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Fruits and Vegetables Consumption Pattern as a Risk Factor for NCDs In A Rural Population of India

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ABSTRACT

Introduction: Globally Non-communicable diseases (NCDs) kill more than 36 million people each year. Nearly 80% of NCD deaths - 29 million - occur in low- and middle-income countries. WHO recommends consumption of five or more servings of fruit and/or vegetable per day in a typical week as adequate for reducing risk of NCD. With this background the present study was undertaken to know fruit and vegetables consumption in rural population of district Wardha (MH.).

Material and Methods: Community based cross-sectional study with participants' age between 15 to 64 years taking a sample size of 3500. Multistage sampling technique was adopted to collect the needed sample size.

Results: There were 1920(54.86%) male and 1580 (45.14%) female. Overall mean consumption days for fruits per week were 1.63. Overall mean number of days in the study population was 6.53, more in males (6.56) than that in females (6.48). servings of fruit per day in a typical week for study subjects was 1.25, it being 1.27 in male and 1.23 in female. mean number of days of vegetable consumption in the study population was 6.53, more in males (6.56) than that in females (6.48).

Conclusion: In our study it was observed that number of days per week of consumption of fruit and vegetable was very less. Nutrition education, price control, local production and governmental policies can alter the scenario.

Key words: fruits & vegetables; pattern; NCD; risk factor.

INTRODUCTION

Globally Non-communicable diseases (NCDs) kill more than 36 million people each year. Nearly 80% of NCD deaths - 29 million - occur in low- and middle-income countries. More than nine million of all deaths attributed to non-communicable diseases (NCDs) occur before the age of 60; 90% of these "premature" deaths occurred in low- and middle-income countries. Thus NCDs have emerged as cause of morbidity and mortality in low and middle income countries like India.¹

Group of major NCDs like CVD Cancer DM and respiratory diseases share common risk factors like unhealthy diet, physical inactivity tobacco use and harmful use of alcohol. These risk factors are preventable and modifiable. About 1.7 million deaths in the world are attributable to low fruits and vegetables consumption (WHO 2013).²

An important way to reduce NCDs is to focus on lessening the risk factors associated with these diseases. Low-cost solutions exist to reduce the common modifiable risk factors. The WHO Global strategy on diet, physical activity and health aims to promote and protect health by enabling communities to reduce disease and death rates related to unhealthy diet and physical inactivity.^{1,3}

It had been possible to measure risk factors in community by using STEPs wise approach developed by WHO for use in all settings allowing flexibility (WHO 2002). Only a few studies on consumption of fruit and vegetables in diet have conducted in India.⁴

Who ICMR six centre study (2005) has reported that 84.6% persons in rural areas and 81.4% in urban areas are consuming less than five servings of fruits and vegetables per day in a week³. WHO recommends consumption of five or more servings of fruit and/or vegetable per day in a typical week as adequate for reducing risk of NCD.⁵

With this background it was realized to find out pattern of consumption of fruits and vegetables in rural folks who form about 70% of India's population.

With this background the present study was undertaken to know fruit and vegetables consumption in rural population of district Wardha (MH.) using WHO STEP wise approach for uniformity and comparability. It was an attempt to know the pattern of fruit and vegetable intake in view of the WHO recommendations of five servings or more per day in their diets.

MATERIAL AND METHODS

STUDY DESIGN:

Community based cross- sectional study

STUDY DURATION:

This study was conducted from July 2008 to September 2010

STUDY POPULATION:

Participant of age 15 years to 64 years from rural area of Wardha district of Maharashtra state, of India were covered in the study.

STUDY SAMPLE:

Sample of 3500 individuals was selected for the study.

SAMPLING TECHNIQUE:

Multistage random sampling was adopted for the collection of required sample size. In this process four blocks of Wardha district in Maharashtra state were selected for the study. One PHC each was selected randomly from each block. Thereafter, one sub-center in each PHC were selected randomly. Three villages were randomly selected from the list of villages in the sub-center. Total 12 villages were taken for our study.

STUDY PARTICIPANTS:

INCLUSION CRITERIA

All adults in the age group of 15 years to 64 years were selected for study.

EXCLUSION CRITERIA

- 1) Those who were below the age of 15years.
- 2) Those who were not willing to give consent
- 3) Seriously ill persons.

CONSENT:

Written informed consent was obtained from participants of the study.

DATA COLLECTION:

Research tools: WHO STEPs 1(core) instrument was adopted for knowing consumption of FV using recall method .WHO has recommended 5 serving per day of fruits and / or vegetables.

With the help of the interns house to house survey was carried out in the morning as well as evening hours to get maximum number of study subjects at home. Two visits were made to ensure maximum participation in the study. Those who were absent were asked to be present at the second visit. The interview technique was used as a tool for data collection. Following operational definitions were

used to categorise consumption of fruits and vegetables:

One serving of vegetable was considered to be one cup of raw green leafy vegetable ,half cup of other vegetables (cooked or chopped raw), or half cup of vegetables juice.

One serving of fruit was considered to be one medium size piece of apple banana or orange, half cup of chopped cooked canned fruit or half cup of fruit juice not artificially flavoured.⁵

DATA PROCESSING AND ANALYSIS:

After collection of data on different variables it was got entered in suitable statistical software and got analysed accordingly.

Statistical analysis: Data was depicted in the form of tables and charts. Variability and precision of each value was illustrated in terms of 95 % Confidence Interval.

RESULTS

A cross sectional study in a rural community setup was conducted in adults in Wardha district, Maharashtra, India from 2008 to 2010. All the 3500 persons in the study group had responded. The study subjects were classified into ten years age groups from 15 to 64 years, having 700 persons in each of five groups for better representation.

There were 1920(54.86%) male and 1580 (45.14%) female. Of all persons a majority (56.28) followed by those in SEC II (35.43%) and only 8.2% were in SEC I or high socioeconomic status (BG Prasad's classification). Most of those in SEC III,IV and V were in the age group of 35-44 years.

Table 1 shows that mean number of days of fruits consumption in a typical week. Overall mean consumption days for fruits per week were 1.63; being slightly higher (1.69 days) in males as compared to that in females (1.57 days). In total respondents it was minimum (1.37 days per week) in the age group of 45-54 years, being only 1.42 in males and 1.31 in females. It was highest at 1.87 days in male in the age group of 25-34 years and 1.8 days per week in both sexes in 35-44 years of age group. In both sexes in the age group of 55-64 years mean number of days of fruits consumption per week was 1.58.

Table 2 is depicting mean number of days of vegetables consumption in a typical week. Overall mean number of days in the study population was 6.53, more in males (6.56) than that in females (6.48). In total respondents it was minimum (6.39 days per week) in the age group of 55-64 years being only 6.53 days in males and 6.22 days in females.

In males it was high at 6.76 days per week in the age group of 15-24 years decreasing with increasing age and it was least in the age group of 25-34 years (6.37 days per week). In females highest mean number of days per week was high (6.75) at the age of 25-34 years and then decreased smoothly to reach a minimum of 6.22 at the age of 55-64 years.

Table 3 is showing mean number of servings of fruit per day in a typical week for study subjects was 1.25, it being 1.27 in male and 1.23 in female which are much below recommended intake by WHO. Among male mean number of daily servings of fruit was higher (1.38) among young

males aged 15-24 years which decreased unevenly to 1.08 in 45-54 years age and a slight increase in the elderly. Among women the mean number of fruit serving per day ranged from 1.06 to 1.5 being higher in 15-24 years and 35-44 years but without a definite pattern

Table 4 is showing that mean number of servings per day of vegetables for both genders was 1.87. Mean vegetable serving for all male was 1.90 and for female it was 1.85. Higher mean servings for male was in 25-34 years age reducing unevenly with increasing age and in female it was highest in 15-24 years age group decreasing unevenly with age but again improving towards the age of 55-64 years.. The vegetable intake is grossly inadequate compared to recommended amount.

Table 5 is describing mean number of servings of fruit and/or vegetable on average per day for the study group. It was 3.13 for all, 3.17 for male and for female 3.08. Except for the age group of 45-54 years in male mean was more than 3.0 servings but for female only 15-24 years age had more than 3.0 servings per day and others had consumed 3 or less. The intake is grossly inadequate compared to recommended amount of five servings of fruit and/or vegetables per day.

It was observed that in the study population only 2% consumed five or more servings of fruit and/or vegetables per day in a typical week and 98.0% were taking inadequate amount.

Table 1. Mean number of days fruit consumed in a typical week

Age Group (years)	Men			Women			Total		
	n	Mean number of days/week	95% CI	n	Mean number of days/week	95% CI	n	Mean number of days/week	95% CI
15-24	380	1.76	1.85-1.68	320	1.72	1.80-1.64	700	1.74	1.80-1.68
25-34	380	1.87	1.98-1.75	320	1.44	1.50-1.37	700	1.67	1.74-1.60
35-44	400	1.80	1.91-1.69	300	1.80	1.87-1.73	700	1.80	1.87-1.73
45-54	380	1.42	1.50-1.35	320	1.31	1.41-1.22	700	1.37	1.43-1.31
55-64	380	1.58	1.67-1.49	320	1.59	1.68-1.50	700	1.59	1.65-1.52
Total	1920	1.69	1.73-1.64	1580	1.57	1.61-1.53	3500	1.63	1.66-1.60

Table 2. Mean number of days vegetables consumed in a typical week

Age Group (years)	Men			Women			Total		
	n	Mean number of days/week	95% CI	n	Mean number of days/week	95% CI	n	Mean number of days/week	95% CI
15-24	380	6.76	6.83-6.70	320	6.50	6.63-6.37	700	6.64	6.71-6.57
25-34	380	6.37	6.51-6.23	320	6.75	6.82-6.68	700	6.64	6.71-6.57
35-44	400	6.60	6.69-6.51	300	6.47	6.60-6.33	700	6.54	6.63-6.46
45-54	380	6.55	6.65-6.46	320	6.47	6.58-6.35	700	6.54	6.62-6.46
55-64	380	6.53	6.63-6.42	320	6.22	6.37-6.07	700	6.51	6.59-6.44
Total	1920	6.56	6.61-6.52	1580	6.48	6.54-6.43	700	6.39	6.48-6.29

Table 3: Mean number of servings of fruits consumed per day by gender and age group

Age Group (years)	Men			Women			Total		
	n	Mean number of servings	95% CI	n	Mean number of servings	95% CI	n	Mean number of servings	95% CI
15-24	380	1.39	1.44-1.35	320	1.31	1.36-1.26	700	1.36	1.39-1.32
25-34	380	1.26	1.31-1.21	320	1.06	1.11-1.02	700	1.17	1.21-1.14
35-44	400	1.38	1.47-1.28	300	1.50	1.63-1.37	700	1.43	1.51-1.35
45-54	380	1.08	1.12-1.04	320	1.25	1.33-1.17	700	1.16	1.20-1.11
55-64	380	1.24	1.29-1.19	320	1.06	1.11-1.02	700	1.16	1.19-1.12
Total	1920	1.27	1.30-1.24	1580	1.23	1.27-1.20	3500	1.25	1.28-1.23

Table 4: Mean numberof servings of vegetables consumed per day by gender and age group

Age Group (years)	Men			Women			Total		
	n	Mean number of servings	95% CI	n	Mean number of servings	95% CI	n	Mean number of servings	95% CI
15-24	380	1.84	1.88-1.81	320	2.03	2.14-1.93	700	1.93	1.98-1.88
25-34	380	2.05	2.14-1.97	320	1.81	1.86-1.77	700	1.94	1.99-1.89
35-44	400	1.85	1.88-1.82	300	1.77	1.81-1.72	700	1.81	1.84-1.79
45-54	380	1.79	1.83-1.75	320	1.69	1.74-1.64	700	1.74	1.78-1.71
55-64	380	1.95	2.04-1.86	320	1.94	2.05-1.83	700	1.94	2.01-1.87
Total	1920	1.90	1.92-1.87	1580	1.85	1.88-1.81	3500	1.87	1.90-1.85

Table 5: Mean numberof servings of fruits and/or vegetables consumed/ day by age and gender

Age Group (years)	Men			Women			Total		
	n	Mean number of servings	95% CI	n	Mean number of servings	95% CI	n	Mean number of servings	95% CI
15-24	380	3.24	3.31-3.17	320	3.34	3.47-3.22	700	3.29	3.35-3.22
25-34	380	3.32	3.40-3.24	320	2.88	2.93-2.82	700	3.11	3.17-3.06
35-44	400	3.23	3.32-3.13	300	3.27	3.39-3.14	700	3.24	3.32-3.17
45-54	380	2.87	2.94-2.80	320	2.94	3.5-2.83	700	2.90	2.96-2.84
55-64	380	3.18	3.30-3.07	320	3.00	3.12-2.88	700	3.10	3.18-3.02
Total	1920	3.17	3.21-3.13	1580	3.08	3.13-3.03	3500	3.13	3.16-3.10

DISCUSSION

In our study mean no. Of days of fruits consumption in a typical week was 1.63 it being slightly more in male (1.69) than that in female (1.57).

The mean number of days of vegetables consumption in a typical week was 6.53 (at 95% CI 6.562-6.49) it being slightly more in male 6.56(at 95% CI 6.61-6.52) than in female 6.48(at 95% CI 6.542-6.43).

Shah et al(2010) in their collated results of six centre study of NCD Risk Factors reported that 87.2% persons in rural areas of India and 84.1% in urban areas consume less than five servings of fruits and vegetables with almost all in Chennai and 96.7% in Dibrugarh but only 50.5% in

Trivandrum doing so. It also means that only 15-19 % of Indians consume healthy diet in terms of fruits and vegetables Mean number of days per week of fruit consumption in males was 2.19 and in females it was 1.91 days highest being in Kerala (3.08-2.61) and Delhi (3.49-3.16).Mean number of days of vegetables consumption per week was 5.51 in males and 5.53 in females it being less in rural areas (5.61 and 5.52) than urban (5.82 and 5.86).⁵

K.Anand (2007) in urban slums of Ballabgarh Haryana reported that mean number of servings of fruit and vegetable per day was 2.7% in male and 2.2% in female. Among men 7.9% consumed =>5 servings whereas 5.4% women did so.⁶

AnandK (2008) in their study in Faridabad rural(Haryana) observed higher rates of mean daily consumption of fruits and vegetables it being 3.7 in men and 2.7 in women. Overall only 7.9% of male and 5.4% of female consumed five or more servings.⁷

NathA(2009) in urban Delhi observed that only 43% consumed vegetable once per day and about 58% took fruits and vegetable on 1-2 days per week despite having money to buy these.⁸

Thankappan et al(2010) from Kerala reported high rates of consumption of fruits and vegetables it being 53% for all, comparatively more in urban people(62%) followed by rural(59.7%) and least(37.1%) in slum dwellers.⁹

Bhardwaj et al(2012)In rural area of Nagpur noticed that mean days of vegetables consumption were closer to our finding, it being 5.55 in males and 5.23 in females, so also were data from Kerala (about six days per week).¹⁰

Gandhari et el (2013) from Hugli (W.B.) has reported that 53.8% of persons consumed vegetables on less than 3 days and others did so on 3-4 days per week fruits consumption was also reported in 59.2% on less than 3-4 days per week.¹¹

Shah B and Mathur (2010) no. Of days per week for fruits consumption for rural areas were 1.5 and 1.2 for male and female. The urban dwellers consumed fruits more often males (2.9 days) females (2.7 days). The figures for vegetables were 5.6 days for male and 5.8 days for females.⁵

Bhagyalaxmi, A(2013) in rural Gujarat reported mean number of servings of fruits and vegetables to be 2.18 in male and 1.78% in female.¹²

In Bangladesh (WHO/SEARO,2010) per capita daily consumption is found to be low (2.3 serving). Most people take vegetables as an adjunct to rice or other staple food. Only 4.3% consumed >_5 servings of either fruit or vegetables consumptio fell in to the category. Daily vegetables consumption should not be considered as a sign of health awareness among people of low income country like Bangladesh, rather it is poverty that incapacitates them to afford meat or fish and as a result they have to resort to low cost vegetables. It was suggested that diets high in saturated fat and salt, and low in fruit and vegetables are likely to be associated with the increased risk of heart disease, stroke, obesity and some cancers.¹³

Unicentric study, problem of recall bias with small sample size were few of the limitations of the present study so if it is replicated on bigger sample size with a longitudinal & multicentre approach can provide us findings which are more generalisable with precise external validity.

CONCLUSION

In our study it was observed that number of days per week of consumption of fruit and vegetable was very less. The mean number of servings per day in a typical week was less than WHO recommendation of five servings in most of the subjects. Females had lower consumption compared to male. Availability, affordability and cultural preferences might be determinants of such pattern.

Nutrition education, price control, local production and governmental policies can alter the

scenario. Female gender empowerment and female literacy are long term solutions to overcome the inadequate consumption of fruit and vegetables. This is going to reduce risk for morbidity and mortality due to ofnon-communicable diseases.

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