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Food Preferences and Reported Frequency of Consumption of Fruits

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ABSTRACT Fruits are an important source of vitamins and minerals, thus, essential components of the human diet. They play a significant role in human nutrition. To understand the relation between the acceptance of various fruits and intractable barriers, Fruit preferences, frequency of consumption of different fruits, the information on the use of various fruits during religious rituals and the most intractable barriers were assessed. A survey was conducted by random sampling technique. A pre-tested, semi-structured food frequency questionnaire was used to collect the information from 528 subjects from 134 households all aged 18 years and above from Hyderabad, Andhra Pradesh, India. The consumption of vitamin A rich fruits is mostly seasonal. In this category, the consumption of mango was highest (38%) on a daily basis during summer. The frequency of consumption of vitamin C rich fruits was observed to be more on 'once a month' basis. As a large variety of fruits are available, the frequency of consumption of particular fruits decreases. However, tomato (ripe) is consumed more (32.8%) on a daily basis and 58.1 percent on weekly 2 or 3 times basis. This study has revealed that though there is a large variety of fruits available in Hyderabad of which most of them can be purchased all over the year and food expenditure though concentrated to a fair extent on the fruits among the residents but still many types of fruits often travel longer distances and are sold at higher prices and hence are considered luxurious and hence are almost consumed occasionally.

INTRODUCTION

A fruit is the edible, and more or less juicy, product of a tree or plant and consists of the matured ovary including its seeds and adjacent parts. Usually fruits are sweet, with a wide range of flavors, colors and textures (Shakuntala and Shadaksharaswamy1998). Fruits and vegetables are essentially storage sites where plants store their reserve supplies of nutrients either for themselves or for their progeny.

Fruits vary greatly in moisture, carbohydrate, pectin, fiber content and acidity. They also vary greatly with regard to vitamin and mineral content (Rajyalakshmi1974). Fruits are generally good sources of vitamin C. Gooseberry and guava are rich sources of this vitamin (Gopalan et al. 2004). The acidity in fruits is derived from different acids such as tartaric acid in grapes and tamarind, citric acid in tomatoes, grapes, oranges, mangoes and lemons, and malic acid in apple. The acids in fruits are formed from the intermediates of carbohydrate metabolism, which accumulate in the raw fruit. As the fruits become mature, the activities of enzymes capable of converting these organic acids to sugars increase resulting in increased sugar content. The sweetness of fruits is mainly due to presence of sucrose, fructose and glucose, different fruits containing different proportions of the same (Rajyalakshmi 1974).

Diets high in fruits and vegetables have been associated with multiple health benefits including a reduced risk of obesity (McCrory et al. 1998), cardiovascular disease (Joshipura et al. 2001), stroke (Joshipura et al.1999), diabetes and some cancers (Ford and Mokdad 2000; Willett and Trichopoulos1996; Steinmetz and Potter 1996).

Dietary choices, including fruit and vegetable consumption, are largely affected by demographic factors like age and gender (Anderson

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and Hunt 1992; Reime et al. 2000), psychological factors (Kristal et al. 1995), socio-economic class (Smith and Baghurst 1992) and lifestyle behavior. Studies found that children did not classify their food into healthy and unhealthy, rather into likes and dislikes (Ross 1995; Stevenson et al. 2007). Studies have shown that people of higher socio-economic classes have healthier and nutritionally more balanced diets than those of lower socio-economic classes (Riediger and Moghadasian 2008; Rasmussen et al. 2006; Nepal et al. 2011; Soumela et al. 2001). Ruelmarie et al. (2004) examined that the consumption patterns of fruits are determined by the combination of 3 main factors, the income level, preferences of households, and market prices in developing countries. Among the many influences on diet, are availability, cost and time, which can be seen as 'external' to the person. These contrast with 'internal' factors such as tastes and preferences. (Ziebland et al.1998). In a study by Jeyanthi et al. (2004) reported that among the barriers identified, high cost and lack of access to fruit and vegetables were among the most intractable. Interventions to increase fruit and vegetable consumption among people on low incomes, or living in socially deprived neighborhoods, may need to include incentives and delivery schemes as well as motivational advice (Anderson et al. 2001).

According to reports from the World Health Organization and the Food and Agriculture Organization (Sargeant et al. 2001), daily consumption of five servings, or a minimum of 400 grams, of fruit and vegetable helps in preventing several diseases. Many countries include similar recommendations in their nutrition guidelines (Cannon 1992). Several empirical studies document that a diet rich in fruits and vegetables is negatively associated with the risks of diabetes (Rolls et al. 2004), obesity (Tohill et al. 2004; He et al. 2006), strokes (lonso et al. 2004), and high blood pressure (Wandel and Fagerli 1999).

A study focused on the preference and consumption pattern of soft drinks and fruit juices on the basis of different age groups of people living in Indore city has remarked the frequency of consuming fruit juices is more than that of soft drinks due to health consciousness of people (Sandhar et al. 2013).The present study was carried out to observe fruit preferences, study the frequency of consumption of different fruits and to collect information on the use of various fruits during religious rituals and the most intractable barriers were assessed using food frequency questionnaires.

MATERIAL AND METHODS

Study Area

Hyderabad city is the capital city of the Indian state of Telangana. Religiously and culturally, the city is known for its rich history, food and its multilingual culture, both geographically and culturally. It is one of the most developed cities in India.

Study Design

This was a cross-sectional descriptive study. The subjects were chosen by simple random sampling procedures. A pre-tested, semi-structured food frequency consumption and preferences questionnaire was used as this has become the dominant method for assessing food consumption in population-based studies.

Study Population

Consisted of all adults (aged 18 years and above) residing in the study area at the time of the study. Those under study need to have resided in the area for at least 12 months, excluding visitors and migrants, 528 subjects were surveyed for the study from 134 households.

Tool Used

Data was collected using interviewer administered questionnaires consisting of structured questions relating to the individual's socio-demographic data, knowledge of the nutritional importance of fruits and vegetables and regarding actual consumption practices of the respondents with special reference to those fruits offered during various religious rituals.

RESULTS AND DISCUSSION

Fruits symbolize healthy foods; they have been the focus of dietary initiatives and are viewed by consumers as very important components of a healthy diet (Kristal et al. 1994).The health benefits of fruit and vegetable consumption are significant and widely documented (Lock et al. 2005; WHO 2003).

The present study conducted to elicit the habitual fruit consumption patterns and preferences among various socio-economic families in the capital city (Hyderabad) of Telangana state. Among the 528 participants from 134 households selected for study the subjects' were above the age group of 18 years. The BMI profile has shown that forty-six percent of the participants were normal while twenty-eight percent of them were underweight and rest twenty- six percent were obese. Of the 134 families, thirty- even percent were nuclear families with both the parents working and drawing an average annual income of rupees 5,00,000 to 7,00,000. Forty- nine percent of the families' annual income is between rupees 2,00,000 and 3,50,000. The frequency of dining out or consuming parceled food from food joints was often among forty- three percent of the families. It is observed that around thirty-nine percent of the participants and who are mostly women observe fasting on special occasions as a mark of respect for their personal Gods, and during these days they consume only the fruits along with some milk and milk substitutes. The important ritual days are *Ekadashi* (11th day after a new moon day and a full moon day), and also during the festivals like *Maha Shivratri*, *Rathasapthami*, and during *Devi Pooja* days of *Navaratri*. There are a large variety of fruits available in Hyderabad, of which most of them can be purchased all over the year. During the offseason, fruits often travel longer distances and are sold at higher prices. Vendors and traders from Hyderabad and surrounding areas and districts visit to put up their supplies in the local markets: *"Rithu Bazars"*. Among the fruits sold are lemons, bananas, figs, guavas, sweet lime, watermelon, sapota, pineapple, papaya and oranges which are available from January to December, while musk melon is sold between the months of August and February, black grapes from December to April, green grapes from March to July, and pomegranate from March to May. These are harder to find during off-season and hence are costlier. During the mango and custard apple season from April to June or July to September, in contrast cheap and good quality products flood the markets whereas they are not to be found during offseason. The above fruits are also preferably offered to the deities during most of the religious ceremonies. Fruits are classified into Pro-vitamin A rich, Vitamin C rich and other fruits and their frequency of consumption is shown in Tables 1, 2 and 3.

Pro-vitamin A Rich

The consumption of vitamin A rich fruits is mostly seasonal. In this category, the consumption of mango was highest (38.0) on a daily basis. Papaya (*Carica papaya*) is a rich source of vitamins, particularly vitamin A, and was mostly consumed twice a month by fifty percent of the respondents. Mango (*Mangiferaindica*) is the

Table 1: Frequency of consumption of Provitamin A rich fruits

Food particulars	*Daily*	*Weekly 2 or 3 times*	*Once a week*	*Once a fort-night*	*Once a month*	*Occasional*	*Never taken*
Vitamin A Rich							
Papaya(ripe)	-	10%	-	50%	9.7%	10.9%	19.3%
Mango(ripe)	38%	38.5%	19.7%	-	1.5%	2.2%	-
Orange	11.5%	2.2%	8.7%	5.1%	16.2%	18.2%	37.9%

Table 2: Frequency of consumption of Vitamin C rich fruits

Food particulars	*Daily*	*Weekly 2 or 3 times*	*Once a week*	*Once a fort-night*	*Once a month*	*Occasional*	*Never taken*
Vitamin C Rich							
Amla	1.4%	6.2%	8.8%	-	11.7%	71.4%	-
Sweetlime	7.3%	5.1%	7.3%	-	16.8%	63.4%	-
Lime	10.2%	8.7%	7.3%	49.6%	14.6%	9.5%	-
Guava	-	13.8%	8.8%	0.7%	57.6%	18.9%	-
Grapes(blue)	5.8%	5.8%	4.4%	0.7%	69.2%	13.9%	-
Grapes(green)	0.7%	1.5%	1.5%	0.7%	5.8%	89.7%	-
Tomato(ripe)	32.8%	58.1%	5.3%	-	1.5%	0.7%	1.5%

Table 3: Frequency of consumption of other fruits

Food particulars	*Daily*	*Weekly 2 or 3 times*	*Once a week*	*Once a fort-night*	*Once a month*	*Occasional*	*Never taken*
Other Fruits							
Apple	14.6%	24.8%	15.3%	2.2%	10.2%	32.8%	-
Banana	24.8%	32.8%	7.3%	1.5%	27.7%	5.8%	-
Custard apple	-	2.2%	1.5%	-	-	96.2%	-
Dates	2.9%	0.7%	2.9%	0.7%	10.9%	81.6%	-
Jackfruit	-	1.5%	-	0.7%	10.2%	87.5%	-
Muskmelon	0.7%	-	1.5%	-	16.0%	72.9%	8.7%
Watermelon	3.6%	0.7%	1.5%	-	24.1%	69.9%	-
Pineapple	-	0.7%	4.4%	4.4%	20.4%	60.4%	9.6%
Pomegranate	2.2%	1.5%	4.4%	22.6%	10.2%	56.0%	3.0%
Sapota	-	4.2%	2.1%	18.8%	21.8%	51.4%	1.7%

most loved and choicest fruit of India and occupies a prominent place among the fruits of the world. Mango fruits contain two to twenty percent sugar and are an important source of vitamin A. They also contain some vitamins B and C. They have a rich, luscious aromatic flavor and a delicious taste in which sweetness and acidity are delicately blended. This makes mango one of the most highly prized dessert fruits of the tropics. Ripe fruits are preserved by canning or used in the manufacture of juice and squash, jams, jellies and preserves. Young and unripe fruits are acidic and are used in making pickles, chutneys and culinary preparations. The seed kernel contains an edible fat (Shakuntala and Shadaksharaswamy 1998). Oranges (*Citrus aurantium*) are flavorful and juicy, and their pulp is sweet. They are mostly consumed as fresh fruits. Around sixty percent of the respondents consumed oranges and around 11.5 percent of them accounted to consume them every day.

Vitamin A is a natural pigment in yellow-orange fruits. Apart from mango and papaya, it is also found in jackfruits, apricots, passion fruit, dates, raspberries and peaches. They can be used in the preparation of orange juice, which is sold fresh, canned or as a frozen concentrate. It is used for flavoring pastry products and in making marmalades. The essential oils, obtained from sweet orange flowers and leaves, are used in the preparation of essences and perfumes.

Vitamin C Rich

The frequency of consumption of vitamin C rich fruits was observed to be more on once a month basis. As a large variety of fruits are available, the frequency of consumption of a particular fruit decreases. However, tomato (ripe) is predominantly consumed by fifty-eight percent on weekly basis, 32.8percent on a daily basis and lime and sweet lime are consumed less frequently, about once a month by 14.6 percent and16.8 percent of the respondents.

Amla (*Emblicaofficinalis*) is a much-preferred fruit for making pickles. The fruit is a rich source of pectin and probably the richest known natural source of vitamin C. As a pickle, seventy percent of the participants consumed only once. The *amla* fruit finds a number of medicinal uses in indigenous medicine (Shakuntala and Shadaksharaswamy1998).

Citrus Fruits: These belong to the genus *citrus* and the common fruits under this category are orange, lemon and lime. The sweet lime is consumed only occasionally by the majority (63.4%) of the population and usually preferred to be given away in rituals to the women invited on these occasions. The bright color, pleasing flavor and sweetness make it a favorite fruit. They are served as juice or slices. Citrus fruits have high pectin content in the white portion of their skin which makes them one of the principal sources of commercial pectin and also of citrus marmalades (Shakuntala and Shadaksharaswamy1998).

Lime (*Citrus aurantifolia*): It is small, round, smooth with yellow or greenish-yellow skin. It is consumed by approximately fifty percent of the participants very often for culinary purposes. In the summer, the seventy- nine percent of the subjects relished to consume this fruit in the form of juice or squashes. It is used to garnish food preparations for additional flavor. Guavas (*Psidiumguajava*) are mostly eaten as fresh fruits by 57.6 percent of the participants once in a month. Most of them relished to consume it

along with chili powder and salt sprinkled on it. Grapes (*Vitisvinifera*) are rich in reducing sugars. The mature fruit contains glucose and fructose in almost equal proportions and only small amounts of sucrose are found. Among blue and green varieties seventy percent of the participants consumed blue grapes once a month to that of green variety. Tomato (*Lycopersiconesculentum*) has high vitamin content, and multiple uses in culinary preparations have made the tomato an important vegetable outranking all other vegetables except the potato in popularity and value. Hence, it is consumed by most of the participants either daily or once in 2 days. In India, tomato is widely available and used throughout the year in various food preparations.

Among other fruits, banana was consumed more (24.8%) on a daily basis and most of them are consumed occasionally.

Apples (*Maluspumila*)*:* These are consumed almost by half of the subjects daily or once in 2-3 days, relished as a dessert. Majority of them preferred apples as an ingredient of mixed fruit jams.

Bananas *(Musa paradisica):* These are used in several different ways mostly preferred to be consumed during the days of fasting and also used along with apples for desserts. Bananas are also offered to deities during rituals mostly in *Satyanaraya Swamyvari Vratham*, a religious worship performed by Hindus in the south in Telugu-speaking states to mark the auspicious beginning.

Custard Apple (*annonasquamosa*)*:* It, being a seasonal fruit, is almost consumed only occasionally. The high price and the quality of the fruits (mostly unripe) sold in the markets of the Hyderabad is a major limitation for its acceptability. These factors hinder the nutritional and health benefits of the custard apple, which plays vital role in relaxing muscles and protecting the heart against diseases because of its Magnesium content.

Dates *(Phoenix dactylifera):* These are classified into three types: soft, semi-dry and dry. Soft dates are often sold in pressed masses and are eaten raw or used in confectionery. Dates are imported from West Asia and are consumed by only three percent of the population regularly while most of them consume occasionally. The dry dates are quite hard and can be kept for a long time.

Jack Fruit *(Artocarpushetrophyllus):* The unripe form is used as a vegetable or made into pickles, while the ripe one is eaten fresh or preserved as syrup.

Muskmelon *(Cucumismelo) and* ***Pineapple*** *(Ananascomosus):* These are not consumed at all by considerable population (approximately 9%). The unpleasant odor of muskmelon makes it unacceptable.

Watermelon *(Citrullus vulgaris):* The flesh of watermelon is consumed regularly during the summer season by majority of the population.

Pomegranate *(Punicagranatum):* A majority of the population consumes the fruit considerably. Most of them relish making and consuming sour pomegranate fresh pickles.

Sapota *(Achrassapota):* It is consumed by twenty percent of the population at least once in 2 weeks.

CONCLUSION

The study was conducted to determine the habitual fruit consumption pattern and preferences among the residents of Hyderabad, Andhra Pradesh. It has revealed that the consumption of fruits is moderate except for bananas and tomatoes and mostly the fruits are preferably consumed only during the fasting rituals. It was concluded from this study that food expenditure though concentrated to a fair extent on the fruits among the Hyderabad residents but still many types of fruits are still considered luxurious as they travel longer distances and are sold at higher prices and hence are almost consumed occasionally.

All the fruits from surrounding places are available, which may be the result of the better transportation facilities and also the sprouting of local markets in various areas, the knowledge of the nutritional value of fruits being fair among the participants which accounts to eighty-six percent, but the consumption of these fruits is low (46%). The reasons for this low intake is attributed to the habitual preferences to consume fried and spicy foods over the fresh ones, Household members' preferences, age, gender and lifestyle changes prompt the participants to dine out and are contributing factors preventing the inclusion of fruits in every day menu.

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