Nutritional Awareness of Saudi Girls and Women about Cancer-Causing and Preventive Foods

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Abstract: Nutritional awareness may reduce the likelihood of cancer risk or death. The present study was a descriptive study aimed to evaluate awareness of cancer-causing and preventive foods, screening eating habits among females. Sample including 895 girls and women from Al- Hassa in the eastern province of Saudi Arabia were participated in the study. Data were collected using self-administered questionnaire. Body weight and height were measured to calculate the BMI. Sources of nutritional knowledge were also evaluated. Data indicated that the major source of nutritional knowledge about cancer was the different stages of education 62.3% and the lowest source of nutritional knowledge was family and friends 20.7%. The general knowledge about cancer as definition and some facts about it was also studied. Generally, knowledge level of participants was good. Nearly half of participants had wrong responses about smoked foods, processed meat and artificial sweeteners. Results showed that approximately 60-80% of the sample had wrong responses about the impact of the following foods: fried foods - preserved juices - pickles and salty foods - stored nuts on cancer risks. Evaluation of the awareness of cancer preventing foods indicated that knowledge of sample was good in vegetables and fruits consumption but they had wrong responses about vegetable oils, legumes and green tea. Results indicated that awareness about preventive-cancer foods was good but, awareness about foods causing-caner was low. Eating habits of girls and women under study were very low. Data also indicated that there was a correlation between females BMI and Σ measures of nutritional awareness at $p<0.0001$. Chi-square proved that there were significant relationships between Σ measures of nutritional awareness about cancer and age, occupation, income, residence area, education level of girls and woman. Although, nutritional awareness of females increase in 18-28 years, between students, low income, in cities, higher education level but it still remains insufficient. So, Saudi girls and women need plans and programs to raise their nutritional awareness and instill healthy eating habits especially for the younger girls in primary, preparatory and secondary schools.

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1. Introduction

Cancer is the second leading cause of death (***Odunsanya, 2001 and WHO, 2013***) after cardiovascular disease (***Kutluk and Kars, 1998 and Engin and zkan, 1998***). Worldwide, approximately 10 million people are diagnosed with cancer annually and more than 6 million die of the disease every year; currently, over 22 million people in the world are cancer patients (***Pvnar, 1998 and Steward and Kleihues, 2003***). For Saudi Arabia, according to World Health Organization's statistics, percentage of deaths attributable to cancer at the year 2002 of Saudi Arabia is 11.2% (***Helen, 2014***). According to the cancer incidence and survival report by the Saudi Cancer Registry, 12,309 cancer cases were diagnosed in Saudi Arabia in 2007 (Saudi Arabia's population at that time was approximately 17 million) (***Radwan and Alanazi, 2014***). Foods might be including toxic or useful substances, cause or protective of cancer. Several studies have addressed that nutrition can prevent cancer, ***Doll and Peto, 1981*** reported that approximately 35% of cancer deaths could be prevented through good nutrition. The World Cancer Research Fund and the American Institute for Cancer Research (1997) estimated that 30–40% of cancer incidence could be prevented through good nutrition and exercise. Lifestyle habits especially dietary intake and physical activity are significant determinants of cancer recurrence and survival (***Yaw et al., 2014***). ***Kamra et al., 2005*** found that there was significant evidence supporting the hypotheses that lifestyle, diet, and bioactive components in foods were important modifiers of cancer risk. Low levels of known carcinogenic chemicals are present in food items, these reactive chemicals could contribute not only to cancer but also to a range of toxicities, including teratogenesis and birth defects, renal failure, vascular disease, and autoimmune diseases (***He et al., 2004***).

Also, limiting fat intake can reduce the risk of breast cancer recurrence. Increasing consumption of vegetables and fruits seems to have possible beneficial effects during and after treatments (***Weitzen et al., 2006***).

In spite of the importance of food and nutritional awareness for prevention or during treatment of cancer, but it sometimes does not take the utmost importance, as found in the Japanese study that awareness of cancer causes in the Japanese general population tends to be dominated by cancer-causing infection, occupational exposure, air pollution and food additives rather than major lifestyle factors such as diet (***Inoue et al., 2006***). So the importance of evaluating the nutritional awareness of Saudi girls and women is emerged, especially since there are several studies confirm the low general awareness among them about cancer as, female's secondary-school in jeddah (***Milaat, 2000***) and females of Qassim region regarding breast cancer. But, also a primary reason for escalating mortality of breast cancer is lack of awareness (***Jahan et al., 2006***).

This study aimed to evaluate awareness of cancer-causing and preventive foods, screening eating habits among Saudi females in order to evaluate the need for intervention plans and programs to rise this awareness.

2. Material and Methods:

Sample of study:

A total of 895 voluntary girls and women, from Al-Hassa - Kingdom of Saudi Arabia, aged 16 – older than 40 were randomly selected as study subjects.

Data collection:

The tool used in research is a self-administered questionnaire that including 4 parts:

Part 1: General information of respondents such as age, education level, occupation, marital status, income, residence area, family members, practicing physical activity and knowledge sources.

Part 2: General Knowledge about definition of caner, nature of cancer, impact of family history, stay lurking for years, places of injury, effect of foods, Survey estimated a rating scale is a 3 levels, agree, not sure and disagree (Measure 1).

Part 3: Nutritional awareness about foods causing or preventive cancer. Survey estimated a rating scale is a 4 levels, reduces cancer risk, increases cancer risk, no effect and I do not know (Measure 2).

Part 4: The eating habits were rating scales with 3 levels: always, sometimes and never (Measure 3).

Each response in the previous measurements was encoded and then were added the total score for each girls and woman to reflect the total measure (Σ Measures).

Body mass index (BMI) for the sample of study was calculated by the following equation: BMI= weight (kg)/ [height (meter)]^2.

Statistical Analysis:

In order to answer to research questions the following appropriate statistical techniques are used as 1) Frequency distribution, 2) Percentage distribution, 3) Different means & their Standard deviation and 4) Test of Association. The Chi-square test and Spearman's correlation were used in the analysis of awareness according to girls and women characteristics. All analyses were performed using SPSS program (version 17.0).

3. Results:

Participants profile characteristics are shown in Table 1. The ages of 895 girls and women were from 16 to 50. The majority of them (78.4%) were between 18-28 years old, 64.6% were single, 79.9% were in college, 67.9% were lived in cities, 86.4% were student and 37.7% of number of family members between 7-9 members. 59.7% of studied females were within the healthy range of BMI, 16.3% of females were suffering from overweight, 9.7% of females were suffering from obesity and 14.3% were suffering from underweight. 63.7% of their income less than or equal 4000 Saudi Riyal per month. Over half of females didn't practice any physical activity.

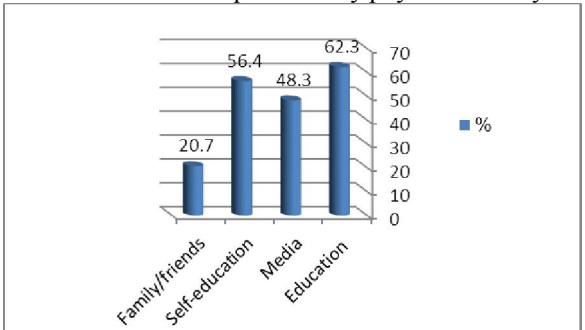

Fig. 1: Most Sources of Knowledge for Girls & Women under Study

Figure 1 illustrates the most sources of nutritional knowledge for girls and women under study.

Education program of schools and Universities appear to play the main role in cancer nutritional awareness (62.3%). Followed by self-education (reading books, lecture …etc) prove to be the second source of nutritional knowledge about cancer. More than half of females knew all information about cancer by reading books and attendance public lectures. Also, media is very important way to nutritional knowledge, about 50% of girls and women used media to know about cancer. Family and friends in this study play a less important role in cancer awareness, just 20.7% of participants mentioned that family and friends were the main source of nutritional knowledge.

Table 1: Selected Characteristics of Participants under study.

Variables	No.	(%)
Age[1] (y)		
< 18	90	10.1
18-28	702	78.4
29-39	76	8.5
40+	27	3.0
Marital status		
Single	578	64.6
Married	303	33.8
Widowed	9	1.0
Divorced	5	0.6
Education		
Primary	1	0.1
preparatory	30	3.4
Secondary	113	12.6
college	715	79.9
Postgraduate	36	4.0
Residence area		
City	608	67.9
Village	281	31.4
Hajer (small village)	6	0.7
Income[2]		
≤ 4000	570	63.7
>4000-10.000	218	24.4
>10.000-15.000	63	7.0
>15.000	44	4.9
Occupation		
Student	773	86.4
Employee	110	12.3
Private work	5	0.5
Non-working	7	0.8
No. of family members		
< 4	188	21.0
4-6	232	25.9
7-9	337	37.7
10 +	138	15.4
BMI[3] (kg/m^2)		
under weight	128	14.3
Normal	534	59.7
Overweight	146	16.3
Obesity	87	9.7
Physical Activity		
Yes	395	44.1
No	500	55.9

Mean±SD [1] 24.1±0.17 [2] 5093.9±81.9 [3]29.3±3.96

Table 2 describes the Saudi female's responses to statements measure the general knowledge about cancer. Majority of females (69.9, 74.0, 81.5, and 81.3%) had correct responses about: what is cancer (st. 1), nature of cancer (st. 2 & 3), and impact of foods (st. 5), respectively. On the contrary, the impact of cancer family history, whereas 59.2% of girls and women in this point had wrong response.

Table 3 showed Saudi females awareness about cancer-causing and protective foods. For the responses of Saudi females to cancer-protective foods sentences which deal with vegetables (broccoli, cabbage, green leafy vegetables, orange vegetables, tomatoes, onion and garlic) and fruits (apples, pomegranate and its fresh syrup, guava, strawberry, cherries, berries, red grapes, mango and pumpkin) were good because the proportion of correct responses were ranging from 65.8 – 78.2%. However, both the awareness of girls and women on the role of vegetable oils, legumes and their relationship to cancer were wrong by approximately 72% of females. Despite the benefits of green tea, but more than half of the females in the sample (58.1%) had wrong response about its protection effect.

As for the foods that cause cancer data indicated that nearly half of girls and women had wrong responses about smoked foods, processed meat and artificial sweeteners. More than 80% of sample responses were incorrect for red meat and using white sugar. Almost (59.8-79.2%) of the sample had wrong responses about the impact of the following foods: fried foods - preserved juices - using of olive oil in frying - pickles and salty foods - stored nuts on cancer risks. 26.7% and a third of girls and women didn't know about riskiness of Indomie and soft drinks, respectively.

Table 4 showed the eating habits of the studied sample. Generally eating habits of girls and women were very low. With regard to food consumption as a whole, 83.5% of girls and women under study eat what they want at any time without any controls. Also, 63.4% of the participants eat all kinds of foods even if they lead to increase their weight. Regarding the consumption of vegetables and fruits: 49.2% of sample did not eat green salad. 77.4 % of the sample did not consume 3 units of fruits and vegetables per day, 67.7% of respondents did not consume fresh juices and 72 % of participants consume fruit after peeling. Consumption of high fat foods: we found that 57%, 76.5% and 81.8% of the respondents did not find nothing wrong in fast foods consumption, folk traditional foods and liquid cheeses, respectively. Also, 69.9 % of participants using butter in cooking foods. Favorite cooking method: more than 80% of Saudi girls and women preferred barbecue, and 76% did not prefer boiling cooking. Reading the food label: 64.7% of girls and women did not care to read the food label.

Table 2: Statements Measure General Knowledge about Cancer.

Statements (Correct Response)	Incorrect Response		Correct Response	
	No.	(%)	No.	(%)
1. Cancer occurs when genes of normal cell change making them behave in an abnormal division and reproduction. (agree)	272	30.4	623	69.6
2. Cancer remains for a period may reach several years lurking in a specific position before starting to spread elsewhere in the body. (agree)	233	26.0	662	74.0
3. Cancer does not affect different parts of the human body. (disagree)	166	18.5	729	81.5
4. Cancer is more likely to occur if you have a family member who has cancer. (agree)	530	59.2	365	40.8
5. Kinds of foods which human intake have an impact on the occurrence of cancer. (agree)	167	18.7	728	81.3

Table 3: Statements Measure Awareness about Foods which Cause or Prevent Cancer.

Statements (Correct Response)	Incorrect Response		Correct Response	
	No.	(%)	No.	(%)
Statements Measure Awareness about Foods which Prevent Cancer				
1. Consuming vegetable oils such as corn oil and sunflower oil. (reduces cancer risk)	645	72.1	250	27.9
2. No eating fresh fruits. (increases cancer risk)	413	46.1	482	53.9
3. Consumption of legumes such as fava beans, soybeans. (reduces cancer risk)	647	72.3	248	27.7
4. Eating apples continuously. (reduces cancer risk)	237	26.5	658	73.5
5. Eating pomegranate or fresh juice continuously. (reduces cancer risk)	255	28.5	640	71.5
6. Eating guava frequently. (reduces cancer risk)	306	34.2	589	65.8
7. Eating strawberry - cherries - berries - red grapes frequently. (reduces cancer risk)	298	33.3	597	66.7
8. Eating broccoli frequently. (reduces cancer risk)	289	32.3	606	67.7
9. Eating Fresh cabbage frequently. (reduces cancer risk)	263	29.4	632	70.6
10. Eating orange vegetables and fruits (carrots - pumpkin - apricot - mango .... etc.) frequently. (reduces cancer risk)	268	29.9	627	70.1
11. Eating green leafy vegetables (parsley - Watercress - Spinach - radish - Jews mallow.... etc.) frequently. (reduces cancer risk)	195	21.8	700	78.2
12. Using fresh tomatoes. (reduces cancer risk)	282	31.5	613	68.5
13. Eating onions and garlic regularly. (reduces cancer risk)	286	32.0	609	68.0
14. Drinking green tea regularly. (reduces cancer risk)	520	58.1	375	41.9
Statements Measure Awareness about Foods which Cause Cancer				
1. Eating Smoked foods (Smoked luncheon meat and nuts) frequently. (increases cancer risk)	458	51.2	437	48.8
2. Eating processed meat (luncheon meat and sausages) frequently. (increases cancer risk)	435	48.6	460	51.4
3. Eating red meat heavily. (increases cancer risk)	724	80.9	171	19.1
4. Using white sugar. (increases cancer risk)	751	83.9	144	16.1
5. Using artificial sweeteners. (increases cancer risk)	482	53.9	413	46.1
6. Eating fried foods (broasted - falafel - sambosa - donuts ..... etc) frequently. (increases cancer risk)	535	59.8	360	40.2
7. Frying with olive oil. (increases cancer risk)	683	76.3	212	23.7
8. Eating stored nuts such as peanuts. (increases cancer risk)	709	79.2	186	20.8
9. Eating salted foods and pickles. (increases cancer risk)	692	77.3	203	22.7
10. Eating food such as noodles (Indomie). (increases cancer risk)	239	26.7	656	73.3
11. Drinking soft drinks (Pepsi - Cola - Seven Up - Miranda) frequently. (increases cancer risk)	298	33.3	597	66.7
12. Drinking canned juices heavily. (increases cancer risk)	606	67.8	289	32.2

Table 4: Statements Measure Eating Habits of Sample.

Statements (Correct Response)	Incorrect Response		Correct Response	
	No.	(%)	No.	(%)
1. I eat any food when I want at any time I want. (Never)	747	83.5	148	16.5
2. I do not eat some foods because they increase my body weight. (always)	567	63.4	328	36.6
3. I eat junk foods constantly. (Never)	510	57.0	385	43.0
4. I eat green salad with my meals. (always)	440	49.2	455	50.8
5. I eat some fruits like apples and pears after peeling. (Never)	644	72.0	251	28.0
6. I drink fresh juices instead of processed. (always)	606	67.7	289	32.3
7. I make sure to eat 3 or more of fruits and vegetables daily. (always)	693	77.4	202	22.6
8. I consumed traditional foods such as porridge, Harees and Almamros (Hnebeny) frequently. (Never)	685	76.5	210	23.5
9. I use butter or margarine when cooking my foods frequently. (Never)	626	69.9	269	30.1
10. I prefer eating liquid cheeses. (Never)	732	81.8	163	18.2
11. Barbecue is my favorite cooking method. (Never)	756	84.5	139	15.5
12. I prefer boiled food instead of fried food. (always)	680	76.0	215	24.0
13. I care to read food components before purchasing. (always)	579	64.7	316	35.3

Table 5: Relationships between Σ Measures of Nutritional Awareness and some Variables.

Variables	Σ Measures (%)		Chi-square value
	Correct Response	Incorrect Response	
Age (y)			54.940***
< 18	1.5	8.6	
18-28	25.5	52.9	
29-39	4.2	4.4	
40+	2.2	0.7	
Occupation			17.661**
Student	27.0	59.3	
Employee	6.0	6.4	
Private work	-	0.5	
Non-working	0.4	0.4	
Income			42.637***
≤ 4000	17.7	46.0	
>4000-10.000	10.2	14.2	
>10.000-15.000	3.7	3.3	
>15.000	2.9	2.0	
Residence area			13.151*
City	24.4	43.6	
Village	9.1	22.2	
Hajer (small village)	-	0.7	
Education			40.017***
Primary & preparatory	0.2	3.3	
Secondary	2.5	10.1	
Higher education	30.7	53.2	

*p<0.05 ** p<0.01 ***p<0.0001

Table 6: Correlation Coefficient (Spearman) between Σ Measures of Awareness and BMI.

Awareness	BMI
Measure 1	0.080*
Measure 2	0.098**
Measure 3	0.187***
Σ Measures	0.153***

*p<0.05 ** p<0.01 *** p<0.0001

From Table 5, it was cleared that there are significant relationships between Σ measures of nutritional awareness about cancer and age, occupation, income, residence area, education of girls and woman. It was clear that nutritional awareness was low in age <18 years while, higher awareness was noticed at the age 18-28 years but, it still remains insufficient. Although the majority of the sample was students, 27% of them had a good knowledge about cancer-causing and preventive foods, but 59.3% of the students had misconceptions about cancer-causing and preventive foods. Knowledge increases in the low income earners and in cities, but it still remains insufficient. Low percentage of nutritional knowledge was found before secondary education and despite the increasing of knowledge in secondary education and higher education but, Saudi girls and women still needs rapid intervention to raise nutritional awareness.

There are correlation between BMI of females and measure 1 (knowledge of cancer) at p<0.05, measure 2 (knowledge about preventive foods and causing-foods) at p<0.01, measure 3 (eating habits) at p<0.0001 and finally Σ measures at p<0.0001(Table 6). All relationships are related to positive direction that is mean nutritional awareness increasing by the increasing BMI (BMI is influenced by the customs and traditions not only with the nutritional awareness).

4. Discussion:

According to what we know that there are no many studies to evaluate the knowledge of role of food and cancer. Most studies that have been assessment of knowledge in specific types of cancer (not nutritional awareness as risks and benefits), so our study is more details in cancer-causing or preventive foods.

The majority of sample was college students, their age raged between 18-28 years old and the mean age of the participants was 24.1±0.17. The most of participants were young adults who should find out more information on cancer before they reach the age of common occurrence of the disease. Similar findings were reported by ***Salaudeen et al., 2009***. Our results indicated that 40.3% of females had malnutrition (underweight, overweight and obesity), overweight and obese females in our study reached 26% and reached to 48% in the study of ***Al-Qauhiz, 2010***.

The major source of nutritional knowledge about cancer was different stages of education in the study (62.3%) and the lowest source of information was family and friends (20.7%). This is due to most of the participants from university. It might also be due to the fact that some of the parents have no information or knowledge on some of these topics and as such have little or nothing to discuss. These findings differ from what is reported by ***Nwagbo and Akpala, 1996***, ***Salaudeen et al., 2009 and Ravichandran et al., 2010*** and their studies concluded that the first source of information on breast cancer was the electronic media.

The general knowledge of cancer as definition and some facts about it (nature of cancer – impact of family history – stay lurking for years – places of injury - effect of foods). Generally, knowledge level of girls and women was good (Range from 69.6-81.5%). But, about 59.2% of sample was not aware of the importance of being a family member is injured. This results were in agreement with that reported by ***Dandash and Al-Mohaimeed, 2007***.

Evaluation of awareness of foods which prevent cancer, generally, knowledge of females was good in vegetables and fruits consumption. Except the use of vegetable oils, consumption of legumes and green tea, we think that lack of awareness of them to using Arabic coffee as national drink, high-energy-density diet with more animal fat. A large body of evidence from case-control and cohort studies has indicated that fruits and vegetables have a strong protective effect against various types of cancer (***Block et al., 1992 and Steinmetz and Potter, 1996***). Yellow and orange fruits and vegetables help to lower the cancer risk (***Khalid et al., 2011***). From our study we found that 70.1% from the participants know that the eating of orange vegetables and fruits lead to decreases the risk of cancer. ***Garcia et al., 2006*** found that the support evidence that olive oil has a protective role against breast cancer. Our results indicated that 27.9% of the participants only know that the use of vegetable oils such as olive oil for cooking lead to decreases the risk of cancer. Legumes consumption has been associated with reduced risk of certain cancers although the mechanisms underlying such effects are not clearly understood (***Smith, 2012***). Our results indicated that 27.7% of the participants know that the eating of legumes lead to decreases the risk of cancer. ***Min et al., 2002*** found that the increasing frequency and duration of tea drinking, especially green tea, can reduce the risk of ovarian cancer. From the obtained results we found 58.1% of the participants don't know that the drinking of green tea lead to decreases the risk of cancer.

Females awareness of foods which cause cancer was low especially red meat (80.9%), white sugar (83.9%), olive oil for frying (76.3%), stored nuts (79.2%), salted foods (77.3%). Previous results are harmonized with data available from food composition of dishes commonly consumed in the Arab Gulf countries showed a high content of sodium in these dishes. The high use of table salt, spices, and pickles, in addition to the salinity of water are contributing factors for the high intake of sodium in these countries. There has been a drastic change in food consumption patterns in the Arab Gulf countries. This change includes both quantitative and qualitative change in diet. The structure of diet has shifted towards a high-energy-density diet with more fat and added sugar in foods, more saturated fat (mostly from animal origin) and lower intake of complex carbohydrates, dietary fiber, fruits, and vegetables (***Musaiger et al., 2012***).

Results of this study concerning nutritional awareness about foods preventive-cancer such as vegetables and fruits are agreed with those reported by ***Cotugna et al., 1992*** but disagree with those foods causing cancer. Results of the study found 51.2% of the participants don't know that the eating of smoked food lead to increases the risk of cancer and this was disagree with those reported by ***Loreta et al., 2006*** who stated that eating salted or smoked meat as well as smoked fish increase risk of gastric cancer. Although, ***Ribeka et al., 2011*** found that higher consumption of red meat was associated with an increased risk of colon cancer among women. But, results of this study indicated that 48.6% and 80.9% of the participants don't know that the eating of processed and red meat lead to increases the risk of cancer, respectively. Several factors suggest that the link between high salted foods intake and the increase in stomach and rectal cancer is N-nitroso compounds such as N-nitrosodimethylamine (NDMA). Several studies have reported an association between NDMA and an increase in colorectal cancer (***Anderson et al., 1996, Dich et al., 1996 and Knekt et al., 1999***). Our results indicated that 22.7% of the participants only know that the eating of salted foods lead to increases the risk of cancer. High consumption of sugar and high-sugar

foods may be associated with a greater risk of pancreatic cancer (***Susanna et al., 2006***). From our study we found that 83.9% of the participants don't know that the eating of sugar lead to increases the risk of cancer. ***Bosett et al., 2002*** found that the consumption of fried foods is directly related to the risk of laryngeal cancer. Our results indicated that 59.8% of the participants don't know that the eating of fried foods lead to increases the risk of cancer. Regular consumption of soft drinks may play an independent role in the development of pancreatic cancer (***Noel et al., 2010***). Our results showed that 66.7% of the sample realize that soft drinks have harmful impact.

Concerning some eating habits results of this study indicated that 35.3% of girls and women read the food label. This finding lower than results obtained by ***Washi, 2012*** who reported that consumer's responses in United Arab Emirates showed general awareness for reading the food label (89.5%).

Chi-square proved that there are significant relationships between Σ measures of nutritional awareness about cancer and age, occupation, income, residence area, education of girls and woman. This results were in agreement with ***Cotugna et al., 1992***.

Conclusion

Results of this study indicated that Saudi girls and women need plans and programs to raise their nutritional awareness and instill healthy eating habits especially for the younger girls in primary, preparatory and secondary schools.

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