Breakfast Consumption and Physical Activity of College Going Students 17 To 21 Yrs, in Selected Areas of Mumbai City

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Abstract

Good nutrition implies optimal intakes of energy and other nutrients in accordance with individual's requirements. Children are healthy, cheerful can perform to a satisfactory level. Obesity has become more common among college going girls. The main cause of this epidemic is their eating pattern, lack of physical exercise and behavior of breakfast consumption. This study assessed the nutritional status and physical activity pattern of college going students. Totally 100 students comprised of 50 breakfast consumer and 50 non- breakfast consumers aged 17 years to 21 years from two colleges in Mumbai were selected randomly. Students who did not eat breakfast had significantly higher weight than girls who ate breakfast both pre intervention group and post intervention group. In group of girls who did not eat breakfast, energy, macro nutrients, iron and RDA intake of all nutrients increased post intervention ($P < 0.05$). The number of steps (Physical activity) walked by college going students was measured with the help of Pedometer. The average number of steps (Physical Activity) walked by students in pre-intervention was 8461 ± 2867 and post-intervention (Physical activity, steps) was 10530 ± 2530. Breakfast eaters walked more steps as compared to non-breakfast eaters both pre and post – intervention. It is seen that there is a positive association between breakfast consumption and increased physical activity among college going.

KEY WORDS: Breakfast consumption, Physical activity, College going girls.

INTRODUCTION

Breakfast is the first meal after an overnight fast. For decades, mothers everywhere have encouraged their families to start their day with a good breakfast. Today, different research shows that mom's advice was right. A healthy breakfast consists of vital nutrients and provides energy which helps the child to perform better in school and college (Katie A, 2013).

Katie A, has done several examinations on benefits of breakfast on health including weight management, cognitive behavior, student's academic performance and total physical activity, even offered ideas to help food nutrition and health social workers and community to educate people and break down barriers.

It is been said that, the most important meal of the day is breakfast, widely acknowledge by researchers worldwide. It consists carbohydrates which gives good amount of glucose essential for brain function . a regular breakfast consumers are in positive balance of

dietary fiber, carbohydrates and lower amount of fat and cholesterol (Deshmukh-Taskar et al., 2010). The lack of micronutrients can be fulfilled by daily nutritious consumption of breakfast (Balvin F. et al., 2013). Breakfast skippers are approximately 20-60% deficient in B vitamins, Iron and vitamin D (Gibson L, 2013). According to Meyers A. (1989) and Shaw M. (1998) reduced physical activity, apathy, lethargy in young children and in adults could be a casual effect of skipping breakfast. Some studies suggest that physically active individuals are averagely never skip breakfast (Keski-Rahkonen2003).

Adolescents are independent in making their own food choices. Influence of parents may become weak because adolescents think that they are now mature enough. Peer group, media and body image play important role in determining their food choices. Availability of money, time and facilities also influences the type of food they consume.

The positive association was also seen in many studies stated the low frequency of fruits and vegetable consumption in irregular breakfast consumers. this also influenced by family attitude towards meal consumption and pattern (Rasmussen M .2006, Laeson NI. 2007 , Person N .2009).

Now communicable diseases are showing positive association between fruits and vegetable less consumption (Thorsdottir I. 2003,Perichart-Perera O. 2010,Eloranta AM. 2014). Reduction in blood pressure shows association with more than two fruits and vegetable servings (Damasceno MM, 2011; Moore LL, 2005).

Consumption of more than three daily servings of fruits and vegetable were shown inversely association with central adiposity in children (Downs S, 2008). Skipping breakfast or inadequate diet in quality and quantity can increase risk of undernourishment and on the other hand may lead a person to over eat later in the day. Lack of knowledge about its importance, lack of time to prepare breakfast or lacks of appetite in the morning are some of the reasons for persons consuming inadequate breakfast.

Objectives: Assessment   of nutritional status and physical activity pattern of college going students, study the breakfast consumption pattern and examine association between breakfast and physical activity in college going students.

METHODOLOGY

A population sample of Hundred (n=100) college going girls, aged 17 to 21 yrs participated in the study. The sample was divided into Breakfast consuming girls (n=50) and Non-Breakfast consuming girls (n=50).It is a pre-post, intervention study, around one hundred under graduate students aged 17 – 21 yrs from two colleges (Junior college and from senior college) from Mumbai, was selected on the basis of their willingness.

A consent form and study protocol information sheet was given and invited to take height (cm) & weight (kg) measurement session. This study was commenced when, all procedures was verbally explained to the students. Fully filled questionnaire including information regarding age, sex, socio-economic status, fitness, medications, lifestyle, diet pattern and physical activity, travelling mode were collected. Translation of the questionnaires was given importance to avoid miscommunication.

In intervention program following factors were explored by researcher like positive attitude towards healthy eating , importance of physical activity including their barriers and facilitators , health risks associated with obesity , diabetes, weight control, body image, family factors etc.

Inclusion criteria: Only adolescents & young adults. No clinical treatment/ medications. Exclusion criteria: No history of disease condition, or currently on medication.

The study was carried out in Girl's colleges in Mumbai (2015-2017).We evaluated Breakfast eating habits and Physical Activity through Pedometer before and after the educational intervention of both the categories of the sample size. Pedometers were bought from Company Collateral medical (smart solution for informed buyers) and Kosmochem private Ltd. (importers and distributer) for research study

Data collection : A. Tools of Data Collection- for this study tool of data collection are:

1. Diet dairies 2. A well structured questionnaire to gather primary information. 3. Informal purposeful conversation and observation as a tool of data collection for activities, life style, eating habits and other issues.

B. Anthropometric Measurements- participants were invited by researcher with trained team to carry out anthropometric measurements in addition they were given instructions on diet   diary and pedometer. Height and weight were taken in light clothing and without shoes and socks.

Physical activity measurement: it was measured by using pedometer, movement sensor that counts steps. This recorded their daily steps (unit length such as in kilometer/miles) from early morning to bed time. Participants were given instructions to wear pedometer every day throughout the study for a period of 10 months.

C. Dietary assessment- Participants were requested to maintain a diet diary and complete records of all food and drinks consumed over a 7-day period during the regular college days & in holidays. Students mentioned their breakfast during 6am to 9am. This began after physical measurement session at college; all students also given training, to how to fill diet-dairy by giving estimated portions, sizes.
Diet diaries and intake of food was analyzed for total daily energy intake of breakfast.

In this study participants was categorized as a breakfast consumer and breakfast skipper, and their energy intake was compared.

Questions regarding breakfast consumption and physical activity were asked to participants. Pedometer assessment: Total numbers of steps were recorded each day to measure their physical activity level. Even nutritional intervention is also planned to conduct in between the study regarding importance of breakfast and physical activity (pedometer) for this age group. Study funded by University Grants Commission western regional office, Pune, conducted according to the guidance and all procedures involving human participation were approved and ethically approved by Inter System Biomedica

Ethics Committee (ISBEC) , c/o Kasturba Health Society, Sthanakwasi Jain Aradhana Dham, Khandubhai Desai Road, Vile Parle (West), Mumbai, Maharashtra

STATISTICAL ANALYSIS

Data is presented as Mean± SD , frequency (percentage) and analyzed by using SPPS software for Windos (version 16.0,2007, SPSS Inc, Chicago, IL) .one sample T test was used to analyze differences among breakfast eaters and breakfast skippers. Paired sample t teat was used to analyze difference between pre intervention and post intervention values. P value < 0.05 was considered as significant.

RESULTS AND DISCUSSION

This randomized , intervention study was conducted on 100 girls (50 breakfast eaters, 50 non-breakfast eaters) in selected area of Mumbai from June, 2015 to June, 2017 with mean age of 18.2±1.2 years. There was no significant difference seen in the mean age of breakfast eaters (18.8±1.1 years) and non-breakfast eaters (19.0±1.2 years) (P=0.503).

Anthropometric parameters: The mean height of the girls in the current study was 160.3±6.5 cm. Weight pre-intervention was 57.2±8.6 kg, weight post intervention was 57.3±8.6 kg, and BMI pre-intervention was 22.3±3.4 kg/m2 and BMI after intervention was seen 22.3±3.3 kg/m2. **Table 1** gives anthropometric parameters of girls when classified according to consumption of breakfast. As seen in **Table 1**, girls who did not eat breakfast had significantly higher weight than girls who ate breakfast in both groups (P<0.05). There was no significant difference in height of pre-and post-intervention BMI of breakfast and non-breakfast eaters (p>0.05) (**Table 1**). There was no significant difference in weight and BMI post intervention in breakfast eater group (p>0.05), however, both weight and BMI changed significantly post intervention in non-breakfast eaters (p<0.05) (**Table 1**).

Table 1: Anthropometric parameters of girls when classified according to consumption of breakfast

	Breakfast eaters			Non-breakfast eaters		
	Pre-intervention	Post-intervention	P value	Pre-intervention	Post-intervention	P value
Height (cm)	159.3±7.4	--	--	161.3±5.3	--	--
Weight (kg)	55.5±9.2	55.4±9.3	0.058	59.1±7.5*	59.1±7.5*	0.011
BMI (kg/m^2)	21.9±3.9	21.9±3.8	0.052	22.7±2.7	22.7±2.7	0.009

Data presented as Mean±SD * significantly different as compared to breakfast eaters

The mean percentage change in weight was 0.1±0.3% and BMI was 0.1±0.3%. **Table 2** presents percentage change in anthropometric parameters post intervention when classified according to consumption of breakfast. Percentage change in weight was not significant even in Basal metabolic index in both groups (**Table 2**).

Table 2: Percentage change in anthropometric parameters after intervention when classified according to consumption of breakfast

	Breakfast eaters	Non-breakfast eaters	P value
Percentage change in Weight (%)	0.1±0.3	0.1±0.3	0.970
Percentage change in BMI (%)	0.1±0.3	0.1±0.3	0.970

Data presented as Mean±SD

Dietary intake: Nutrient intake, percentage energy from macro-nutrients and percentage of RDA in pre- and in post- intervention was calculated. Pre-intervention, the mean energy intake was 1233±288 kcal/d, protein was 37.4±9.7 g/d, carbohydrates was 158.3±41.6 g/d, fat was 46.8±12.0 g/d, percentage RDA energy was 64.9±15.2%, percentage RDA protein was 68.0±17.7%, percentage iron was 29.5±13.1%, percentage energy from protein was 12.2±2.4%, percentage energy from carbohydrates was 51.5±6.4% and percentage energy from fat was 34.4±4.7%. Post-intervention, the mean energy intake was 1388±329 kcal/d, protein was 43.3±10.0 g/d, carbohydrates was 179.5±52 g/d, fat was 52.1±13.0 g/d, percentage RDA energy was 72.6±17.3%, percentage RDA protein was 78.8±18.2%, percentage iron was 39.3±16.9%, percentage energy from protein was 12.7±2.0%, percentage energy from carbohydrates was 51.8±6.5% and percentage energy from fat was 34.2±4.3%.

Table 3 gives dietary intake of girls when classified according to consumption of breakfast. No difference change is seen in pre-intervention energy, macro-nutrient, iron, RDA energy, RDA protein and percentage energy from between breakfast eaters and non-breakfast eaters pre-intervention (p>0.05) (**Table 3**). Post intervention, non-breakfast eaters had significantly higher energy, macronutrient intake, RDA energy, RDA proteins and energy from carbohydrate as compared to breakfast eaters (p<0.05) also shows the change in RDA Iron intake pre intervention between breakfast and non breakfast eaters that disappeared post intervention (**Table 3**).

In the group of girls who ate breakfast, protein intake, iron intake, RDA protein and RDA iron intake increased significantly post intervention. There was no significant change in energy, carbohydrates, fats, RDA energy and percentage energy from macronutrients post intervention in breakfast eaters (p<0.05).

In group of girls who did not eat breakfast, energy, macro nutrient, iron and RDA intake of all nutrients increased post intervention .However, there was no significant difference seen in the percentage of energy obtained from macro nutrients post intervention in the non-breakfast eater girls(**Table 3**).

Table 3: Dietary intake of girls when classified according to consumption of breakfast

	Breakfast eaters			Non-breakfast eaters		
	Pre-intervention	Post-intervention	P value	Pre-intervention	Post-intervention	P value
Energy (kcal/d)	1209±301	1253±303	0.112	1257±275	1505±308*	0.001

Protein (g/d)	35.5±9.6	39.3±9.3	0.004	39.2±9.6	47.4±9.1*	0.001
Carbohydrates (g/d)	155.2±42.4	164.1±48.7	0.095	161.5±40.9	194.9±51.0*	0.001
Fats (g/d)	46.8±11.9	48.6±12.8	0.191	46.8±12.2	55.5±12.4*	0.001
Iron (mg/d)	5.5±2.8	7.6±3.6	0.001	6.9±2.6	8.9±3.4	0.001
RDA energy (%)	63.6±15.9	65.9±15.9	0.112	66.2±14.5	79.2±16.2*	0.001
RDA protein (%)	64.6±17.4	71.4±16.9	0.004	71.3±17.5	86.2±16.5*	0.001
RDA iron (%)	26.1±13.3	36.1±17.0	0.001	32.8±12.1*	42.5±16.3	0.001
Energy from proteins (%)	11.9±2.4	12.6±1.6	0.064	12.5±2.3	12.8±2.4	0.435
Energy from carbohydrates (%)	51.4±6.1	52.1±6.5	0.630	51.5±6.8	51.6±6.5	0.906
Energy from fats (%)	35.2±4.9	35±4.5	0.812	33.5±4.4	33.4±3.9*	0.816

Data presented as Mean±SD * significantly different as compared to breakfast eaters

Percentage change in dietary intake after intervention

The percentage change in dietary intake post intervention was calculated. The mean percentage change in energy was 13.3±18.4%, protein was 20.0±28.8%, carbohydrates was 15.8±28.6%, fats was 13.5±22.7%, iron was 51.1±73.3%, RDA energy was 13.3±18.4%, RDA protein was 20±28.8%, RDA iron was 51.1±73.3%, energy from protein was 6.4±21.1%, energy from carbohydrates was 1.9±16.8% and energy from fat was 0.8±15.7%. **Table 4** presents percentage change in dietary intake after intervention when classified according to consumption of breakfast. As seen in **Table 4**, there was a significantly higher percentage change in energy, protein, carbohydrates, fats, RDA energy and RDA protein in non-breakfast eaters as compared to breakfast eaters post intervention. There was no significant difference in the percentage change in energy from macronutrients of breakfast and non-breakfast eaters post intervention (**Table 4**).

Table 4: Percentage change in dietary intake after intervention when classified according to consumption of breakfast

	Breakfast eaters	Non-breakfast eaters	P value
Percentage change in Energy (%)	5.2±15.6	21.3±17.5	0.001
Percentage change in Protein (%)	14.3±26.8	25.7±29.9	0.047
Percentage change in Carbohydrates (%)	8.6±28.2	23.1±27.4	0.001
Percentage change in Fats (%)	5.6±21.2	21.3±21.7	0.001
Percentage change in Iron (%)	63.5±86.9	38.7±54.8	0.091
Percentage change in RDA energy (%)	5.2±15.6	21.3±17.5	0.001
Percentage change in RDA protein (%)	14.3±26.8	25.7±29.9	0.047
Percentage change in RDA iron (%)	63.5±86.9	38.7±54.8	0.091
Percentage change in Energy from proteins	9.1±22.1	3.7±20.0	0.209

(%)			
Percentage change in Energy from carbohydrates (%)	2.9±19.3	1.0±11.3	0.535
Percentage change in Energy from fats (%)	0.9±16.3	0.7±15.2	0.952

Data presented as Mean±SD

Number of steps walked each day: Averagely number of steps calculated for students was measured with help of pedometer. Total number of steps in average walked by girls' pre-intervention was 8461±2867 and post intervention was 10530±2530. **Table 5** gives number of steps walked by girls when classified according to consumption of breakfast. Breakfast eaters walked more steps as compared to non-breakfast eaters both pre- and post- intervention .

Table 5: Number of steps walked by girls each day when classified according to consumption of breakfast

	Breakfast eaters			Non-breakfast eaters		
	Pre-intervention	Post-intervention	P value	Pre-intervention	Post-intervention	P value
Number of steps	9268±3088	11302±2724	0.001	7654±2396*	9758±2073*	0.001

Data presented as Mean±SD * significantly different as compared to breakfast eaters

After intervention change in steps: Comparison and analysis shows 31.1±31% Change in steps after intervention. When classified according to consumption of breakfast. However no difference change is seen in percentage change in number of steps post intervention between breakfast and non breakfast eaters(**Table 6**).

Table 6: Percentage change in number of steps after intervention when classified according to consumption of breakfast

	Breakfast eaters	Non-breakfast eaters	P value
Percentage change in number of steps (%)	28.5±31.7	33.7±30.4	0.400

Data presented as Mean±SD

Correlation of physical activity with dietary intake in breakfast eaters: Table 7 presents correlation of number of steps with dietary intake in breakfast eaters. There was a negative correlation of iron intake and carbohydrate intake with number of steps after intervention (**Table 7**).

	Pre-intervention		Post-intervention	
	Pearson R value	P Value	Pearson R value	P Value
Energy	-0.211	0.142	-0.246	0.085
Protein	-0.086	0.554	-0.148	0.306
Carbohydrates	-0.205	0.154	-0.317	0.025

|				
Fats	-0.128	0.375	-0.207	0.150
Iron	-0.362	0.010	-0.038	0.792

Correlation of physical activity with dietary intake in non-breakfast eaters : Table 8 presents correlation of number of steps with dietary intake in non-breakfast eaters. There was a negative correlation of carbohydrate and fat intake with number of steps pre-intervention ($p<0.05$) (**Table 8**).

Table 8: Correlation of number of steps with dietary intake in non-breakfast eaters

|	Pre-intervention		Post-intervention	
	Pearson R value	P Value	Pearson R value	P Value
Energy	-0.387	0.006	-0.185	0.198
Protein	-0.220	0.125	-0.062	0.670
Carbohydrates	-0.316	0.025	-0.083	0.566
Fats	-0.277	0.051	-0.210	0.144
Iron	-0.158	0.272	0.028	0.850

Figure 1: presents percentage of girls who were breakfast eaters v/s non-breakfast eaters. As seen in the **Figure 1**, 50 % girls were breakfast eaters whereas 50% girls were non-breakfast eaters.
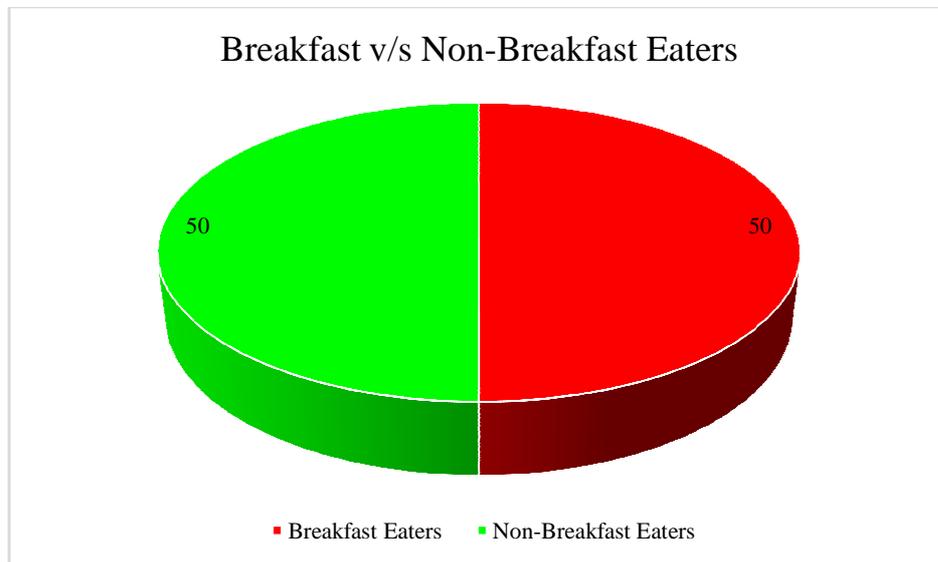
Data presented as percentage

Religion: Of the 100 girls, 55 girls were Hindu, 38 girls were Muslim, 6 girls were Christian and 1 girl was Buddhist. **Figure 2** gives the religion of girls when classified according to breakfast consumption. In both the groups, highest percentage of girls were Hindus followed by Muslims (**Figure 2**).

Figure 2: Religion of girls when classified according to breakfast consumption

Religion of Participants

Legend: Hindu, Muslim, Christian, Buddhist
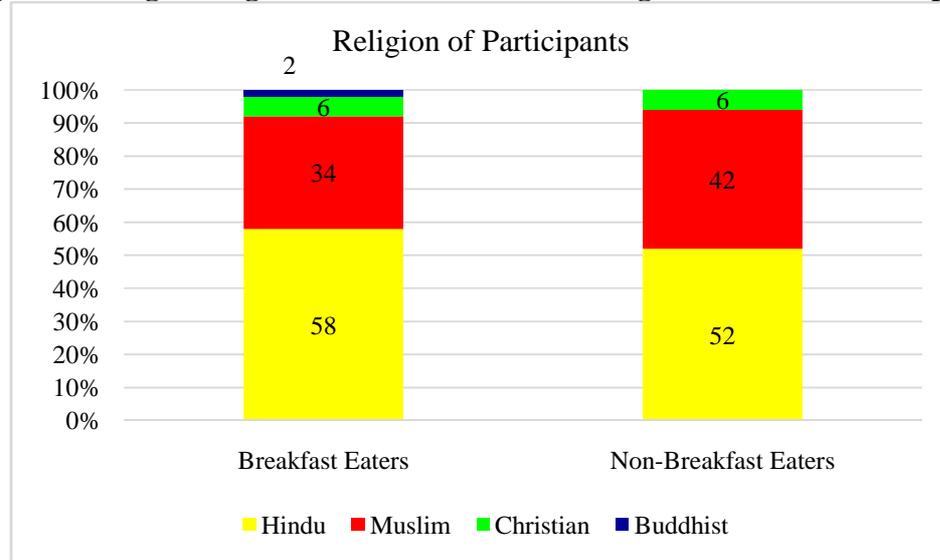
Data presented as percentage

Type of family:

Of the 100 girls, 52 girls were from nuclear family, 40 girls were from joint family, 7 stayed alone and 1 was from extended family. **Figure 3** gives percentage of type of family when classified according to breakfast consumption. As seen in **Figure 3**, higher percentage of breakfast eaters were from nuclear families whereas high percentage of non-breakfast eaters were from joint families.

Figure 3: Type of family when classified according to breakfast consumption

Type of Family

Legend: Nuclear, Joint, Extended, Alone
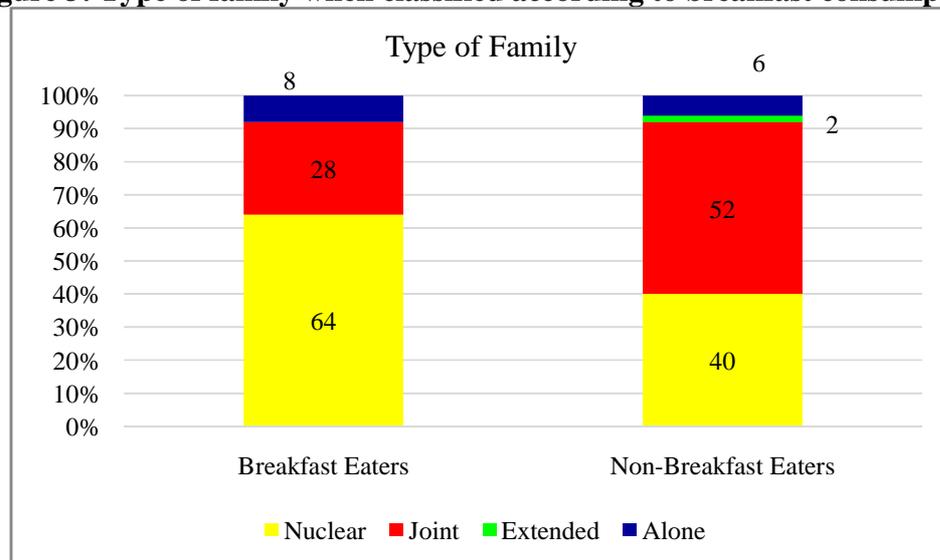
Data presented as percentage

Number of working hours: Of the 100 girls, 4 girls worked for 4 hours, 7 girls worked for 5 hours, 47 girls worked for 6 hours, 14 girls worked for 7 hours, 21 girls worked for

8 hours whereas 7 girls worked for 9 hours. **Figure 4** gives number of hours the girls worked for when classified according to breakfast consumption. As seen in **Figure 4**, higher percentage of girls from both groups worked for 6 hours.

Figure 4: Number of working hours of girls when classified according to breakfast consumption
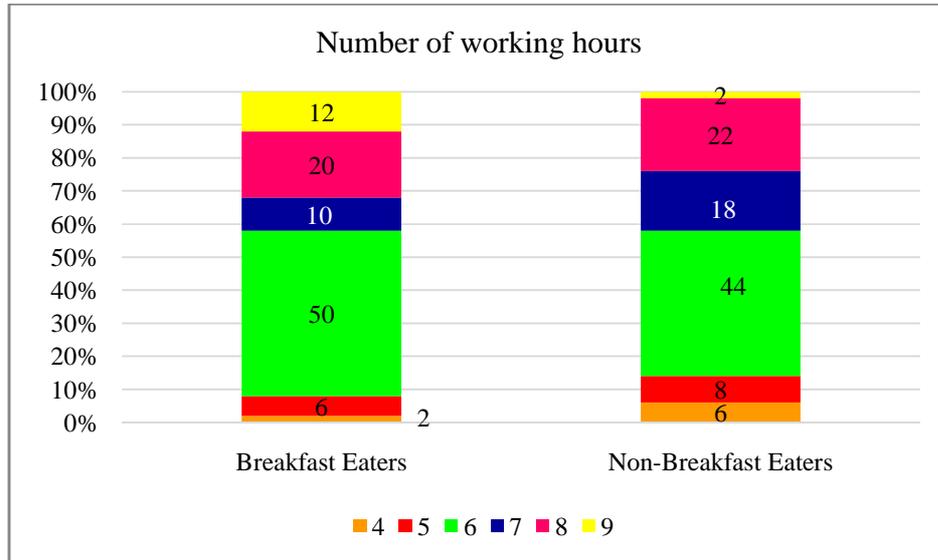
Data presented as percentage

Travel mode: Of the 100 girls, 55 girls travelled by bus, 39 girls travelled by train and 6 girls used other travel mode. **Figure 5** gives travel mode of girls when classified according to consumption of breakfast. As seen in **Figure 5**, similar percentage of breakfast and non-breakfast eaters travelled by bus and train.

Figure 5: Travel mode when classified according to breakfast consumption
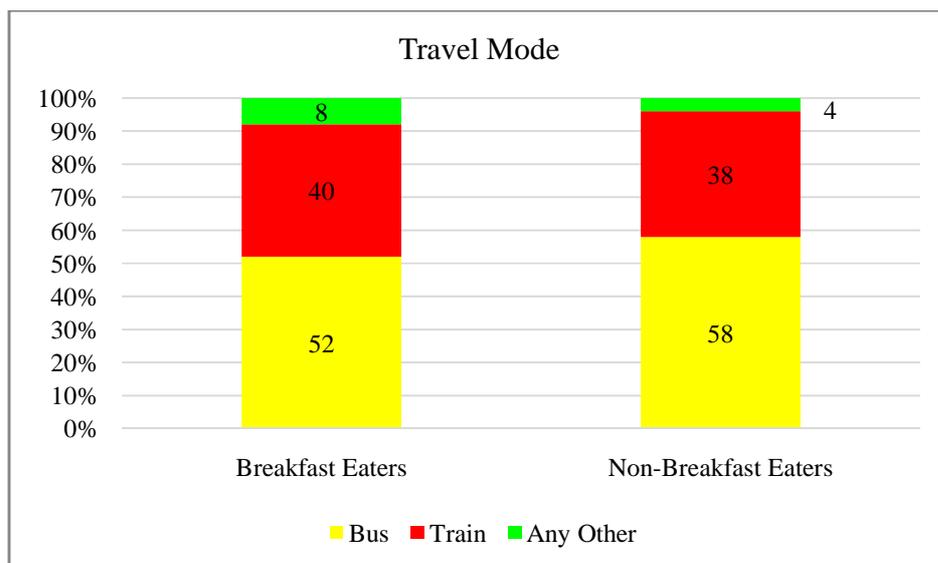
Data presented as percentage

Type of activity: Pre-intervention, from the 100 girls, 68 walked, 14 ran, 5 did yoga, 10 did exercise and 3 were engaged in other physical activity. Post intervention, from the 100 girls, 54 walked, 12 ran, 10 did yoga, 21 did exercise and 3 did other physical activity. **Figure 6** gives type of activities done by girl when classified according to breakfast consumption. As seen in **Figure 6**, in breakfast and non-breakfast eaters, percentage of girls walking decreased and those was performing other activities increased post intervention.

Figure 6: Type of activity when classified according to breakfast consumption
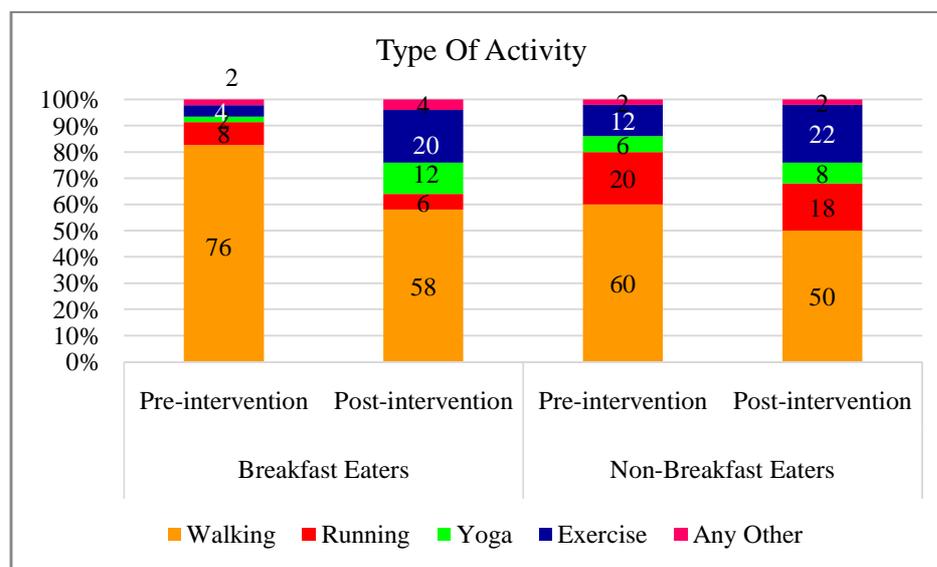
Data presented as percentage

We conducted randomized controlled study to evaluate association between breakfast eating pattern and levels of physical activity of college going girls. Post intervention in the study, non-breakfast eaters had significantly higher energy, macronutrient intake, RDA energy, RDA proteins and energy from carbohydrate as compared to breakfast eaters. In the group of students who ate breakfast, protein intake, iron intake, RDA protein and RDA iron intake increased significantly post intervention. In a group of college going students who did not eat breakfast, energy, macro nutrient, iron and RDA intake of all nutrients increased in post intervention.

Breakfast skipping is quite common in college going students. Easy access to popular, tasty foods, unhealthy food items, which soon become a part of their behavior, can result in wide range of health problems Such as overweight, obesity, high blood pressure, insulin resistance, diabetes, poor immune. The whole family should have balanced diets and goal should be to ensure Childs proper growth, maintenance and development. This is a right age for establishment of good food habits. Parents, schools and media all together can help in this regards and bring more favorable results in developing good food habits.

There was a significantly higher percentage change in energy, protein, carbohydrates, fats, RDA energy and RDA protein in non-breakfast eaters as compared to breakfast eaters post intervention

Students pre-intervention walked 8461±2867 steps and post intervention was 10530±2530. **Table 5** gives number of steps walked by girls when classified according to consumption of breakfast. Breakfast eaters walked more steps as compared to non-breakfast eaters both pre- and post- intervention.

CONCLUSION

This study explored that there is a strong association between breakfast consumption and an increased physical activity (steps) in regular breakfast eaters who participated in the study strongly believed that breakfast is an important meal of the day. Regular breakfast consumption increases macro nutrients in the diet and a habit of healthy food choices

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