throughout the world. Unhealthy diet is a risk factor for NCDs. There is a lack of studies on the prevalence of dietary risk factors among the industrial population in India particularly in North East India.
Methods: A cross-sectional study was conducted among industrial workers of a major industry in Assam. The sample size was 330 considering a prevalence of 50% and 95% confidence interval, and a design effect of 1.5. Data was collected using methods described in WHO STEPS instrument v3.1.
Results: A total of 318 subjects consented to participate in the study. Consumption of less than 5 servings of fruit and/or vegetables on average per day was observed in majority 98.4% of the study participants. In a typical week, fruits and vegetables were consumed on 2.99 and 6.89 days respectively. Mean number of servings of fruit consumed on average per day was 0.5 and for vegetables were 2.33.46 (14.5%) of the study participants added extra salt always or often to their food before eating or while eating. 132 (41.5%) of the study participants always or often ate processed foods high in salt.
Conclusions: Inadequate consumption of fruits and vegetables was observed in 98.4% of industrial workers included in the study. Increasing awareness among this population about adequate consumption of fruits and vegetables to prevent NCDs is necessary.

Keywords: Dietary risk factors, Non-communicable disease, Industrial workers, Salt consumption

INTRODUCTION

Non-communicable diseases (NCDs) are the leading cause of death and morbidity throughout the world. Of 56.4 million global deaths in 2015, 39.5 million, or 70%, were due to non-communicable diseases (NCDs).[1] The heaviest burden of NCDs is concentrated in low- and middle-income countries.[2] The rise of NCDs has been driven by primarily four major risk factors: tobacco use, physical inactivity, the harmful use of alcohol and unhealthy diets.[3]

A healthy diet can reduce NCDs. Adequate consumption of fruit and vegetables, reduces the risk of cardiovascular diseases, stomach cancer and colorectal cancer.[4] There was a threshold around five servings of fruit and vegetables a day, after which the risk of all-cause mortality did not reduce further.[5] In many countries worldwide, the vast majority of the population consumes less than the recommended amount of five servings of fruit and vegetables per day. In 2015, low intake of fruits and vegetables was estimated to cause 4.7% of the global disease burden-as estimated in DALYs.[6]

High salt consumption in diets is also a risk factor of NCD. WHO recommends a reduction in salt intake to less than 5 g/day (sodium 2 g/day). Current estimates suggest that the global mean intake of salt was around 10 g of salt daily (4 g/day of sodium) in 2010. In 2015, a diet high in salt was estimated to cause 3.4% of the global disease burden – as estimated in DALYs.[6]

High prevalence of risk factors and morbidity due to non-communicable diseases (NCDs) has been reported among Indian industrial workers.[7] High prevalence of risk factors and the NCDs themselves, may lead to reduction in productivity and cause losses in industries.

There is a lack of studies on the prevalence of dietary risk factors among the industrial population in India particularly in North East India. The present study is an effort of documenting baseline information on prevalence of this risk factor which will be useful in determining corrective interventions.

METHODS

A cross-sectional study was conducted among the industrial workers aged 18-59 years. The study area was Upper Assam, one of the five regional divisions of Assam. The study was carried over a period of one year from June 2017 to May 2018.

Sample size

It was calculated using the formula: $n = (z^2pq)/d^2$, where p was taken as 0.50 (50%) (as similar studies in industrial population in India were only a few), absolute precision 0.07 (7%) and z=1.96 for 95% Confidence interval yielded a sample size of 196.[8] Considering a design effect of 1.5 and a non-response rate of 10%, the final sample size was 326 which was rounded off to 330.

Sampling design

There are seven major industrial public sector undertakings (PSUs) in upper Assam namely Oil India Limited, Numaligarh Refinery Ltd. (NRL) Oil and Natural Gas Corporation Limited (ONGC) Brahmaputra Cracker and Polymer Ltd (BCPL), Brahmaputra Valley Fertilizer Corporation Ltd, Assam Gas Company and Indian Oil Corporation (IOC) Ltd. Digboi Refinery, Tinsukia.[9] One PSU was randomly selected for the purpose of the study.

Permission was taken from the General Manager of the selected PSU for conducting the study. A list of all the employees was obtained from the Human Resource Department of the selected PSU. The required number of employees was selected randomly from this list using a random number table.

Data was collected by interview method using the modified WHO STEPS instrument v3.1.

Inclusion and exclusion criteria

Only permanent employees of the PSU were included for the study. Contractual employees of the PSU, pregnant females and persons with debilitating illness were excluded.

Ethical clearance

Ethical clearance was obtained from the Institutional Ethics Committee (H) of Assam Medical College and Hospital, Dibrugarh. Written informed consent was obtained from the study participants prior to the onset of the interview.

Statistical analysis

Data was coded and entered into statistical software. Quantitative data were analyzed in terms of mean, median and standard deviation. Qualitative data were analyzed in terms of proportions.

Definitions used

Insufficient Fruits and vegetables intake:

Less than five servings of fruits and vegetables per day was considered insufficient fruit and vegetable intake.[6]

One serving for vegetables refers to one cup of raw, leafy green vegetables, (spinach, salad etc.), one half cup of other vegetables, cooked or raw (tomatoes, pumpkin, beans etc.), or a half cup of vegetable juice.

For fruits, this refers to one medium-sized piece of fruit (banana, apple, kiwi etc.) or a half cup of raw, cooked or canned fruit or a half cup of juice from a fruit (not artificially flavoured).

RESULTS

A total of 318 subjects consented to participate in the study. The response rate was thus 96.4%.

All the study participants belonged to upper class (Modified BG Prasad classification 2017).

Mean age of the study participants was 49.56±10.37 years. 244 (76.7%) of the study participants belonged to the age group of 45-59 years followed by 30-44 years age group 43 (13.5%).

Majority 287 (90.3%) of the study participants were males, only 31 (9.7%) were females. 120 (37.7%) of the study subjects had completed education up to high school while 112 (35.2%) had a graduate degree. Only 3 (0.9%) of the study subjects were illiterate (Table 1).

313 (98.4%) of the study participants consumed less than 5 servings of fruit and/or vegetables on average per day. 46 (14.5%) of the study participants added extra salt always or often to their food before eating or while eating. 132 (41.5%) of the study participants always or often ate processed foods high in salt (Table 2).

Table 1: Socio-demographic characteristics of study participants.

Characteristic		Frequency	%
Age groups (years)	18-29	31	9.7
	30-44	43	13.5
	45-59	244	76.7
Sex	Male	287	90.3
	Female	31	9.7
Religion	Hinduism	288	90.6
	Islam	19	6
	Christianity	8	2.5
	Sikhism	3	0.9
Caste	General	172	54.1
	OBC	96	30.2
	SC	41	12.9
	ST	9	2.8
Educational status	No formal schooling	3	0.9
	Less than primary	1	0.3
	Middle school	11	3.5
	High school	120	37.7
	Intermediate or post high school diploma	44	13.8
	Graduation	112	35.2
	Post graduation	27	8.5

Table 2: Frequency of fruits, vegetables and salt intake (n=318).

Fruits, vegetables and salt intake	Frequency	%
Less than 5 servings of fruit and/or vegetables on average per day	313	98.4
Always or often add salt or salty sauce to their food before eating or as they are eating	46	14.5
Always or often eat processed foods high in salt	132	41.5

249 (78.3%) of the study participants had awareness of health risk from dietary salt. Self-perceived too much salt consumption was found in 20 (6.3%) study participants. 115 (36.2%) study participants considered it very important to reduce salt intake in diet. In a typical week, fruits and vegetables were consumed on 2.99 and 6.89 days respectively. The mean number of servings of fruit consumed on average per day was 0.5 while mean number of servings of vegetables consumed on average per day was 2.33 (Table 3).

Table 3: Number of days and servings of fruits and vegetables consumption.

Diet		Mean	S.D.
Fruit consumption	Number of days a typical week	2.99	2.09
	Number of servings consumed on average per day	0.5	0.37
Vegetables consumption	Number of days in a typical week	6.89	0.76
	Number of servings consumed on average per day	2.33	0.7

DISCUSSION

The present study done among industrial workers of a major public sector unit in NE India showed that 98.4% of the study participants consumed less than recommended 5 servings of fruit and/or vegetables on average per day.

Studies on diets of industrial workers in other parts of India have been reported. In a study among factory workers in Delhi by Kishore et al adequate fruits and vegetables intake was found in 0.0% of the study participants.[10] In a study by Mehan et al prevalence of low intake of fruits and vegetables was reported to be 100% in an industrial population in Gujarat.[11] The findings of this study regarding the intake of fruit and/or vegetables per day are similar to the findings of other studies on industrial population however different operational definitions were used in both the studies to define adequate or normal intake of fruit and/or vegetables per day.

Studies in general population in India have also shown low intake of fruits and vegetables. In a study conducted by Misra et al, among adults of Mishing tribe in Tinsukia district Assam, consumption of less than five servings of fruits and vegetables per day was reported by 68.1% participants which is lower than what was found in this study.[12]

Thakur et al reported consumption of less than 5 servings of fruits and vegetables among 95.8% study participants in a state-wide STEPS survey involving adults aged 18-69 years in Punjab.[13] In a study by Garg et al among adults ≥18 years in Delhi, 94.5% study participants consumed less than 5 servings of fruits and vegetables.[14] In another study by Thankappan et al on individuals aged 15-64 years in Kerala, 47.0% study population consumed less than 5 servings of fruits and vegetables.[15]

Similar studies in the nearby South East Asian region also show low consumption. In a study by Pelzom et al among Bhutanese aged 18-69 years, less than 5 servings of fruits and/or vegetables per day were consumed by 67.0% of study population.[16] Zaman et al in a study on Bangladeshi adults aged 25 years or older found prevalence of less than 5 servings of fruits and/or vegetables per day to be 93.3%.[17] In another study by Zaman et al, less than 5 servings of fruits and/or vegetables per day was seen in 99.0% of study participants.[18]

The prevalence of less than 5 servings of fruits and/or vegetables per day in this study was similar to the findings of Thakur et al, Garg et al, Zaman et al and Zaman et al. The prevalence was higher when compared to the studies by Thankappan et al and Pelzom et al.

In the present study it was observed that 14.5% of the study participants added extra salt always or often to their food before eating or while eating. Thakur et al. in their study found that 12.8% study population always/often added salt before/ when eating which is similar to what was found in this study.[13] Pelzom et al in their study found high salt intake in 99.0% of study population but their estimates were based on calculations from urine sodium concentration.[16]

CONCLUSION

Inadequate consumption of fruits and vegetables is a risk factor for developing NCDs and prevalence of this risk factor was observed in 98.4% of industrial workers included in the study. Increasing awareness among this population about adequate consumption of fruits and vegetables to prevent NCDs is necessary.

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