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**Dr. Priyanka Rana**

MBBS Tutor, Department of Biochemistry, Rajiv Gandhi Medical College and Chhatrapati Shivaji Maharaj Hospital, Thane, Maharashtra, India

**Dr. Vrushali Vishal Kulkarni**

Assistant Professor, Department of Community Medicine, Rajiv Gandhi Medical College and Chhatrapati Shivaji Maharaj Hospital, Thane, Maharashtra, India

**Dr. Srabani Bhattacharya**

Professor and Head of Physiology Department, Rajiv Gandhi Medical College and Chhatrapati Shivaji Maharaj Hospital, Thane, Maharashtra, India

**Late Dr. S Kartikeyan**

Ex-Professor and Head of PSM Department, Rajiv Gandhi Medical College and Chhatrapati Shivaji Maharaj Hospital, Thane, Maharashtra, India

**Corresponding Author:**

**Dr. Srabani Bhattacharya**

Professor and Head of Physiology Department, Rajiv Gandhi Medical College and Chhatrapati Shivaji Maharaj Hospital, Thane, Maharashtra, India

## Gender differences in diet, exercise, co-morbidities, smoking and alcohol consumption in urban Indian adult population

**Dr. Priyanka Rana, Dr. Vrushali Vishal Kulkarni, Dr. Srabani Bhattacharya and Late Dr. S Kartikeyan**

### Abstract

This cross-sectional study was conducted across India, among the population of 18 years and above of both male and female genders. An extensive anonymous survey of a large sample of 693 people was conducted, among which 51.94% were males and 48.05% were females. Our study focussed on gender differences in years of education; sedentary lifestyle; co-morbidities; dietary patterns; carbonated beverages and salt intake; tobacco and alcohol consumption; pattern of physical and breathing exercises. In our study we found that men were more likely to suffer from hypertension [72%] as compared to women [28%] and women were less likely to be smokers and frequent drinkers, [25%, 34%] compared with their male counterparts [75%, 66%] We also inferred that women were less likely to exercise regularly when compared to their male counterparts. Furthermore our study revealed, increased prevalence of physical inactivity and faulty eating patterns among both male and females. Therefore, it is the need of the hour to initiate urgent steps to promote healthier life-style behaviours, balanced nutritious diet and regular physical and breathing exercises for a sustainable wholistic approach towards health and well being.

**Keywords:** gender differences, healthy lifestyle, diet, adult Indians

### 1. Introduction

A person who does a lot of sitting and spends less than 10% of daily energy expenditure in moderate- to high-intensity activities is regarded as “sedentary” [1]. The ICMR-INDIAB study (Phase-1) [2] reported that a large percentage of people in India are inactive with fewer than 10% engaging in recreational physical activity. Modifiable risk factors that contribute to Non communicable diseases (NCDs) are generally adopted early in life [3]. Consumption of unhealthy energy-dense foods, inadequate physical activity and excessive sitting time may put youth at higher risk for obesity and cardiovascular disease in later years [4]. Behavioural (smoking, alcohol abuse, physical inactivity, and poor dietary habits) and physiological (obesity) NCD risk factors are known to be prevalent in the South African population [5]. The explosive increase in the prevalence of type 2 diabetes is due, to the adoption of unhealthy lifestyle practices. Low and middle income countries like China and India are expected to contribute most to the increase globally [6]. Insufficient physical activity and unhealthy diets have emerged as two of the most important modifiable risk factors not only for diabetes, but for other chronic NCDs like cardiovascular diseases [7]. The objective of this study was to determine the gender differences in dietary, lifestyle and physical activity patterns and co-morbidities among adult Indian Population.

### 2. Materials and Methods

The cross-sectional comparative study was conducted among 693 people, across major Indian cities. A pre-validated questionnaire via google form was uploaded. Only those who agreed to take part in the study were considered. The questionnaire, contained questions pertaining to years of education; sedentary lifestyle; co-morbidities; pattern and frequency of consumption of vegetables, fruits, salads, sweets, carbonated beverages and salt intake; tobacco and alcohol consumption; pattern of physical and breathing exercises.

SPSS version 22.0 statistical software package for Microsoft Windows (SPSS Inc., Chicago, IL) and MS-Excel were used for data analysis. Results on categorical measurements are presented in number (%). Distribution of demographic variables in terms of tables and graphs for all participants has been carried out in descriptive analysis. To check the association between two variables, a non-parametric Chi-square test has been used in the data analysis. (p values less than 0.05 considered as significant value)

### 3. Results and Discussion

#### 3.1. Age distribution

Out of 693 participants, there were 333 females (48.1%) and 360 males (51.9%).

The mean age of female participants was 26 ± 11 years while that for their male counterparts was 27 ± 11.4 years. The gender difference in age group wise distribution of our sample was not significant as p = 0.4344 (Table 1 & Figure 1)

#### 3.2. Socio-demographic and lifestyle factors

Table 1 shows the basic socio-demographic and lifestyle factors of the whole sample and the comparisons between genders.

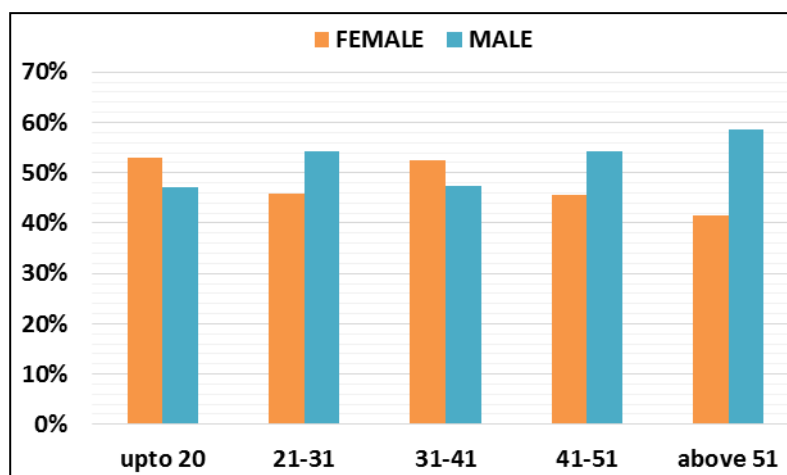
Compared to men, women had lower education levels. (Table 1 & Figure 2) Gender inequality in all stages of education as far as the gross enrollment ratio, poor enrolments of girls in higher education; gender bias in educational program etc. have adversely affected the Indian educational system [8].

In our study, there were no significant gender differences with regards to sedentary and physically active lifestyle of participants. (Table 1 & Figure 3)

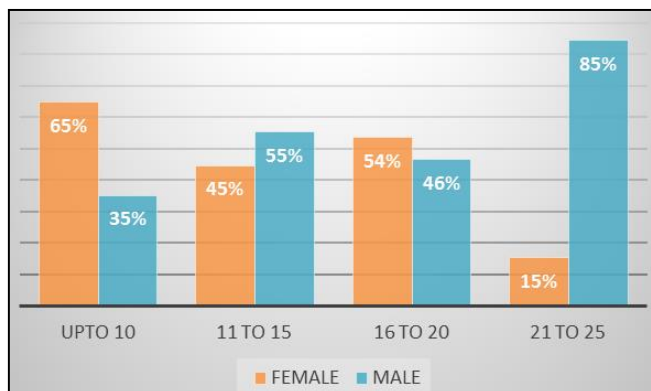
However, only 30.03% of the total females and 32.22% of total males had a physically active lifestyle compared to 61.86% females and 55.83% males following a sedentary lifestyle. This is a matter of grave concern as prolonged sitting is associated with development of metabolic syndrome, [9] deficient physical and mental health and premature death [10, 12].

**Table 1:** Socio-demographic and lifestyle factors.

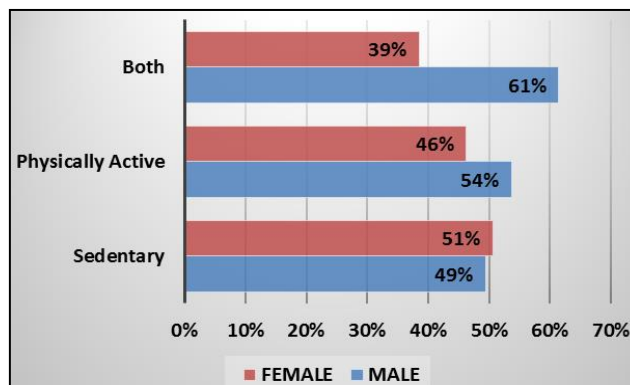
Variable	Total		Female		Male		Statistics	
	n(693)	n(333)	%	n(360)	%	χ <sup>2</sup>	p	
<b>Age-group (years)</b>								
18-20	206	109	53	97	47	3.795	<b>0.434</b>	
21-31	371	170	46	201	54			
31-41	40	21	53	19	48			
41-51	35	16	46	19	54			
>51	41	17	41	24	59			
<b>Years of Education</b>								
<10	37	24	65	13	35	14.459	0.002	
11-15	417	186	45	231	55			
16-20	226	121	54	105	46			
21-25	13	2	15	11	85			
<b>Lifestyle</b>								
Sedentary	407	206	51	201	49	3.857	0.1453	
Physically Active	216	100	46	116	54			
Both	70	27	39	43	61			



**Fig 1:** Age Distribution.



**Fig 2:** Years of education.



**Fig 3:** Lifestyle.

### 3.3. Dietary Pattern

The gender difference with regards to dietary patterns i.e. vegetables, fruits, salads, sweets, soft drinks consumption and sprinkling extra salt on food were not significant in our study. (Table 2) (Figure 4) However, a Kolkata, (India)-based study [13] found that females consumed more vegetables and fruits as compared to their male counterparts. Studies have revealed that the consumption of healthy foods, which included fruits, vegetables, salads, had a significant inverse relationship with depression among males and females subjects [14, 15].

In our research, 24.3% of total females and 23.05% of total

males reported daily consumption of carbonated beverages. As per J F Tahmassebi *et al.*, the consumption of soft drinks with high sugar content and acidity could contribute to detrimental oral health and also affect general health [16]. Our study revealed that, 58.25% of total females and 57.22% of total males sprinkled extra salt on their food. High dietary salt has been shown to adversely affect the vasculature, heart, kidneys, skin, brain, bone and overall health outcomes [17]. Katrina J. *et al.* provides evidence that high salt reduces non-inflammatory innate immune cell activation and may thus lead to an overall imbalance in immune homeostasis [18].

Table 2: Dietary pattern

Variable	Total	Female		Male		Statistics	
	n(693)	n(333)	%	n(360)	%	$\chi^2$	p
<b>Vegetables</b>							
2-3 times a week	302	145	48	157	52	2.808	0.422
Daily	149	64	43	85	57		
Once a week	180	94	52	86	48		
Rarely/Never	62	30	48	32	52		
<b>Fruits</b>							
2-3 times a week	257	117	46	140	54	4.429	0.218
Daily	223	115	52	108	48		
Once a week	140	72	51	68	49		
Rarely/Never	73	29	40	44	60		
<b>Salads</b>							
2-3 times a week	240	103	43	137	57	5.073	0.166
Daily	164	81	49	83	51		
Once a week	145	79	54	66	46		
Rarely/Never	144	70	49	74	51		
<b>Sweets</b>							
2-3 times a week	240	103	43	137	57	5.073	0.166
Daily	164	81	49	83	51		
Once a week	145	79	54	66	46		
Rarely/Never	144	70	49	74	51		
<b>Soft Drinks</b>							
2-3 times a week	240	103	43	137	57	5.073	0.166
Daily	164	81	49	83	51		
Once a week	145	79	54	66	46		
Rarely/Never	144	70	49	74	51		
<b>Extra-Salt</b>							
No	293	139	47	154	53	0.076	0.782
Yes	400	194	49	206	52		

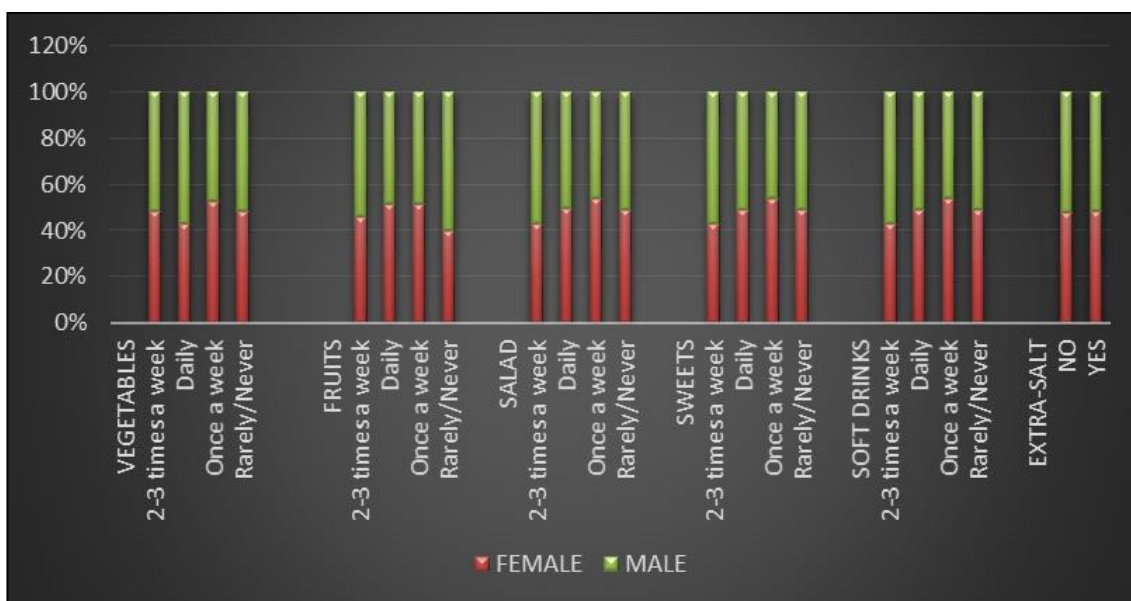


Fig 4: Dietary Pattern

### 3.4 Co- morbidities

In the present study, The prevalence of family history of respiratory diseases was higher in women than in men. Kathryn E. stated that women with a family history of lung cancer and personal history of bronchitis, pneumonia, emphysema were at increased risk of developing lung cancer [19].

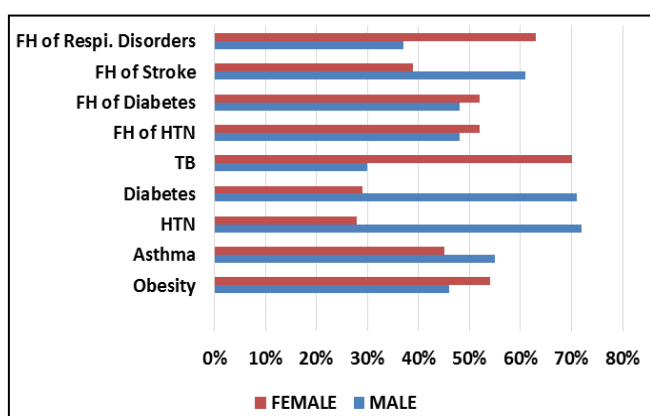
In our study we found that Men were more likely to suffer from hypertension [72%] as compared to women [28%]. In agreement with this, Bethany *et al.* stated that gender disparities in hypertension status were evident among men and women in their twenties: women were far less likely to be hypertensive compared to men (12% vs. 27%) [20].

No significant differences were found between the two genders in the prevalence of obesity, asthma, diabetes, tuberculosis and family history of hypertension, diabetes and stroke in our study. (Table 3) (Figure 5) A China based study also found no significant differences between the two genders in the prevalence of diabetes, cerebrovascular disease, COPD, liver disease, urolithiasis, chronic nephritis, chronic nasopharyngitis and cancer [21]. However, another study revealed that, adult women are more likely to be obese, but men had a higher risk of developing Type 2 Diabetes [22].

**Table 3:** Co-morbidities

Variable	Total		Female		Male		Statistics	
	n(693)	n(333)	%	n(360)	%	$\chi^2$	p	
<b>Co-morbidities</b>								
Obesity	121	65	54	56	46	1.886	0.169	
Asthma	20	9	45	11	55	0.076	0.781	
HTN	32	9	28	23	72	5.336	0.020	
Diabetes	14	4	29	10	71	2.172	0.140	
TB	10	7	70	3	30	1.958	0.161	
FH of HTN	149	77	52	72	48	0.999	0.317	
FH of Diabetes	190	99	52	91	48	1.722	0.189	
FH of Stroke	44	17	39	27	61	1.668	0.196	
FH of Respi. Disorder	41	26	63	15	37	4.120	0.042	

\*HTN=hypertension  
 \*TB= tuberculosis  
 \*FH= family history  
 \*Respi.= respiratory



**Fig 5:** Co-morbidities

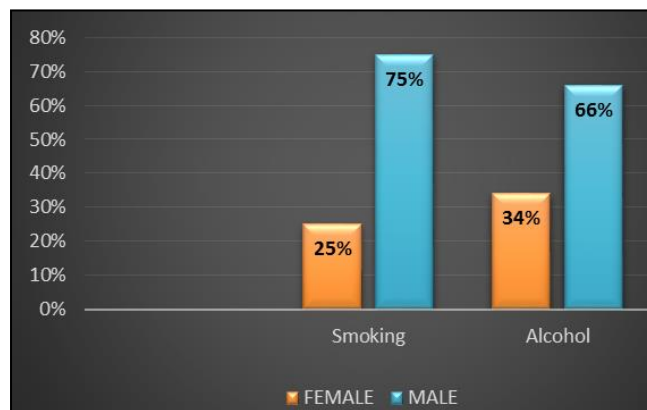
### 3.5 Tobacco and alcohol consumption

Table 4 presents the comparisons of the smoking and alcohol consumption among men and women. In the present study, we found that, women were less likely to be smokers and frequent drinkers, {25%, 34%} compared with their male counterparts {75%, 66%} respectively. (Figure 6) Shibin Wanga *et al.* also reported that women were less likely to be current smokers and frequent drinkers [21]. These findings are

consistent with earlier findings in both Western and Asian countries [23, 24].

**Table 4:** Cigarette Smoking & Alcohol Consumption

Variable	Total		Female		Male		Statistics	
	n(693)	n(333)	%	n(360)	%	$\chi^2$	p	
Cigarette Smoking	113	28	25	85	75	29.296	<0.00001	
Alcohol Consumption	248	85	34	163	66	29.369	<0.00001	



**Fig 6:** Smoking & Alcohol Consumption

### 3.6 Exercise Pattern

Our study revealed that women were less likely to exercise regularly compared to men.

Similar gender differences were also found in some [25, 27] but not all studies [28, 29].

Furthermore, our study revealed that, 143 (42.09%) of total females and 137(38.05%) of total males rarely or never indulged in any form of physical exercise. Lack of physical activity is a risk factor for many chronic diseases, such as, cardiovascular diseases, diabetes mellitus, obesity, hypertension, osteoporosis, osteoarthritis and mental depression [30].

There were no significant gender difference in the practice of pranayama (Breathing exercises) in our study. However, we discovered that 43.24% of total females and 50% of total males had never performed any kind of breathing exercise in their life. A pilot randomized controlled trial reported that yogic breathing reduces the levels of pro-inflammatory biomarkers in saliva [31]. Several Studies have confirmed the beneficial effect of Pranayama in improving lung function, tackling respiratory illnesses and in reducing fatigue, stress and anxiety in both male and female healthy subjects [32, 37].

**Table 5:** Exercise Pattern

Variable	Total		Female		Male		Statistics	
	n(693)	n(333)	%	n(360)	%	$\chi^2$	p	
<b>Exercise</b>								
2 days/week	192	100	52	92	48	7.027	0.029	
5 days/week	221	90	41	131	59			
Rarely/Never	280	143	51	137	49			
<b>Pranayama (Breathing Exercises)</b>								
Everyday	61	31	51	30	49	3.777	0.151	
Sometimes	310	160	52	150	48			
Never	322	142	44	180	56			

### 4. Conclusion

In our study we concluded that prevalence of hypertension, smoking and alcohol consumption was more in males as compared to females. We also inferred that women were less likely to exercise regularly when compared to their male



counterparts. Furthermore our study revealed, increased prevalence of physical inactivity and faulty eating patterns among both male and females. There is a need for mass awareness campaigns, innovative measures, public health policies and regular surveillance to make people realize the need for making changes in their dietary and lifestyle patterns and promote inclusion of pranayama and indulging in recreational physical activity in both genders. The Fit India Movement started by the Government of India, is a right step towards this direction. Admst the ongoing corona pandemic, the necessity to incorporate pranayama (breathing exercises) in our daily routine has increased multifold. It is the need of the hour to switch to healthier life-style behaviour, balanced nutritious diet and regular physical and breathing exercise for a sustainable wholistic approach towards health and well-being.

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