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Carrot Intake its Perception, Nutritional Value and Health Benefits: A Case Study of Sokoto Metropolis, Sokoto State, Nigeria

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Abstract: The investigation on carrot intake, its perception, nutritional value and its health benefits was conducted in Sokoto Metropolis, Sokoto State, Nigeria. Purposive sampling techniques were used to select Sokoto Metropolis (two local government areas) and twelve wards from two LGAs. Simple random sampling technique was used to select 120 people from the study area. Interview schedule was also employed to seek information from the selected people on demographic characteristics, carrot eating, perception about importance of carrot eating and the diseases that are common among the people. The data collected were analyzed using descriptive statistics and chi-square. The result revealed that some demographic characteristics such as sex, age, occupation and educational status have influence on carrot intake. Also the findings revealed that majority (46 and 44%) agreed that regular eating of carrot improve their health and only 2% disagreed, while 8% had no idea about the health benefits. Chi-square test revealed that there is significant difference between intake of carrot during production season and during off-season. The result revealed that some food related diseases are common in the study area. About 50% did not indicate the diseases they were suffering from. Among those who indicated their diseases; 14% were suffering from poor eyesight, 9% had skin disease, 8% had ulcer, 7% suffering from hypertension, 4% had painful urination, 4% had gum disease and another 4% were suffering from diabetic condition. It can be concluded that nutritional education about the food we consume, awareness and information about the importance of regular intake of carrot may change the wrong perception of the people about carrot consumption in relation to health benefits. Awareness campaign about the importance of carrot consumption should be done by government and extension workers.

Key words: Carrot, intake, diseases, health, benefits

INTRODUCTION

Carrot (*Daucus carota sativus*) is of the parsley family. The importance of fruits and vegetables is related to their nutritional value as the major contributors of vitamins and minerals which form the protective nutrients in our diets (Okpanachi, 2005). Carrots originated from middle Asia around Afghanistan and slowly spread to Mediterranean area (Hughes and Tindall, 1989). Today, the most significant crop yields come from California. Carrots as vegetable can grow in any environment with nutrient-dense soil, sunlight and water (Wood-Moen, 2011). Orange roots of carrots containing the pigment carotene were not discovered until 16th century in Holland. These were crossed with red varieties containing anthocyanin to produce orange coloured roots (Rosemary, 1999).

Research studies have found that carrots contain calcium, potassium, vitamins, A, B and C. with their medicinal properties. Carrot is rich in alkaline elements which purify and revitalize the blood. Contents of carrots include vitamin A, Vitamin B_1 B_3 B_6 and K, manganese and phosphorus (World's Healthiest Food, 2008). Table 1 shows the nutrients in raw carrots. Carrots are high in fibre, carotenoids, vitamin C and E (Pool-Zobel *et al.*, 1998) quoted by Potter *et al.* (2011). A medium size carrot is believed to have 52 calories (Health Mad, 2007). Recent research has proved that early cancer formation can be cured with the help of carrot juice (Capstone, 2005; El-Abasy *et al.*, 2012). Additionally, vitamin B_6 in carrot assists in the production of important brain chemicals and hormones like serotonin and melatonin needed for mood stability and sleep. It helps manage metabolic processes and the function of the immune system (Wood Moen, 2011). Its juice may be drunk from the age of two months onwards to stimulate tooth growth and strengthen teeth in children, (Capstone, 2005).

Eating carrot is also good for allergies, aneamia, rheumatism, tonic for the nervous system. Carrot also helps in stimulating milk flow during lactation and has effects against round worms and dandruff (WCM, 2008).

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Vitamin A in carrot is important in vision (Wood-Moen, 2011). A news paper (Daily Trust) reported that over one million Nigerians are blind and that 75% of this is avoidable (Anon, 2008).Carrot juice when taken daily helps to improve eye sight (WHF, 2008; El-Abasy *et al*., 2012). In food preparation carrots can be eaten raw, grated or cooked slightly. This makes it easier for consumption for the elderly.

Carrots are produced on a large scale in Sokoto but many people are not aware of its nutritive value. Some people eat it for pleasure and because of its sweet taste. This study therefore was carried out to investigate the intake of carrot, its perception and awareness of its health benefits in Sokoto metropolis, Sokoto State, Nigeria.

MATERIALS AND METHODS

An investigation was carried out on carrot intake, its perception and awareness of its nutritional value and health benefits, in Sokoto metropolis, Sokoto State, Nigeria. Sokoto metropolis is made up of two Local Government Areas (LGA) (Sokoto North and Sokoto South LGAs). Sokoto metropolis is located in the extreme north of north-west of Nigeria. It lies within Latitude 13°-01^{1} N and Longitude 5°-15^{1}E (Kowal and Konobe, 1972). The population of Sokoto State is 3,696,999. That of the two LGAs used for the study are: Sokoto South is 194,914, while that of Sokoto North is 232,846. The population of each ward is not available (NPC Census, 2006).

The annual rainfall is approximately between 500-1300 mm. The rainy season starts from May to October in the study area. It is characterized by very high extreme temperature (39°C) during the month of March to April and harmattan (dry cold season) starts from November to February with mean minimum temperature of 18.7°C and mean maximum temperature of 39°C, respectively (SERC, 2006). The occupation of the people in the study area are mainly farming and trading. They grow mainly sorghum, millet, beans and varieties of vegetables such as sugarcane, carrot, lettuce, cabbage, spinach, okro, moringa (Zogole) and garden eggs.

Purposive sampling technique was used to select Sokoto metropolis. Twelve wards within metropolis were also purposively selected for the study because of the availability of carrot farms, rural and urban resident and sales of carrot by small traders in the area of study. This makes carrot available during season and off season. Simple random sampling technique was used to select people from the study area both male and female were selected. Interview schedule was employed to obtain relevant information from the people selected (using trained enumerators) to seek for relevant information on demographic characteristics of selected people, their perceptions about importance of carrot intake, awareness about its health benefit, frequency of carrot intake and diseases common in the study area.

Ten respondents were selected from each of the twelve wards making a total of 120 respondents. The data collected were analyzed using descriptive statistics (frequency and percentages) and chi-square. The chi-square was used to test the null hypothesis which stated that there is no significant difference between the intake of carrot during production season and during off-season. Secondary data were also obtained on nutritional value and health benefits of carrot from literature and internet. American Psychology Association (APA system) was used for the references.

RESULTS

The results of the study have been presented in Table 2 to 5. Majority of the respondents were male (93%) while few were female (7%). Out of 120 respondents, 80% were below 51 years of age, while, only 20% were above 50 years. This is an indication that young people consume carrots more than older ones. Those involved in the study were mainly civil servants (41%) traders (30%) farmers (20%), while others were 9%. Majority of the respondents had formal education (67%) those with only Quranic education were 31% and those with adult literacy education 2% (Table 2)

Table 3 shows that 6 and 26% (32%) of the respondents about perception and importance of carrot eating agreed that carrot eating is not important, thirty- two (32%) and 28% disagreed, they believed that carrot eating is important, while 8% had no idea about importance and health benefits of carrots. On the other hand majority (46 and 44%) agreed that carrot eating promote good health, only 2% disagreed while 8% had no idea about the importance and benefits of carrot.

Table 4 shows the frequency of carrots eating during season and off-season. The value of X^2 calculated (43.02) is greater than the value of X^2 tabulated (9.48) at 5% level of significance. Since X^2 cal (43.02)>X^2 tab (9.48), therefore, the null hypothesis is rejected.

Table 5 depicts the different diseases that are common in the study area. Those who did not indicate the disease they were suffering from was 50%. Those who indicated the diseases they were suffering from were also 50% out of which 14% suffered from poor eyesight and 4%. from diabetic.

DISCUSSION

Demographic characteristics of the respondents in the study area: In this study sex, age, occupation and educational status were the main factors considered to influence carrots intake. More male were encountered in the study because they predominated females outside and are engaged in different type of occupation and trade than the females in the study area, 93% were male and 7% female (Table 2). In the study area women engage mostly in domestic activities and food processing because majority of them are in door (Pudar). This implies that males eat carrot more from

Table 1: Nutrients in raw carrots. 1 cup: 122 g

Nutrient	Amount	Nutrient density	World's healthiest food rating
Vitamin A	4317.40 IU	235.5	excellent
Vitamin K	16.10 mcg	6.9	very good
Vitamin C	11.35 mg	6.5	very good
Potassium	394.06 mg	3.9	very good
Vitamin B6 (Pyridoxine)	0.18 mg	3.1	good
Manganese	0.17 mg	2.9	good
Molybdenum	6.10 mcg	2.8	good
Vitamin B1 (thiamin)	0.12 mg	2.7	good
Vitamin B3 (niacin)	1.13 mg	1.9	good
Phosphorous	53.68 mg	1.8	good
Magnesium	18.30 mg	1.6	good
Folate	good		

Source: World`s Healthiest Food (WHF) (2008)

Table 2: Demographic characteristics of the respondents in the study area

Demographic characteristics	Frequency	Percentage
Sex		
Male	112	93
Female	8	7
Age		
12-30	31	26
31-40	36	30
41-50	29	24
51-60	11	9
61-70	8	7
71-80	3	2
81-90	2	2
Occupation		
Civil servants	49	41
Merchants	3	2
Farmers	24	20
Traders	36	30
Others	8	7
Educational level		
Quranic education	37	31
Adult education	3	2
Primary education	8	7
Secondary education	13	11
Tertiary education	59	49

n = 120

Table 3: Perception of the respondents about carrot importance and health benefits

Carrot eating is not important	Frequency	Percentage
Strongly agreed (SA)	7	6
Agree (A)	31	26
Disagreed (D)	39	32
Strongly disagreed (SD)	33	28
No Idea (NI)	10	8
Carrot eating promote good health		
Strongly agreed (SA)	55	46
Agree (A)	53	44
Disagreed (D)	2	2
Strongly disagreed (SD)	0	0
No Idea (NI)	10	8

n = 120

hawkers outside the home, while doing their business round the metropolis. The age range of 12 to 50 years of the respondents constitutes 80%. This is a productive age group they go out for their businesses. This gave them the opportunity to have means for buying carrots and other necessities of life. Only 20% were above 50 years of age.

Table 4: Frequency intake of carrot during season and off-season by the respondent's families in the study area

Frequency of carrots intake	--- Production season --- Frequency	Percentage	------- Off-season ------- Frequency	Percentage
Daily	32	26	4	3
Weekly	50	42	34	28
Monthly	17	14	30	25
Festival/	8	7	17	14
Gifts to children	13	11	31	26
Not eating	0	0	4	3

Chi-square (X^2): Cal. (43.2)>tab (9.48) n = 120

Table 5: Diseases suffered by respondents in the study area

Common diseases in the study area	Frequency	Percentage
Poor eye sight	17	14
Skin disease	11	9
Ulcer	10	8
Hypertension	9	7
Gum disease	5	4
Diabetic	5	4
Painful urination	5	4
Cancer	0	0
Did not indicate any disease	60	50

Multiple response n = 120

The elderly probably may not like to eat carrot because of weak teeth. Fresh carrot may be strong to eat by the elderly but carrot can be grated or slightly cooked for easy consumption. Capstone (2005) reported that carrot eating prevents tooth decay. According to Wood-Moen (2011) a cupful carrots contain 13% of the daily recommended intake of vitamin C, a powerful antioxidant. It is required for cellular activity and skin growth, wound healing, bones and teeth. Moreover, majority of the respondents were literate, due to the level of educational status, many of them have knowledge about the usefulness of fruits and vegetables (including carrot) in the body, but do not know the extent of the health benefits of carrot.

Respondents' perception about carrot importance and health benefits: The findings of the study revealed that 6% strongly agreed and 26% agreed that carrot eating is not important, 32 and 28% disagreed, while 8% had no idea about importance of carrot. Some of them also believed that carrot eating prevents some diseases. This may not be unconnected with the fact that majority of the respondents are educated. This shows that they have some level of knowledge of nutritional value of some foods which are useful to the body. Ninety 1% (46 and 44%) agreed that carrot promotes good health and 2% disagreed that carrots eating did not promote good health, while 8% had no idea about carrot health benefits (Table 3). Probably those who did not agree and those who had no idea about importance of carrot eating and its health benefits had low level of education.

Research studies have found that eating a lot of carrot is among indicator of lowering cancer risk (El-Abasy *et al*., 2012), it also prevents vascular diseases (WHF, 2008).

Other vegetables may be good for eating but carrots consumption has more health benefits. Oral intake of carrot juice also displace other beneficial physiological effects, including reduced oxidative DNA damage, increased levels of plasma antioxidants and reduced inflammation (Potter *et al*., 2011). This result is similar to that of Okpanachi (2005) who reported that some of the respondents in her study had little knowledge about the health benefits or importance of eating carrot. This idea may be traditional biased because carrot as vegetable is not an indigenous vegetable. Majority of the people prefer to consume indigenous vegetables (e.g. garden egg) more regularly than carrots. This is one of the reasons why proper and regular awareness campaign is necessary, knowing the health benefits of carrot.

Frequency of carrot intake during season and off-season by the respondents' families: Every food has season when they are harvested by the farmers. Various foods are also sold cheaply during season. The frequency of carrot intake by the respondents' families in the study area was affected by the season. In order to confirm this statement chi-square was used to test null hypothesis which stated that there is no significant difference between the frequency of carrot intake during season and off- season. Table 4 depicts that the value of X^2 calculated (43.2) is greater than tabulated (9.48). This implies that there is a significant difference of carrots consumption between the seasons. That is people consumed carrot more during production season than during off-season. This could be true because carrot is readily available at all seasons but became costly during off-season, only few families may be able to spend more money in buying carrot for the family.

Some common diseases suffered by the respondents in the study area: Some of the diseases common among the respondents in the study area are more or less diet related diseases; such as eye problems (bad vision) skin diseases, ulcer, hypertension, gum disease, diabetes and other uncommon food diseases. About 50% did not indicate the diseases suffered from. Table 5. Among the six zones of the Federation (Nigeria), on vision 2020 (the right to sight) north-west had the highest number of blind people (0.32 million) (Anon, 2008). Sokoto metropolis is one of the major towns in the north-west of Nigeria. Researches have proved that carrots are the most abundant sources of vitamin A or better carotene. Vitamin A is an important nutrient needed for eye health, bone growth, reproduction, cell division and the formation of these cells in the major organs of the body (Wooden-Moen, 2011).

The study also revealed that those with poor vision had the highest percentage of 14%, followed by those with skin diseases (9%), people with ulcer and hypertension 8 and 7% respectfully. According to Potter *et al*. (2011) carrots juice is rich sources of potassium which may contribute to lowering systolic blood pressure. Drinking carrot juice increases total antioxidant status and decreases lipid peroxidation in adults. Carrot is an inexpensive and highly nutritious, since it contains appreciable amounts of B1, B2, B6 along with carotene. Dietary carotenes are associated with lowering risk of many cancers. Vitamin A is an antioxidant which plays a key role in growth and repair of tissues (El-Abasy *et al*., 2012).

National Planning Commission (NPC, 2001) reported that diet-related diseases such as diabetes, hypertension, cardiovascular diseases and cancer are on the increase in Nigeria. The increasing prevalence of these diseases is due to the changes in the diet and life style of the people. In the past (about 3 or 4 decades ago) only few people especially the rich and elites who have the money, but do not know what is good to consume or what not to consume were suffering from these diseases. Poor dietary quality is the main nutritional problem facing poor people worldwide. Poor diet quality including not having enough vitamins and minerals or other essential nutrients in the diet or too much of other food components such as saturated fats, sugars, snacks made of flour and excess salt were among the problems of wrong diet. These can lead to obesity and increase the risk of non-communicable diseases such as diabetes and cardio-vascular diseases (IFPRI, 2005). According to Wood-Moen (2011) carrots are low in fat and sodium but high in nutrients needed for optimum health. Regular intake of carrot especially the juice can be used to prevent and treat cancer and some other food diseases (WHF, 2008).

According to Capstone (2005) consumption of a carrot after food kills all the harmful germs in the mouth and prevents tooth decay. It also prevents wrinkles, blisters and skin diseases, when applied externally. It helps in keeping the skin beautiful and healthy. It can be used (the juice) for healing infected wounds, burns, abscesses and eczema. It is used in the prevention of cancer. World's Healthiest Food (2008) reported that carrot antioxidant compounds help to prevent cancer and promote good vision if consumed regularly. Vitamin A in carrots promote good eyesight, it also improves cough and high blood pressure. It contains cholesterol-lowering pectin (WCM, 2008).

Conclusions: Lack of adequate information about the nutritional value and health benefits of carrots may not allow people to see the need for carrot intake. To be well nourished and be in good health, one needs to have knowledge of food value of carrot. Carrot contains elements that keep us healthy in many levels. People living in carrots producing area, are not aware of the

health benefits of carrot. There is the need to consume carrot everyday, both children and adults. Awareness campaign about the usefulness of carrot to the body by the government will contribute immensely to good health of the people. Integrating of nutrition education into the curricular of primary, secondary and tertiary institutions will promote healthy life style and good dietary habits.

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