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Original Research Article

Inadequate Fruits and Vegetables Intake: A Cross-Sectional Study from Rural Haryana

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ABSTRACT

Background: Usual diet pattern in our area with consumption of processed foods high in refined starch, sugar, salt and unhealthy fats, cheaply and readily available and less frequently fruits and vegetables that too in inadequate amount.
Aims & objectives: To determine the prevalence and correlates of inadequate fruits and vegetables intake among the rural community of block Beri, district Jhajjar, Haryana.
Methods: This cross-sectional study was carried out during the period of September 2012 to August 2013. Multistage random sampling was used in this study. 90 individuals of 15-64 years age group who were further subdivided into 15-24, 25-34, 35-44, 45-54 and 55-64 years age-group were selected and interviewed. Appropriate statistical tests were used for analysis.
Results: In our study the prevalence of inadequate intake of fruits and vegetables (servings <5/day taking one serving of 80 grams each for fruits and vegetables) was found to be 96.6% (males-96.5% and females-96.7%), which revealed that only 3.4% of study participants were consuming adequate fruits and vegetables (servings ≥5/day) (males-3.5% and females-3.3%).
Conclusion: Adequate diet in form of fruits and vegetables is essential to curb the deadly menace of Non Communicable Diseases.

Keywords: Diet, Servings, fruits, vegetables.

INTRODUCTION

The composition of human diets have changed considerably over time, with globalization and urbanization making processed foods high in refined starch, sugar, salt and unhealthy fats, cheaply and readily available and enticing to consumers-often more so than natural foods. [1] As a result, overweight and obesity, and associated health problems, are on the rise in the developing and developed world. [2] Exacerbating matters have been a shift toward more sedentary lifestyles, which has accompanied economic growth, the shift from agricultural economies to service-based economies, and urbanization in the developing world. The spreading of fast food culture, sedentary lifestyle and increase in bodyweight has led some to coin the emerging threat a "globesity" epidemic. [3]

The physiological risk factors can be delayed if the behavioral or lifestyle related risk factors are given due emphasis at an appropriate and timely stage. Lifestyle modifications in the form of adequate nutrition and exercise have to be initiated in schools/colleges. Laws have to be enacted for food outlets, sale of tobacco production and alcohol especially in children and young adults.

Usual diet pattern in our area is consumption of processed foods high in refined starch, sugar, salt and unhealthy fats, cheaply and readily available and less frequently fruits and vegetables that too in inadequate amount. Under IDSP risk factor survey, inadequate intake ranged from 75.5% in Maharashtra to 87.3%, 88.0%, 89.1%, 89.6%, 90.7% and 98.8% in Kerala, Madhya Pradesh, Uttarakhand, Andhra Pradesh, Mizoram and Tamil Nadu respectively. [4] Our study aimed to calculate the prevalence of inadequate fruits and vegetables intake and also to study the socio-demographic variables associated with it.

MATERIALS AND METHODS

Study area and study period

This cross-sectional study was carried out during the period of September 2012 to August 2013 in Block Beri, district Jhajjar, Haryana, a rural field practice area of Department of Community Medicine, PGIMS, Rohtak. This block is served by one General hospital (Beri), two Community Health Centres (Dighal and Dubhaldan), five Primary Health Centres and twenty five Subcentres and has a total of 136 Anganwadi Centres (AWCs). Ethical approval to conduct the study was taken from Institution Review Board (IRB). Active support and help of health workers and anganwadi workers was taken in contacting and motivating study population which made them more cooperative and in minimizing non-responders.

Sample Size and Sampling Strategy

The sample size was calculated to be 576 considering the prevalence of inadequate consumption- 40.3% [5] with confidence level of 95% and 10% relative allowable error.

Multistage random sampling was used including both the CHC's and three randomly selected PHCs of the rural block. From each PHC, two subcentres were randomly selected and from each subcentre area, two anganwadis were also selected by simple random sampling technique. Hence a total of 6 sub-health centres and 12 anganwadis were included in the study. From each anganwadi, 90 individuals of 15-64 years age group who were further subdivided into 15-24, 25-34, 35-44, 45-54 and 55-64 years age-group were selected and interviewed. Gender wise enumeration of the study population according to the subdivided age groups was done from the anganwadi registers. Nine males and nine females were selected from each of the five age subgroups by systematic random sampling. Thus, a sample size of 1080 was included in the study. In case, the desired numbers of study subjects were not available in any anganwadi area, subsequent anganwadi population was included in the study. Those subjects who were not willing to participate were excluded and next individual was selected for the interview instead.

Definitions used [6]

Standard Serving: One standard serving of fruits and vegetables is equivalent to 80 grams, translated into different units of cups depending on type of vegetables and fruits.

Inadequate intake of fruits and vegetables: <5 servings in a day.

Data collection and Analysis

A pre-tested, semi-structured schedule was used for interviewing the study subjects. Written and informed consent was taken from all subjects before initiating the interview. The confidentiality of the information was assured.

Collected data were entered in the Excel spreadsheet and analysis was carried out using Statistical Package for Social Studies (SPSS) version 20.0. Pearson's chi square test was used to evaluate differences between groups for categorized variables. Normally distributed data were presented as means and standard deviation, or 95% confidence intervals (CI). Student's t test and logistic regression analysis was done to evaluate factors associated with alcohol intake. All tests were performed at a 5% level of significance, thus the association was significant if the p value was < 0.05.

OBSERVATIONS

Table 1: Prevalence of inadequate intake of combined Fruits and Vegetables (servings <5 in a day) among study participants by age groups & gender.

Age group (years)	Inadequate intake of fruits and vegetables (servings <5)		
	Male (n=540)	Female (n=540)	Total (N=1080)
15-24	101/108 (93.5)	105/108 (97.2)	206/216 (95.4)
25-34	100/108 (92.6)	108/108 (100)	208/216 (96.3)
35-44	108/108 (100)	97/108 (89.8)	205/216 (94.9)
45-54	108/108 (100)	107/108 (99.1)	215/216 (99.5)
55-64	104/108 (96.3)	105/108 (97.2)	209/216 (96.8)
Total	521/540 (96.5)	522/540 (96.7)	1043/1080 (96.6)
χ^2	15.5	21.6	8.56
p value	0.004	0.000	0.073

(Figures in parentheses indicate percentages)

The above table depicted that the overall prevalence of inadequate intake of fruits and vegetables (servings <5) was 96.6% (1043/1080) which indicated only 3.4% of study participants taking adequate fruits and vegetables servings ≥5. The observed difference in age groups was found to be statistically significant among both males (p=0.004) and females (p=0.000). This reflected that food habits of people were consuming more of staple food in the form of wheat, pulses and vegetables.

Table 2: Average number of days per weekly consumption of Fruits and Vegetables servings among study population (N=1080).

Variables		Mean ±S.D
Fruits consumption days/week	Male	3.43 ± 2.37
	Female	2.36 ± 2.05
	Total	2.90 ± 2.28
Vegetables consumption days/week	Male	6.23 ±1.49
	Female	6.02 ±1.77
	Total	6.12 ± 1.64
Fruits and veg. consumption days/week	Male	4.83 ± 1.58
	Female	4.19 ± 1.55
	Total	4.51 ± 1.60

The above table revealed that the participants weekly mean consumption (days/week) of fruits was 2.9 ± 2.3, vegetables was 6.1 ± 1.6, and combined fruits and vegetables was 4.5 ± 1.6. Among the poorer section of the community fruits were consumed occasionally as compared to vegetables which were consumed more frequently due to availability of vegetables from fields easily and at a cheaper cost.

Table 3: Association of socio-demographic variables with inadequate intake of Fruits & vegetables (servings <5).

Socio-demographic Variables	Fruits & vegetables (servings ≥5) consumers (n=37)	Fruits & vegetables (servings < 5) (n=1043)	Total (N=1080)	Significance χ^2, p value
Marital status				
Married	23 (2.6)	861 (97.4)	884 (100.0)	10.774, 0.013
Unmarried	11 (7.1)	145 (92.9)	156 (100.0)	
Divorced	0 (0.0)	4 (100.0)	4 (100.0)	
Widowed	3 (8.3)	36 (91.7)	36 (100.0)	
Educational status				
Illiterate	8 (2.5)	317 (97.5)	325 (100.0)	26.119, 0.000
Primary	2 (2.2)	88 (97.8)	90 (100.0)	
Middle	7 (4.0)	166 (96.0)	173 (100.0)	
High school	6 (1.7)	356 (98.3)	362 (100.0)	
Graduate and above	14 (10.8)	116 (89.2)	130 (100.0)	
Occupation				
None	14 (2.9)	461 (97.1)	475 (100.0)	19.662, 0.003
Labourer	5 (2.3)	210 (97.7)	215 (100.0)	
Caste	2 (15.4)	11 (84.6)	13 (100.0)	
Business	0 (0.0)	30 (100.0)	30 (100.0)	
Independent	2 (2.4)	81 (97.6)	83 (100.0)	
Cultivation	2 (1.7)	118 (98.3)	120 (100.0)	
Service	12 (8.3)	132 (91.7)	144 (100.0)	
Socio-economic status with inadequate intake of fruits & vegetables				
Lower	2 (1.3)	147 (98.7)	149 (100.0)	12.632, 0.013
Lower-middle	16 (3.4)	461 (96.6)	477 (100.0)	
Middle	14 (3.8)	350 (96.2)	364 (100.0)	
Upper-middle	5 (6.7)	70 (93.3)	75 (100.0)	
Upper	0 (0.0)	15 (100.0)	15 (100.0)	

(Figures in parentheses indicate percentages)

This table revealed the prevalence of inadequate intake of fruits & vegetables (servings <5) was highest among divorced (100.0%) followed by married (97.4%), unmarried (92.9%) and widowed (91.7%). The association of intake of fruits and vegetables with their educational status was observed to be higher in illiterate (97.5%) than in graduate and above category (89.2%). With occupation, it was found that none of the individuals in business class had reported adequate fruits & vegetables intake. The prevalence of inadequate intake of fruits & vegetables was highest among upper (100.0%) followed by lower (98.7%), lower-middle (96.6%), middle (96.2%) and upper middle (93.3%). The difference observed by marital status (p=0.013), educational status (p=0.000), occupation (p=0.003) and socio-economic status (p=0.013) with prevalence of adequate intake of fruits & vegetables was found statistically significant.

Table 4: Independent association of socio-demographic variables with Fruits and Vegetables (<5 servings) consumption (Logistic Regression analysis) (N=1080).

Variable	Fruits and Vegetables <5 servings		
	Prevalence (%)	aOR (C.I.)	p value
Educational status			
Illiterate	317/325 (97.5)	Reference	0.000
Primary	88/90 (97.8)	0.90 (0.19-4.32)	0.896
Middle	166/173 (96.0)	1.67 (0.60-4.69)	0.329
High School	356/362 (98.3)	0.67 (0.23-1.95)	0.459
Graduate and above	116/130 (89.2)	4.78 (1.99-11.70)	0.001

In the above table, stepwise logistic regression method was used to predict the prevalence of fruits and vegetables (<5 servings) consumption. Among the above mentioned variables only educational status was found to be statistically significant.

With illiterate as reference and showing an increasing trend with nearly five times in (aOR: 4.78, CI: 1.99-11.70, p-0.001) graduate and above group indicated that as the educational status increased prevalence of inadequate fruits and vegetables consumption increased.

Table 5: Comparison of various quantitative variables with Fruits and Vegetables intake (<5 servings) (N= 1080).

Variables	Fruits and vegetable intake (<5 servings) (N=1043)	Fruits and vegetable intake (≥5 servings) (N=37)	p value
Weight (kgs)	59.09 ± 13.17	62.35 ± 11.80	0.138
Height (cms)	160.44 ± 9.37	160.22 ± 11.60	0.908
BMI (kg/m^2)	22.95 ± 4.82	24.35 ± 4.24	0.082
SBP (mmHg)	120.41 ± 17.68	118.59 ± 13.22	0.422
DBP (mmHg)	78.86 ± 11.49	78.38 ± 10.14	0.801
WC (cms)	85.85 ± 12.65	83.78 ± 8.96	0.182
Age (years)	39.52 ± 14.46	35.30 ± 14.08	0.081

Table 5 showed none of the variables mentioned above had any significant association between adequate and inadequate fruits and vegetables intake.

DISCUSSION

Prevalence of NCDs risk factor – inadequate dietary intake

In our study the prevalence of inadequate intake of fruits and vegetables (servings <5/day taking one serving of 80 grams each for fruits and vegetables) was found to be 96.6% (males-96.5% and females-96.7%), which revealed that only 3.4% of study participants were consuming adequate fruits and vegetables (servings ≥5/day) (males-3.5% and females-3.3%).

Krishnan et al (2008) reported that the proportion of men and women consuming <5 servings of fruits and vegetables per day were 93.4% and 98.2% respectively which was almost similar to our study. [7] However, in a study by Thankappan et al (2010, Kerala) it was revealed that inadequate consumption was 40.3%. [5] This difference could be attributed proximity of our study area to National Capital Region (NCR) of Delhi and people enjoying almost all urban amenities including changing dietary pattern. in our area the usual diet pattern was consumption of cereals, pulses, milk & milk products and less frequently fruits and vegetables that too inadequate in amount. Under IDSP risk factor survey, inadequate intake ranged from 75.5% in Maharashtra to 87.3%, 88.0%, 89.1%, 89.6%, 90.7% and 98.8% in Kerala, Madhya Pradesh, Uttarakhand, Andhra Pradesh, Mizoram and Tamil Nadu respectively. [6]

Average consumption of fruits, vegetables and combined fruits & vegetables was found 2.9 days/week (3.4 for males; 2.4 for females), 6.12 days/week (6.2 for males; 2.4 for females) and 4.51 days/week (4.8 for males; 4.2 for females) respectively in our study. Krishnan et al (2008) reported that the mean number of days in a week for intake of fruits was 2.1 and 1.5 for men and women respectively, which was on the lower side as compared to our study. [7] IDSP risk factor survey showed that the consumption of vegetables was comparatively higher (ranged from 3.7 days/week in Maharashtra to 6.8 days/week in Mizoram) against fruits (ranged from 1.3 days/week in Madhya Pradesh to 2.9 days/week in Kerala) in all the surveyed states among both sexes and this finding was in coherence to our study. [6]

Socio-demographic variables with inadequate dietary intake (servings <5/day)

Our study showed significant statistical association of occupation, educational and socioeconomic status with inadequate dietary intake. The prevalence of inadequate dietary intake was observed higher in illiterate (97.5%) than in graduate and above category (89.2%). No association could be observed with business occupation as none of these study subjects reported to have adequate intake of fruits & vegetables.

The prevalence of inadequate intake of fruits & vegetables was highest among upper (100.0%) followed by lower (98.7%), lower-middle (96.6%), middle (96.2%) and upper middle (93.3%) socio-economic status. This difference was because of the sample size in our study, as only 1.4% of the study population constituted upper socio-economic category and majority (nearly 80%) of the subjects in middle and lower middle category. Though they might be consuming but the quantity was inadequate. Kinra et al (2010) reported prevalence of inadequate intake of fruits & vegetables was more in low socioeconomic group (Males: 81.0%; Females: 86.6%) as compared to middle (Males: 75.6%; Females: 78.5%) and high socioeconomic group (Males: 63.6%; Females: 69.9%). [8]

Our study on logistic regression, revealed that the prevalence of inadequate fruits and vegetables intake (<5 servings) was nearly five times (aOR: 4.78, CI: 1.99-11.70, p-0.001) in graduate and above group than illiterate (reference). In contrary to our study, Sugathan et al (2008, Kerala) reported that lower education (<5th class) showed five times (aOR: 5.1; 95% CI: 3.1-8.7) risk than higher education group (reference). [9] This might be because of increased awareness about dietary pattern in highly literate state of Kerala.

CONCLUSION AND RECOMMENDATIONS

- Lifestyle modifications in the form of diet, yoga or physical activities, free from tobacco & alcohol use should be a part of curriculum in the educational institutions & universities in an effective and objective manner.
- Community based education programmes should be devised to lay emphasis on the need for maintaining healthy lifestyles and proper nutrition in the high risk groups.
- Incorporation of literature regarding adequate dietary intake of fruits and vegetables in schools, colleges and other health institutions/universities curriculum should be of utmost priority. In the peripheral areas, help of literate volunteers, youth clubs, mahilamandals, SMS, village health and sanitation committee, NGO's and other educational institutions should be taken to create awareness regarding good dietary habits and adequate intake in the community.

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