



## Fruit Consumption Pattern and its Determinants among College Going Girls in Alappuzha

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### Abstract

*A joint WHO/FAO expert consultation report on diet, nutrition and prevention of chronic diseases sets population nutrient goals and recommends intake of minimum gram of 400 g of fruits per day. Fresh fruits are rich sources of micronutrients and macronutrients with myriad of health benefits. The study aims to find the fruit consumption pattern and awareness among college going girls. Majority (68.57%) were not having daily consumption of fruits as influenced by family fruit intake, income and level of education. Majority (51.42%) were only having 50-60g of fruit/day which was far below the RDA indicating their poor nutritional status and serious concern. More girls (51.4%) were preferring citrus fruits due to its juiciness. Body fat and fruit intake was negatively correlated. Banana was the most commonly consumed fruit as it is economical. The major determinants influencing fruit consumption among college going girls was found to be convenience (28.57%), taste (25.71%), price (17.14%) colour (8.57%) and smell (5.71). 42.85% girls were not having awareness on nutritional benefits of fruit intake which suggests the need for intervention programmes in future.*

**Key Words:** *Fruit consumption, college girls, determinants, frequency, awareness*

### I. Introduction

Fruits are an important element of a healthy, balanced diet, be it as a part of a main meal or as a snack. They are a rich source of vitamins, minerals and fibre, energy and phytochemical [1] Epidemiological studies have shown that high intake of fruits is associated with lower risk of chronic diseases, particularly, cardiovascular disease [2] also type 2 diabetes and certain cancers of mouth, pharynx, larynx, oesophagus, stomach and lungs [3].

Insufficient consumption of fruits was among the risk factors recognized as contributing to worldwide non communicable disease burden [4]. The health benefits of fruits seen in epidemiological studies are the main reasons for the recommended intake of at least 400 g of fruits per day. During adolescence several factors impact on chronic diseases: the development of risk factors, the tracking of risk factors throughout life, and the development of healthy or unhealthy habits that tend to stay throughout life [5]. Because of this, increasing fruit consumption among children and adolescents is an important public health issue [6].

It was reported that over one-third of the adolescents eat fruits rarely or never. The strongest determinants for fruits intake were availability at home, parental modeling, demanding family rule, knowledge of recommendations, positive self-efficacy, positive liking, preference and demand. Increasing consumption of fruit is a practical and important way to reduce disease risk and maximize good health. The very low consumption of fruits by adolescents is of considerable concern, in terms of their current health and nutritional status, as well as the increased risks of a range of health problems.

In spite of the importance of an adequate intake of fruits during adolescence, large population groups, including children and adolescents in most Asian countries [1] eat far less than the recommended amount of fruits. It is important to promote a high intake of fruits in childhood as dietary habits acquired in early life may have a great impact on long-term health status [6]. Only few studies have examined fruit intake and its correlates among college going girls in Alappuzha. In addition to that promotion of fruits based recipe and intervention programmes has been proved to be successful for promoting eating fruits for keeping healthy [8]. Hence the present study was conducted on "Fruit consumption pattern and its determinants among college going girls in Alappuzha".

## **II. Materials and Methods**

A total of 250 college girls of age group 17-20 years were selected by random sampling from colleges of Alappuzha. Approval for conducting the study was obtained from the management and verbal consent was taken from each respondent. College going girls were selected randomly from each class. Questionnaire was used to elicit information from college girls regarding personal data, anthropometric measurements, fruit consumption pattern determinants of fruit consumption among college girls. The questionnaire was pre-tested on samples before finalization and fruit frequency. Questionnaire was used to check the awareness on fruit consumption and administration.

An automatic body composition analyzer was used to measure the weight of the college girls. A stadiometer was used to measure the height of the subjects. They were allowed to stand erect on the stadiometer in such a way that the hair of the subjects should touch the head plate. The values were recorded in centimeters. Height and weight are used to indirectly assess under nutrition and over nutrition.

To measure the body composition of the subjects a standard white glass body composition analyzer was used. The body fat percentage of a human being is the total mass of fat divided by total body mass which is a measure of the fitness level. The body water percentage and Bone Mineral Density is an important measure of good health. The information on the fruit frequency pattern, fruit intake and awareness on fruit consumption of the subjects was also carried out.

After the survey the collected information was reviewed, coded, classified, tabulated and results were analyzed. Simple statistics namely mean and percentage analysis were used for the present study.

## **III. RESULTS AND DISCUSSION**

### **A. Demographic profile of college going girls**

*Table I. Age wise distribution of college going girls*

SL NO	Age(Years)	Number	%
1	17-18	107	42.85%
2	19-20	143	57.14%

Table I shows that 57.14% of them belonged to the age group 19-20 years and 42.85% of the subjects belonged to the age group 17-18 years. Fruit and vegetable intake is an important part of a healthy diet and is associated with numerous positive health outcomes. Fruit consumption is determined by an individual's age, sex, and physical activity level. As age advances fruit intake increases whereas in elderly the consumption will be decreased [10].

**Table II. Income wise distribution of college going girls**

SL NO	Income	Number	%
1	Low	79	31.4%
2	Middle	172	68.57%
3	High	0	0

Table II reveals that majority (68.57%) of the college going girls were of middle income group and only (31.4%) were of low income group. There were no respondents from high income group. Economic variables, such as individual income may influence the intake of fruits. High income could also indicate a better access to nutrition information compared to lower income households [11].

**Table III. Educational level distribution of family of college going girls**

SL NO	Educational Level	Number	%
1	SSLC	129	51.42%
2	Predegree	65	25.71%
3	Degree	42	17.14%
4	Graduation	14	5.71%

Table III demonstrates that 51.42% of the family were having SSLC degree, 25.71% were having Pre-degree qualification and 17.14% were degree holders and only 5.71% were graduates. Every family members of the respondents were having basic education. Studies have revealed that higher income resulted in equally higher consumption of fruit at all educational levels, that is, similar among those with low, intermediate and high education [12].

## **B. Anthropometric Profile of college going girls**

**Table IV. Mean height, weight and BMI of college going girls**

SL NO	Mean Height (cm)	Mean Weight (Kg)	Mean BMI
1	157.88 ±3.6	47.65± 5.3	18.93±3.4

Table IV reveals that mean height of the selected college going girls was 157.88 cm, mean weight was 47.65 Kg and mean BMI was 18 which indicates the poor nutritional status.

**Figure I. Nutritional Status of college going girls**

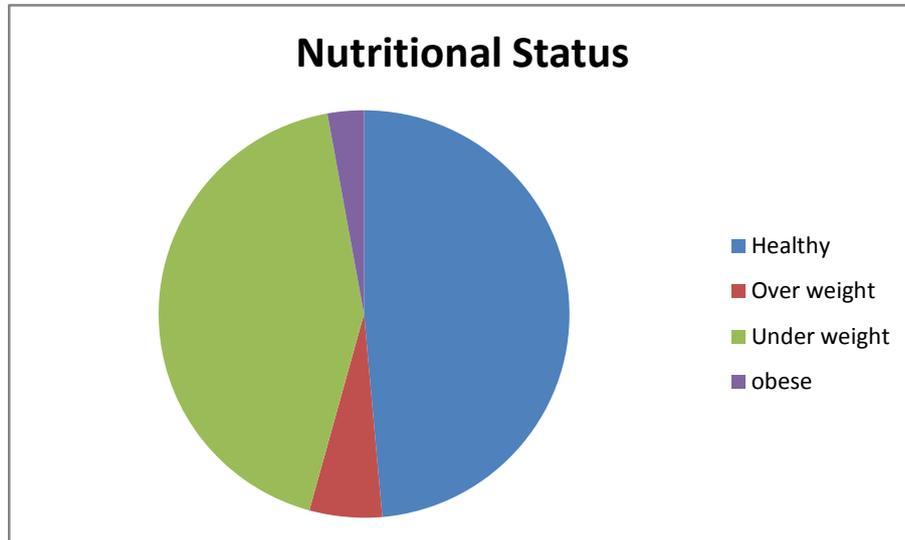


Figure I shows that 42.85% of selected college going girls were under weight. 48.75 % of college girls were found to be healthy. Only 5.7% of the college girls were overweight and 2.85% were obese. Since most of the girls are coming from coastal area hailing from middle income may be the reason for undernourishment. The results indicates that majority of college girls are not having a balanced diet. There is a positive correlation between fruit intake and body weight [13].

### C. Body Composition profile of college going girls

**Table V. Mean Body Water, Body Fat and Bone Mineral Density of college going girls**

SL NO	Body Fat (%)		Body Water (%)		Bone Mineral Density(g/cm <sup>2</sup> )	
	Mean	Normal Value	Mean	Normal Value	Mean	Normal Value
1	17.13	8-12%	63.23	45-60%	2.42	1.083±0.087

Table V depicts that mean body fat was high (17.13%) among college girls, whereas Mean body water (63.23%) and bone mineral density (2.42g/cm<sup>2</sup>) was found to be adequate. A negative correlation is found between body fat and fruit consumption in some studies (Enuah & Hyun, 2014). The body fat percentage is a measure of fitness level, since it is the only body measurement directly calculate a persons relative body composition. Adolescence, characterized by change in height, weight and body composition is also crucial period of bone mineral accrual. Approximately 40% of peak bone mass is accumulated during adolescence [14].

#### **D. Fruit consumption pattern of college going girls**

*Table VI. Fruit Intake of College Going Girls*

SL NO	Fruit Intake	Number	%
1	Yes	229	91.4%
2	No	21	8.57%

Table VI shows that fruit intake was found among majority (91.4%) of college girls. Only 8.57% were not having the habit of fruit consumption. Children and adolescents are victims of unhealthy behaviors: poor nutrition, insufficient daily fruit, vegetables consumption excessive high dense food intake, inactivity, smoking [15].

*Table VII. Daily Fruit Consumption Pattern of College Going Girls*

SL NO	Daily Consumption Pattern	Number		%	
		Yes	No	Yes	No
1	Daily	11	24	31.42%	68.57%

Table VII reveals that majority (68.57%) of college girls were not having daily consumption of fruits. Only 31.42% were having fruits daily. It has been observed that nearly half the study population doesn't realize the potential health benefits of consuming fruits on a daily basis, and about ¼ of the study population doesn't believe it is important to consume fresh fruits[16].

**Figure II. Mode and Location of Purchase of Fruits**

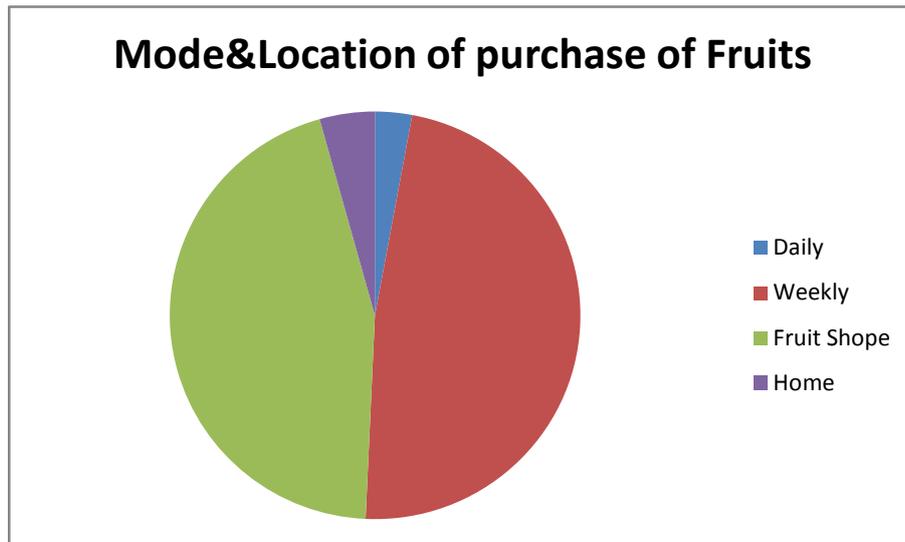


Figure II demonstrates that majority (94.28%) were having fruit consumption on weekly basis. Only 5.71% had fruits daily. 88.57% purchased the fruits from fruit shop whereas only 8.57% had the fruits at home.

**Figure III. Meal Preferred For Fruit Consumption**

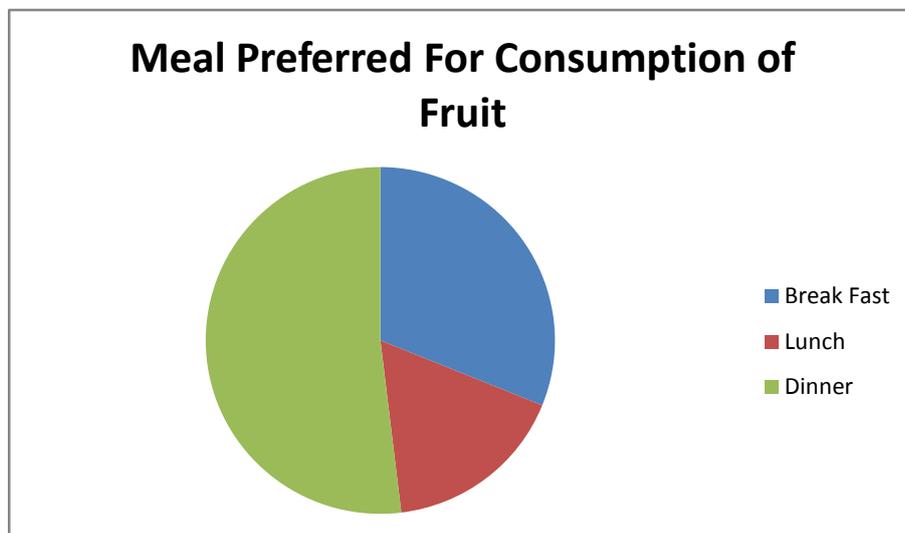


Fig III shows that most of the college girls preferred having fruits at dinner, 31.42% for breakfast and only 17.14% preferred fruits for lunch which may be due to convenience in eating. female students were more likely to eat during lunch and dinner and they prefer eating a fruit instead of a dessert at lunch or dinner and during breakfast [17].

Figure IV. Type of Fruit Consumed

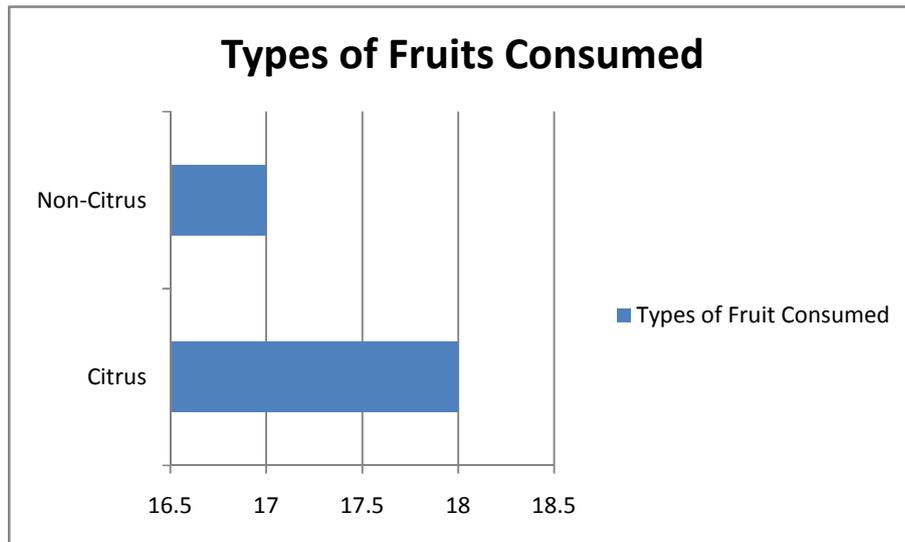


Fig IV reveals that 51.4% of college girls had citrus fruits whereas 48.57% had non- citrus fruits. The consumption of citrus and non- citrus fruits were found to be almost similar. During summer season the subjects loved to eat citrus fruits as they were considered more juicy than non- citrus fruits.

Figure V. Quantity of Fruit Consumed

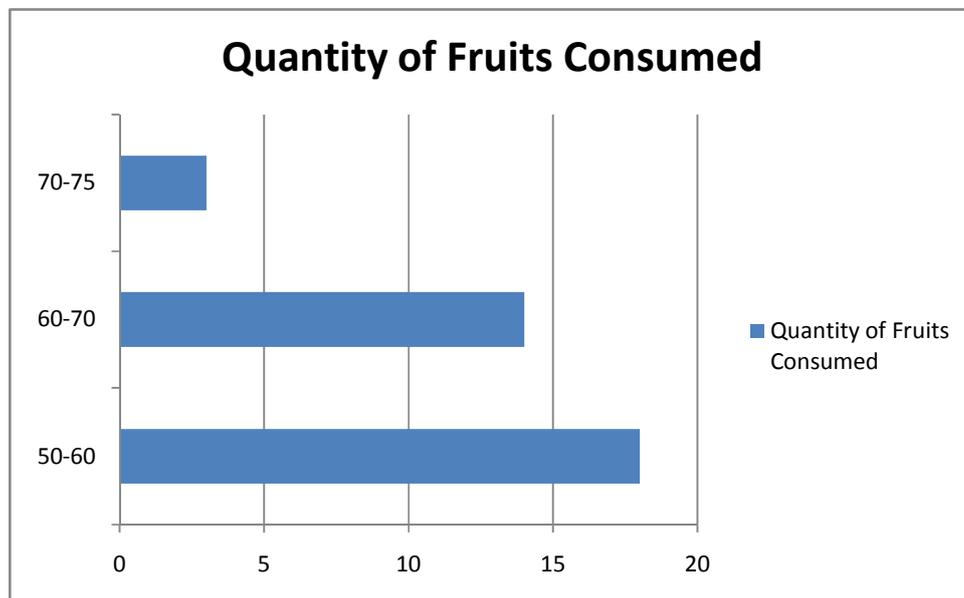


Fig V demonstrates that 51.42% of college girls were only having 50-60 g of fruits which was far below the RDA of 400g. 40% consumed 60-70 g of fruits which was below the RDA. Only 8.57% girls consumed 70-75g of fruits or five a day meal. WHO recommends 400g of fruits a day (WHO, 2003). Campaigns now advice people to eat 5 portions of fruit daily adopting the well known message of “5 A DAY” initiated in the US and extended to several countries [18].

**Table VIII. Mode of Fruit Purchase and Consumption**

**\*Multiple Responses**

SL NO	Type of fruits purchased and consumed	Number*	%
1	Fresh/whole fruit	157	62.85%
2	Cooked	0	0%
3	Dry	7	2.85%
4	Fruit Juice	79	31.4%
5	With Other Dishes	43	17.14%
6	With Seed and Stem	172	68.57%

Table VIII shows that 62.85% of college girls purchased the fruits as fresh. 31.4% were having fruits in the form of juices. 17.14% of girls had fruits with other dishes and 68.57% were having fruits with seed and stem. No one were having fruits in cooked form.

### E. Determinants of fruit consumption among college going girls

*Figure VI. Factors influencing selection of fruits*

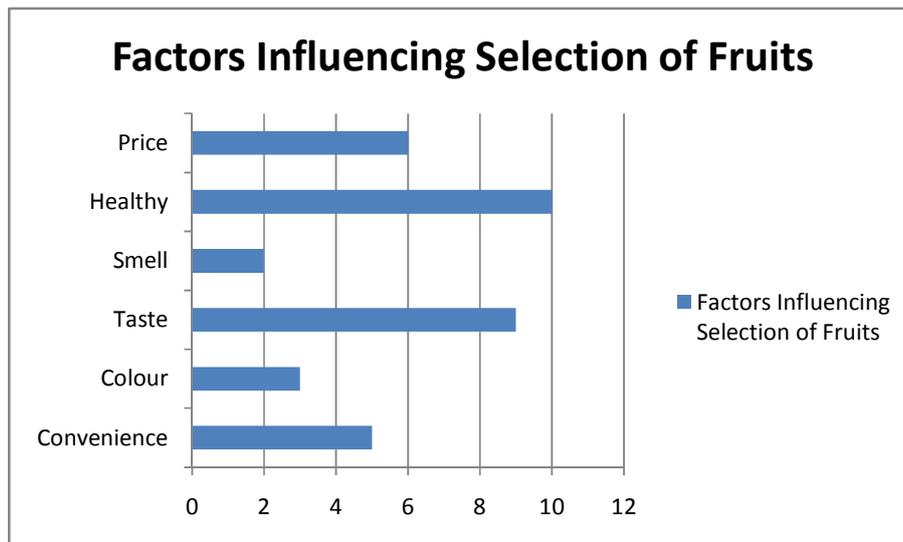


Fig VI depicts that factors influencing selection of fruit considered mainly by college girls were convenience, color, taste, smell, health and price. Among these determinants of fruit consumption 28.57% preferred fruits because of their health benefits. 25.71% gave importance to taste of fruits, 17.14% to price, 14.28% to convenience and 8.57% and 5.71% to color and smell respectively. The main factors influencing fruit consumption was found to be health, taste, price and convenience.

The determinants namely income of the family, education of the family, occupation of family and body composition is found to be dependent on fruit consumption. Among adolescents and adults, fruit and vegetable consumption was positively related to income. Lower-income groups consumed a smaller variety of fruits than their higher-income counterparts. Fruit and vegetable variety did not vary by income among adolescents. Lower-income adults expressed less desire to increase their fruit consumption, and were more likely to report that price and storage were barriers to doing. Socio-economic differences in consumption and variety were more apparent for adults than for adolescents [19]. The adiposity decreases as the fruit consumption increases. Here, the people with low body fat had greater consumption of fruits than people with greater adiposity.

Fruit frequency questionnaire reveals that the fruit daily consumed by majority (40%) of subjects is banana and the fruits which are least consumed are apricot, fig and litchi. Apple, orange, mango, are frequently consumed. Orange, papaya and apple were found to be consumed 34.2%, 31.4%, 25.7% respectively by college girls weekly. Fruits like papaya(31.4%), guava(28.5%), orange(22.8%), apple(17.1%), pineapple(22.8%), passion fruit(22.8%), jackfruit(22.8%) were found to be consumed by the girls monthly. Fruits like

plum, strawberry, pomegranate, litchi, fig and apricot were never consumed by the girls. Lime was consumed by 60% of girls especially in summer due to its refreshing and cooling aspect. The results showed that the fruit mainly consumed was banana indicating that price was the most important determinant in fruit consumption. Costly fruits were never consumed by the girls indicating the strong interrelationship between fruit intake and income level. Instead of having favorite fruit the fruit intake was mainly dependent on convenience and price.

## **F. Awareness on fruit consumption among college going girls**

*Table IX. Awareness on fruit consumption among college going girls*

SL NO	Health benefits of fruit consumption	Number	%
1	Aware	15	42.85%
2	Not aware	20	57.14%

Table IX reveals that 57.14% of the college girls were not aware of significance of fruit consumption whereas 42.85% of girls were aware of importance of fruit consumption. Nutrition knowledge is one of the key factors to improving eating behavior for health and overall wellbeing in adults [20]. A number of studies were conducted to assess the nutritional knowledge of fruits among college girls. Among the medical students of South India [1], it was found that most of the medical students have good nutritional knowledge but it is not directly proportional to their intake of fruits.

*Table X. Awareness of fruit consumption among college going girls*

SL NO	Query	Aware		Not Aware	
		Number	%	Number	%
1	Citrus fruits are not good for health	11	31.42	24	68.5
2	Eating an apple a day keeps the doctor away	28	80	7	20
3	Fruits are rich in potassium	23	65.7	12	34.28
4	Fruits promote digestion	33	94.28	2	5.7
5	Fruits provide dietary fibre	33	94.28	2	5.7
6	Fruits prevents constipation	33	94.28	2	5.7
7	Fruits are rich in antioxidants	30	85.71	5	14.28
8	Fruits provide satiety	26	74.28	9	25.7
9	Fruits are rich in Vitamin C	15	42.85	20	57.14
10	Whole fruit is better than fruit juice	13	37.14	22	62.85
11	Seasonal fruits are not having high nutritive value	11	31.42	24	68.57

12	Fruits are rich in vitamins & minerals	33	94.28	2	5.7
13	Classification of fruits	15	48.85	20	57.14
14	Cosmetic value of fruits	15	48.85	20	57.14
15	RDA of fruits	5	14.28	30	85.7

Table X demonstrates that only 31.42% of college girls were aware on the importance of citrus fruits on health. 65.7% were having awareness that fruits are rich sources of potassium. Majority (94.28%) were having awareness that fruits promotes digestion, provides dietary fibre and is good for relieving constipation. 85.71% were having knowledge that fruits are rich in antioxidants. 74.28% were knowing that fruits provide satiety. 57.14% were not aware that fruits are rich in Vitamin C. Only 37.14% agreed that whole fruit is better than fruit juice. 68.57% were not aware of nutritional significance of seasonal fruits. 94.28% agreed that fruits are rich sources of vitamins and minerals. Only 48.85% were aware of the classification and cosmetic value of fruits and 14.28% were only aware regarding the RDA of fruits.

#### IV. Conclusion

Fruits provide a diversified, flavored, colorful, tasty, low caloric, and protective, micro-nutrient rich diet. The dietary habits of young adults is in lime light as this group is in transition from adolescence to adulthood and are potential to influence health status of the next generation. Low Fruit intake is considered as the sixth main risk factor for mortality in the world [21]. In the present study the fruit consumption among college going girls was found to be insufficient (60g) than the recommended intake. Majority of the college going girls were of middle income group and only few percentage were of low income group. Higher income resulted in equally higher consumption of fruit at all educational levels and less fruit intake was associated with reduced weight among college going girls which indicates that majority of college girls are not having a balanced diet.

Majority of the college girls were not aware of significance of fruit consumption in terms of RDA, health benefits and satiety. Several factors namely age, sex, education, occupation, family modelling, convenience, health, price and taste were found to influence fruit intake. The daily consumption of fruits and awareness regarding fruit consumption was found to be less. The main factor influencing fruit intake was found to be convenience and price. The fruit consumption was found to be positively associated with BMI and body composition mainly body fat and body water. In addition to increasing the consumption of fruits among the general population, nutrition interventions, programmes, popularization of recipes based on fruits and policy aiming to improve diet should target adolescents from low socio-economic groups and the strategies should address price and storage barriers.

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