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Consumption Pattern of Micronutrient Rich Foods to Fight Corona Virus

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Abstract: ***Frequency of fruits and vegetable consumption is collected as they are rich sources of micronutrients and antioxidants necessary to build immunity. Semi structured questionnaire was used for collection of data. Two hundred and thirty middle-income families were randomly selected from Hyderabad. Demographic profile and frequency of consumption of fruits and vegetables was collected. Religion wise, Hindus and Muslims constituted 87.5 and 81.5 percent respectively Majority are nuclear families, 85.7 percent in Hindus and 14.3 percent in Muslims. Respondent's age ranged between 20-80 years. Fruit consumption pattern was reported considering Hindus and Muslims as one group as the differences are not significant. Among the regularly available fruits, apple is consumed by 17.4 daily, being highest percent and lowest is for guava 0.8 percent. Among the imported fruits, strawberry is consumed by 0.8 percent daily.IN the seasonal fruits group 6.5 percent took custard apple daily while lowest of 0.4 percent was for grapes and wood apple. Of the eleven fruits listed jackfruit, watermelon, mango and gooseberry are not taken daily but are consumed in greater percentage at other times in the season. Among root vegetables seven are listed and carrot is consumed by 7.8 percent, Potato and radish are consumed by 0.4 percent daily. Colacasia., sweet potato and yamare not consumed daily. Comparing the overall consumption of fruits, root vegetables and green leafy vegetables daily consumption in all categories is very low which is 6.1, 2.6 and 11.7 percent respectively. Conclusion is that there is a need to think of NUTRITION SECURITY by making fruits and vegetables accessible to all categories of people at affordable prices.***

Keywords: Micronutrient, Vitamins, Minerals, Consumption pattern, Nutrition Security

1. Introduction

Fruits and vegetables are considered most important because of high concentration of dietary fiber, vitamins, minerals, electrolyte's and more recently phytochemicals especially antioxidants.(**1**) Most dietary guidelines, recommend consumption of 2 servings of fruits and three servings of vegetables per day (2.3). Despite an increasing focus on the health benefits, intake of fruits and vegetables continue to be below RDA among adults. (4, 5). Purchasing there commended amount would require a substantial proportion of household income, making fruits and vegetables unaffordable in many low income and middle income countries. Policies that enhance the affordability of fruits and vegetables are crucially needed to meet these recommendations. A large population of India doesn't earn as much to fill their diet with fruits and vegetables. Root cause is poverty and price hike. Fruits are a luxury item for many. (6.**)**. A lower intake of fruits and vegetables is largely determined by dietary choice of individuals in India, which leaned towards cereals. Ironically, in a large vegetable country like India, fruits and vegetables account for only 9 percent of total calorie intake (7).The changing lifestyles, increase in socio economic status, availability of a variety of foods changed consumption patterns. In the present context of corona virus, building immunity is important which can be achieved by consumption of fruits and vegetables above requirements. (8) This study is planned to study the frequency of consumption of fruits and vegetables, in Hyderabad, so that ameliorative measures can be planned if required.

2. Methodology

To assess the frequency of consumption of fruits and root vegetables 230 families were randomly selected from middle income group. Market survey was done to list fruits and vegetables available in the market throughout the year, imported fruits, seasonal fruits and duration of availability are collected. To determine the frequency of consumption of foods a semi structured questionnaire was prepared in English and was pretested in a group of 10 adults, as the main study group are adults. Demographic profile consisting of region, age of the respondent, type of family, type of diet, and family size was collated. Data is presented as percentages.

3. Results and Discussion

The responses obtained from the families are presented as demographic profile and consumption pattern of fruits and root vegetables.

Demographic Profile: Most of the families are nuclear (85.7 percent), joint families are 2.3 percent, extended families or families with one of the in-laws are to the tune of 14.3 percent. (Table 1) 85.7 percent are non-vegetarians while only 14.3 percent are vegetarians. Hindus constituted 76.5 percent and Muslims 23.5 percent.

Age of respondents ranged between 20-80 years. (Table 1). Majority (81.7 percent) are in the age groups between 21-50 while those below 20 years are 2.6 percent and above 51 years 15.7 percent.

Table 1: Type of family

Type of family	Hindus	Muslims	Total
Nuclear	87.5 (154)	81.5 (44)	86.1 (198)
Joint	2.3 (4)	11.1 (6)	4.3 (10)
Extended	4.5 (8)	1.9 (1)	3.9 (9)
One of -In law	5.7 (10)	5.5 (3)	5.7 (13)
Total	100 (176)	100 (54)	100 (230)

Total number of members in each family varied from two to 10 members. (Table2). Most of them are with three, four or five members indicating one or two children per family. Hindu families with more than seven members are joint families, in Muslim families are those with more than seven members are nuclear families.

Table 2: Age wise Distribution of Respondents

Age in Years	No	Percent
<20	6	2.6
21- 30	58	25.2
31-40	68	29.6
41-50	62	26.9
51-60	26	11.3
61-70	8	3.5
71-80	2	0.9
	230	100

Number of members in each family ranged between 2-10 members (Table 3). Families with 3 and 4 members are more among Hindus, the percentages are 25.6 and 34.6 respectively. Among Muslims highest percentage is seen among 4 and 5 members the percent is 37.1 and 29.6 respectively. In the categories of 8, 9 and 10 members there is 1 family each among Muslims and none among Hindus.

Table 3: Family Size of Respondents

No of persons	Hindus		Muslims		Total	
	%	No	%	No	%	No
2	14.2	25	7.5	4	12.6	29
3	25.6	45	9.3	5	21.7	50
4	34.6	61	37.1	20	35.3	81
5	22.7	40	29.6	16	24.3	56
6	1.7	3	9.3	5	3.5	8
7	1.1	2	1.8	1	0.9	2
8	0	0	1.8	1	0.4	1
9	0	0	1.8	1	0.4	1
10	0	0	1.8	1	0.9	2
	100	176	100	54	100	230

Consumption of fruits: Consumption of fruits is discussed under three heads –
(1) Regularly available fruits (2) Imported foods (3) Seasonal fruits

Regularly available fruits: Apple and banana are available throughout the year. Highest percent consuming daily is by 17.4 and 16.9 percent respectively. Among other fruits, pomegranate is taken by 6.1 percent, guava 0.8, lemon 3.5 and orange 1.3. Sweet lime and papaya are not consumed daily(Table 4) Majority said most often, this percentage ranged between 13.9 (banana) to 73.4 (sweet lime). Those who don't consume apple are 0.4 and guava by 18.3 percent, the reason apple, they do not like and guava as it is difficult to digest. The remaining took either on alternate days, twice a week or once a week.

Consumption of imported fruits as listed by respondents is given in Table 5. Three foods Avocado, Litchi and Straw berry were listed, of them avocado and litchi was not consumed daily, straw berry was consumed by two of them. Nearly 60 percent consumed all imported fruits. Frequency of intake depended on likes and dislikes or advice by elders of the house.

The craze for consumption of seasonal fruits is more as they are available only for three months in season. (Table 6).Highest percentage consuming mango during season is 80.4 followed by muskmelon 75.2 and watermelon71.2. All other fruits listed are consumed but at varying frequencies.

Consumption pattern of micronutrient rich fruits and vegetables: comparison is made between frequency of consumption of fruits, root vegetables and green leafy vegetables (Table8). ICMR recommends fruits and vegetables to be consumed daily and in specified quantities, but the daily consumption of fruits was by 2.6 percent, root vegetables by 1.3 percent and green leafy vegetables by 1.7 percent, these frequencies pertain to the entire family and not individual consumption, which indicates that individual consumption will much lower. Other families chose either on alternate day, twice a week, once a week or most often.

The main concern is the low percent of people taking fruits and vegetables which are the main sources of micronutrients like Vitamin A, B, C and E. If this trend continues coupled with the corona virus causing a threat to health, risk is double fold. World health Organization and Indian Council of Medical Research from time give Recommended Dietary Allowances to meet growth and development, protection against infection–immunity, for functioning of various organs and for the daily activity. WHO specified 5 servings of 80 grams each for vegetables and fruits. Of them three servings (240g) are for vegetables and two (160g) for fruits. While ICMR specified 300gm per day, 100g for fruits and 200 g for vegetables which includes green leafy vegetables, roots and tubers and other vegetables. A report published in 2017(9) estimated the GLV intake as 24g/cu/day, while in the combined state of Andhra Pradesh it was 7g/cu/day. In the present study also there is not much change.

Recent recommendations from a group of experts is to take an additional quantity of micronutrients apart from the recommended dietary allowances so that immunity can be built and threat to corona virus can be decreased.(8)

Table 8: Daily Comparison of fruits and vegetables

Frequency	Daily Consumption	
	%	No.
Fruits	6.1	14
Roots	2.6	24
Green leafy vegetables	11.7*	27

Ref13.*

4. Conclusion

Education programs are necessary. Policies that enhances the affordability of fruits and vegetables are needed to meet these recommendations. The report on India Phytonutrient Report 2016 highlights a number of regulatory issues related to Agricultural Product Marketing Com (APMC) Act and consumer protection, which if rectified can support an efficient supply and help to increase the consumption of fruits and vegetables(7). If these measures are addressed, India can ensure definitely Nutrition Security apart from food security.

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Table 4: Consumption of Regularly Available Fruits

S. No		Daily		Alternate day		2/week		1/week		Most often		Never		Total	
		%	No	%	No	%	No	%	No	%	No	%	No	%	No
1	Apple	17.4	40	19.1	44	16.9	39	27.4	63	18.7	43	0.4	1	100	230
2	Banana	16.9	39	15.7	36	19.1	44	25.7	59	13.9	32	8.7	20	100	230
3	Guava	0.8	2	1.7	4	7.4	17	12.2	28	59.6	137	18.3	42	100	230
4	Lemon	3.5	8	15.2	35	14.3	33	34.8	80	23.9	55	8.3	19	100	230
5	Sweet lime	0	0	0.4	1	0.4	1	13	30	73.4	168	13	30	100	230
6	Orange	1.3	3	7.4	17	5.2	12	25.3	58	56.9	131	3.9	9	100	230
7	Papaya	0	0	2.6	6	2.2	5	18.3	42	61.3	141	15.7	36	100	230
8	Pomagranate	6.1	14	3.9	9	4.8	11	24.3	46	61.7	142	3.5	8	100	230

Table 5: Consumption of Imported fruits

Foods	Daily		Alternate day		2/week		1/week		Most often		Never		Total	
	%	No	%	No	%	No	%	No	%	No	%	No	%	No
Avocado	0	0	4.8	11	0	0	8.3	19	39.6	91	47.4	109	100	230
Straw berry	0.8	2	1.3	3	0	0	2.6	6	51.3	119	43.5	100	100	230
Litchi	0	0	0	0	1.3	3	4.3	10	53.9	124	40.4	93	100	230

Table 6: Consumption of Seasonal Fruits

Foods	Daily		Alternate day		2/week		1/week		Most often		Never		Total	
	%	No	%	No	%	No	%	No	%	No	%	No	%	No
Custard apple	6.5	15	0	0	1.7	4	9.1	21	68.7	158	13.9	32	100	230
Grapes green	0.4	1	1.7	4	1.7	4	13.9	32	72.2	166	10	23	100	230
Grapes black	0.8	2	1.7	4	2.2	5	15.7	36	56.1	129	23.5	54	100	230
Jackfruit	0	0	2.2	5	0.8	2	6.5	15	41.7	96	48.7	112	100	230
Mango	0	0	0.9	2	0	0	10.9	25	80.4	185	7.8	18	100	230
Muskmelon	5.2	12	0	0	0	0	0	0	75.2	193	10.9	25	100	230
Sapota	0.8	2	1.7	4	1.3	3	12.2	28	57.8	133	26.1	60	100	230
Water melon	0	0	0.8	2	1.3	3	22.2	51	71.2	166	3.5	8	100	230
Wood apple	0.4	1	0	0	0	0	8.7	20	37.8	87	53	122	100	230
Goose berry	0	0	0	0	0.8	2	6.5	15	41.3	95	51.3	118	100	230
Pineapple	0.8	2	1.3	3	2.2	5	18.3	42	67.8	156	9.6	22	100	230

Table 7: Consumption of Root Vegetables

Foods	Daily		alternate day		2/week		1/week		Most often	
	%	No	%	No	%	No	%	No	%	No
Beetroot	1.7	4	4.3	10	66.7	16	24.3	56	55.3	127
Carrot	7.8	18	8.7	20	12.6	29	24.8	57	45.2	104
Potato	0.4	1	7.8	18	24.8	57	49.6	114	14.8	34
Radish	0.4	1	3.5	8	5.2	12	12.2	28	49.6	114
Sweet Potato	0	0	0.4	1	0.8	2	8.7	20	67.4	155
Colacasia	0	0	1.3	3	3.1	7	33.1	76	54.7	126
Yam	0	0	0	0	0	0	3.1	7	39.1	90

Table 7: Consumption Pattern of Green Leafy Vegetables

Frequency of Consumption of Green Leafy Vegetables(--)													
S	Foods	Daily		alternate day		2/week		1/week		most often		Never	Total
No		%	No.	%	No	%	No	%	No	%	No	%	No	%/No.
1	Amaranth			1.3	3	7.4	17	19.6	45	68.7	158	3	7	100/230
2	Gogu leaves							43.1	99	46.9	108	10	23	100/230
3	Cabbage			0.9	2	2.2	5	41.3	95	48.7	112	6.9	16	100/230
4	Fenugreek leaves	1.7	4	2.6	6	9.6	22	45.2	104	39.2	90	1.7	4	100/230
5	Poannaganni					1.7	4	21.3	49	36.6	84	40.4	93	100/230
6	Spinach			0.8	2	8.7	20	56.9	131	32.3	74	1.3	3	100/230
7	Tamarind leaves			1.7	4	3.5	8	7.4	17	87.4	201		0	100/230
8	Drumstick leaves									30.4	70	69.6	160	100/230
9	Bachhalikura									52.2	120	47.8	110	100/230
10	Gangabayalakura									52.2	120	47.8	110	100/230
11	Soya kura									53.5	123	46.5	107	100/230
12	Chukka kura									91.7	211	8.3	19	100/230
13	Coriander leaves	69.6	160			11.3	26	10.4	24	8.7	20		0	100/230
14	Curry leaves	100	230										0	100/230
15	Mint leaves	8.7	20	18.7	43	13.9	32	8.7	20	10.4	24	39.6	91	100/230

Table 2: Age wise Distribution of Respondents

Age in Years	No	Percent
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31-40	68	29.6
41-50	62	26.9
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61-70	8	3.5
71-80	2	0.9
	230	100

Type of family	Hindus	Muslims	Total
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One -In law	5.7 (10)	5.5 (3)	5.7 (13)
Total	100 (176)	100 (54)	100 (230)