

Evaluation of Nutritional Status for Some Sensitive Sets and its Relationship to Natural Antioxidants

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Abstract

There exists a need to get the knowledge of natural antioxidants' sources as a result of several factors; perhaps most notably is the change in our lifestyle. Although modern life has become easier and more comfortable, it harms us in different ways. So, we should look for the best ways to support our health. Although our body manufactures antioxidants, we need additional quantities for protecting the body. Natural antioxidants are found in fresh vegetables, fruits, seafood and some nuts. Sport is essential for our health. The short period sports could increase the antioxidant production quickly too. Groups of children, adolescents, adults and elderly have been tested. A self-administered questionnaire asking about socio-demographic data, various forms of activities, dietary intakes and habits was used for data collection. The elementary schoolchildren were interviewed by structured interview to gather information. Therefore, there is a necessity to develop a nutrition education program in order to change lifestyle habits and avoid the negative health consequences.

Keywords

Natural antioxidants; Health; Sets

Introduction

Food with antioxidants helps us to resist the negative impact of the modern lifestyle. Antioxidants neutralize free radicals which help to oxidize our cells and which are encountered from many sources including exposure to radiation, smoking, inhalation of contaminated air, exposure to pesticides, some drugs taken to cure some diseases, foods containing preservatives, artificial hormones, or foods that contain saturated fats such as exist in abundance in junk food^[1].

Environmental studies provide evidence on the fact that mortality, dietary habits and cancer incidence are significantly correlated^[2]. During normal intercellular metabolic processes, free radicals are generated constantly. Nevertheless, an oxidative stress might occur if the concentration of these free radicals increases. This harmful situation might lead to awful destruction of bio-molecules in the body. As consequence, cellular functions are impaired resulting in diseases and cellular death. The oxidative injuries accumulate over time and participate in cancer

development, neurodegenerative and cardiovascular disorders as well as aging. Nutrient antioxidants such as vitamins C and E, carotenoids, polyphenols, and trace elements are considered powerful antioxidants and are involved in reducing destructive effects of reactive species. The immune system is extremely vulnerable to oxidant and antioxidant balance as the uncontrolled free radical production can degrade defense mechanisms and impair its function^[3]. Quercetin is an abundant dietary flavonoid widely present in many vegetables and fruits. In vitro, previous studies has shown that quercetin acts as an anti-inflammatory and antioxidant agent and it has potent anticarcinogenic properties as an apoptosis inducer^[4].

Recent investigations demonstrated that various plants ginger, garlic, black pepper and licorice have considerable antioxidant content. Their extract exerts noticeable antimicrobial activity^[5]. Srdic and Konic^[6] studied pomegranate, orange peel and ginger rhizomes as natural sources of antioxidants to improve palm tree oil properties. Different bioactivities have been associated with soy products such as antioxidant capacity; anti-inflammatory properties for decreasing cancer development risk have been scarcely studied^[7]. There was a study into the potential for antioxidants to ameliorate adverse effects induced by radiotherapy and chemotherapy^[8,9]. Various investigations provide evidence on how to preclude cancer and support the immune system. The goal of this research is to evaluate the nutritional status of some sensitive sets and their relationship to the natural antioxidants.

Materials and Methods

Study Population and Design

Design

Table 1 shows the study population. It consists of 267 samples (n=46 children 0-12 years; n=98 adolescents 13-21 years; n=111 adults 22-60 years; n=12 elderly over 60 years) during the period of study (1st of November 2015 through the end of April 2016). Males were not included in this study because according

Table 1. The Nutritional status of respondents by age.

| Sets | Age (Year) | Total (N) |
|-------------|------------|-----------|
| Children | 0-12 | 46 |
| Adolescents | 13-21 | 98 |
| Adults | 22-60 | 111 |
| Elderly | > 60 | 12 |

to the traditions of the Saudi community a female investigator is not allowed to access males.

All samples were selected randomly; children and adolescents were selected from several schools in different regions of the city of Taif and represented individuals from a wide cross-section of living conditions and categories. Permission for the study was obtained from the Ministry of Education.

Socioeconomic Status

First of all, we identified the socio-demographic characteristics of tested samples living in Taif City. The samples were asked to describe their occupational and educational status and their answers were confirmed by the school directors in the youth cases. The questionnaire included the following Socio-demographic data such as: age; residence; academic grade; marital status; father and mother education and occupation; family monthly income in Saudi Riyal; family size and crowding index (Table 2). Different forms including diseases history (Table 3) and information regarding physical activities were achieved by asking how many times per month, week and day^[10,11].

Nutritional Status

The questions designed for food categorization and intake frequency were asked from their memory; descriptions are listed in Merchant *et al.*^[12] and Cooper and Chifamba^[13]. Interviewees were asked to record the types of foods consumed in one week per day within the lists: fruits, vegetables, meats, dairies, pickles and sweets, etc. The response to each question was either yes or no, and each individual was given a score according to their response^[14].

Statistical Analysis

The samples replications data were subjected to (ANOVA) by using SPSS Inc. for Windows, Version 16 (SPSS Inc., Chicago, IL USA). The correlation between sets and the favorite cooking methods was determined by the principal component analysis (PCA) using XLSTAT software (KCS., LL75 8UY, United Kingdom).

Results

Nutritional knowledge shows that the elderly sample had the highest level of taking vitamins and mineral supplements (91%). Intake of nutritional supplements among the students was very low (Table 4). The dietary intake for children sample 43% of the children

Table 2. Socio-demographic factors among study samples.

| Variables | Children | | Adolescents | | Adults | | Elderly | |
|----------------------------|----------|--------|-------------|--------|--------|--------|---------|--------|
| | (N) | (%) | (N) | (%) | (N) | (%) | (N) | (%) |
| Marital Status | | | | | | | | |
| Single | 46 | 100% | 90 | 91.84% | 34 | 30.63% | 0 | 0.00% |
| Married | 0 | 0.00% | 6 | 6.12% | 73 | 65.77% | 6 | 50.00% |
| Divorced | 0 | 0.00% | 2 | 2.04% | 3 | 2.70% | 1 | 8.33% |
| Widow | 0 | 0.00% | 0 | 00.0% | 1 | 0.90% | 5 | 41.67% |
| Family Member | | | | | | | | |
| 1-3 | 8 | 17.39% | 40 | 40.82% | 3 | 2.70% | 3 | 25.00% |
| 4-6 | 16 | 34.78% | 14 | 14.29% | 11 | 9.91% | 1 | 8.33% |
| 7-10 | 10 | 21.74% | 15 | 15.31% | 21 | 18.92% | 2 | 16.67% |
| > 10 | 12 | 26.09% | 29 | 29.59% | 76 | 68.47% | 6 | 50.00% |
| Education | | | | | | | | |
| Illiterate | 13 | 28.26% | 1 | 1.02% | 3 | 2.70% | 5 | 41.67% |
| Primary | 33 | 71.74% | 3 | 3.06% | 10 | 9.01% | 2 | 16.67% |
| Middle and Secondary | 0 | 0.00% | 68 | 69.39% | 24 | 21.62% | 3 | 25.00% |
| University and Higher | 0 | 0.00% | 26 | 26.53% | 74 | 66.67% | 2 | 16.67% |
| Family Income/Month | | | | | | | | |
| SR 1,000-3,000 | 10 | 21.74% | 11 | 11.22% | 38 | 34.23% | 8 | 66.67% |
| SR 3,000-5,000 | 7 | 15.22% | 21 | 21.43% | 9 | 8.11% | 1 | 8.33% |
| SR 5,000-10,000 | 17 | 36.96% | 30 | 30.61% | 32 | 28.83% | 1 | 8.33% |
| Other | 12 | 26.09% | 36 | 36.73% | 32 | 28.83% | 2 | 16.67% |
| Food Expenses/Month | | | | | | | | |
| SR 0-500 | 8 | 17.39% | 1 | 1.02% | 2 | 1.80% | 1 | 8.33% |
| SR 500-1,500 | 18 | 39.13% | 15 | 15.31% | 25 | 22.52% | 5 | 41.67% |
| SR 1,500-4,000 | 13 | 28.26% | 44 | 44.90% | 57 | 51.35% | 4 | 33.33% |
| SR > 4,000 | 7 | 15.22% | 38 | 38.78% | 14 | 12.61% | 2 | 16.67% |

Table 3. Widespread diseases.

| Health Problems | Children | | Adolescents | | Adults | | Elderly | |
|-----------------|----------|--------|-------------|--------|--------|--------|---------|--------|
| | (N) | (%) | (N) | (%) | (N) | (%) | (N) | (%) |
| Diabetes | 0 | 0.00% | 1 | 1.02% | 6 | 5.41% | 5 | 41.67% |
| High Pressure | 0 | 0.00% | 0 | 0.00% | 22 | 19.82% | 8 | 66.67% |
| Dysentery | 0 | 0.00% | 3 | 3.06% | 3 | 2.70% | 1 | 8.33% |
| Constipation | 2 | 4.35% | 2 | 2.04% | 6 | 5.41% | 4 | 33.33% |
| Obesity | 7 | 15.22% | 18 | 18.37% | 33 | 29.73% | 5 | 41.67% |
| Slim | 10 | 21.74% | 6 | 6.12% | 6 | 5.41% | 1 | 8.33% |
| Alzheimer's | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 2 | 16.67% |
| Kidney Problems | 0 | 0.00% | 3 | 3.06% | 2 | 1.80% | 2 | 16.67% |
| Liver Problems | 0 | 0.00% | 0 | 0.00% | 4 | 3.60% | 0 | 0.00% |
| Colon Problems | 0 | 0.00% | 2 | 2.04% | 15 | 13.51% | 3 | 25.00% |
| Dental Problems | 46 | 10.00% | 40 | 40.82% | 23 | 20.72% | 12 | 10.00% |
| Anemia | 9 | 19.57% | 1 | 1.02% | 13 | 11.71% | 0 | 0.00% |
| Heart Disease | 0 | 0.00% | 4 | 4.08% | 0 | 0.00% | 0 | 0.00% |
| Osteoporosis | 1 | 2.17% | 3 | 3.06% | 13 | 11.71% | 3 | 25.00% |
| Cancer | 0 | 0.00% | 0 | 0.00% | 0 | 00.0% | 1 | 8.33% |

consumed red vegetables daily, 24% did not take dairy, about 40% did not take meat and 35% did not take any meat products at all (Fig. 1). 50% of the teenagers participating in this study indicated that they consumed white vegetables on a monthly basis, however, seafood intake was high, reaching up to 63% of this group consuming seafood each week. None in the adolescent group consumed meat or its products at all (Fig. 2). The adult population reported consuming seafood at a very low frequency of 7% for daily consumption, with 29% of the group never consuming seafood. About 24% and 27% consumed green and red vegetables daily, respectively (Fig. 3). In the elderly

population the daily consumption of dairy was almost 29%, with red vegetables consumption at 27% and seafood consumption at 4%. The consumption of green vegetables was 32% weekly. Up to 31% of this group did not consume yellow vegetables at all (Fig. 4).

Discussion

Table 4 shows the distribution according to the nutritional knowledge. According to the results, most of our samples had low levels of eating fruits and vegetables, while they had high levels of eating pickles, nuts and desserts. So these results confirmed

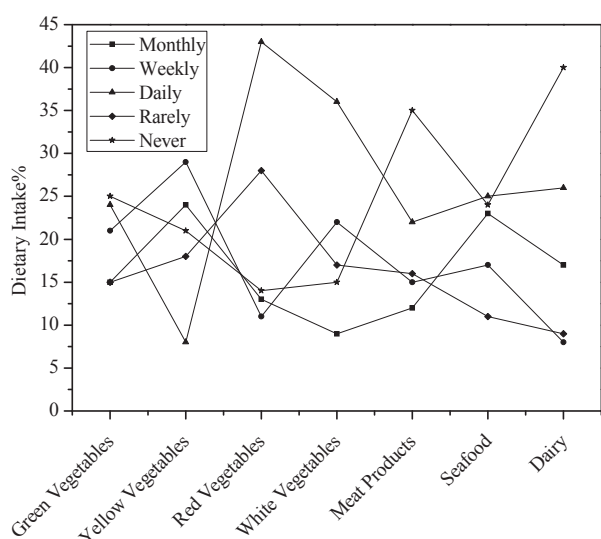


Figure 1. Sample's knowledge about nutritional habits.

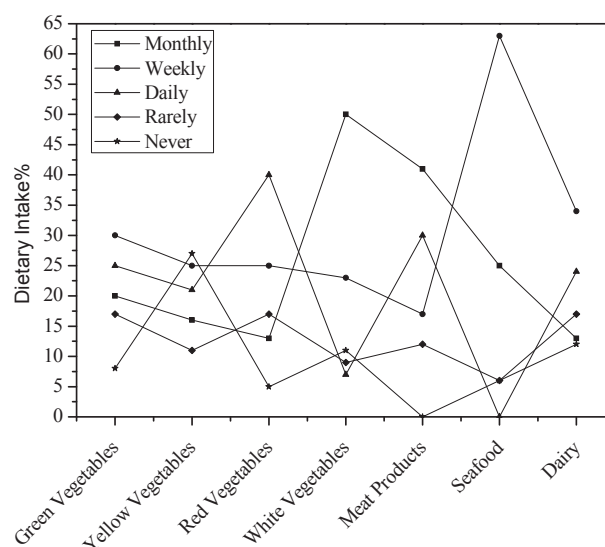


Figure 2. Dietary intake performance for adolescents.

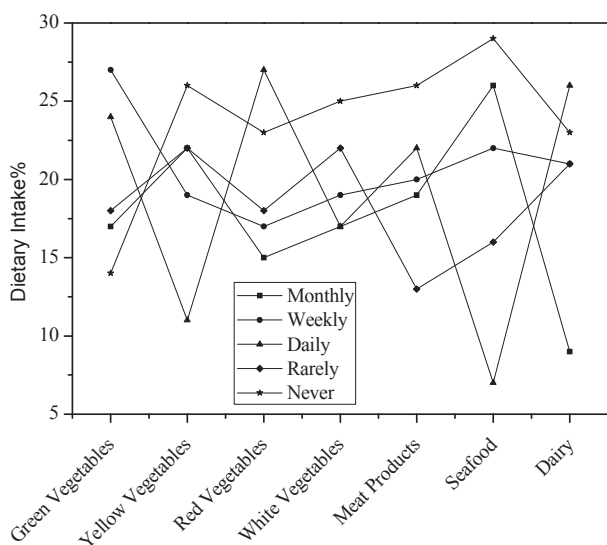


Figure 3. Dietary intake performance for adults.

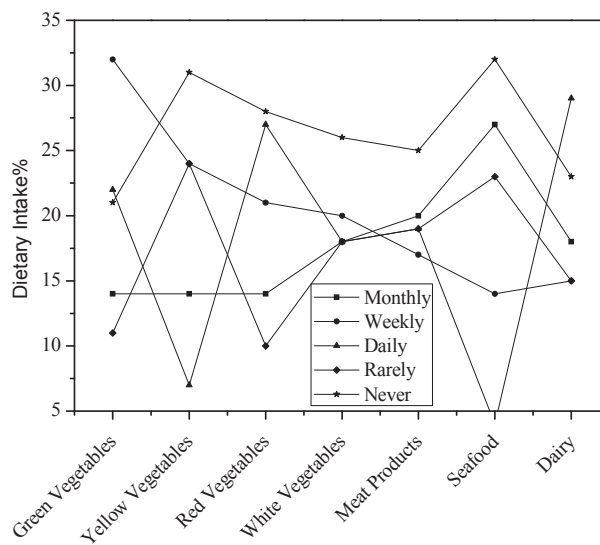


Figure 4. Dietary intake performance for elderly.

Table 4. Sample's knowledge about nutritional habits.

| Items | Children (%) | | Adolescents (%) | | Adults (%) | | Elderly (%) | |
|--|--------------|--------|-----------------|--------|------------|--------|-------------|--------|
| | Yes | No | Yes | No | Yes | No | Yes | No |
| Does almost your food is proteins? | 35.22% | 64.78% | 29.11% | 70.89% | 34.03% | 65.97% | 28.88% | 71.22% |
| Does almost your food is carbohydrates? | 39.40% | 60.60% | 36.05% | 63.95% | 34.87% | 65.13% | 27.03% | 72.97% |
| Does almost your food is full of fat? | 6.52% | 93.48% | 27.65% | 72.35% | 15.50% | 84.50% | 18.63% | 81.37% |
| Do you eat fruits and vegetables daily? | 20.71% | 79.29% | 8.00% | 92.00% | 17.43% | 82.57% | 27.20% | 72.80% |
| Do you always eat pickles daily? | 58.88% | 41.12% | 83.05% | 16.95% | 80.90% | 19.10% | 94.50% | 5.50% |
| Do you eat nuts daily? | 31.02% | 68.98% | 87.67% | 12.33% | 85.5% | 14.5% | 75.71% | 24.29% |
| Do you eat desserts daily? | 93.63% | 6.37% | 85.81% | 14.19% | 97.66% | 2.44% | 82.00% | 18.00% |
| Do you always take vitamins and mineral supplements? | 15.32% | 84.68% | 33.50% | 66.50% | 47.01% | 52.99% | 91.42% | 8.58% |
| Do you always walk, jog or run? | 74.70% | 25.30% | 80.60% | 19.40% | 86.76% | 13.24% | 54.43% | 45.57% |

the previous health problems in this study. Our study was consistent with previous studies^[15,16]. Similar findings were reported among university students of Taif, as less than half of them (40.5%) consume the weekly adequate amounts of vegetables and fruits^[17]. The majority of the tested samples do some physical activities. Sport and physical inactivity are considered an independent risk factor of several chronic diseases such as hypertension, coronary heart disease and diabetes. Studies also proved that continuous exercise is associated with a decrease in all causes of mortality^[18].

Figure 1 shows the dietary intake frequency for the children sample. Low intake of fruits and vegetables observed among the studied students may be due to the low content of vegetables in most Saudi meals as Mandy and Kabsa^[19]. Other reasons are the increasing intake of animal products and refined foods in the Saudi Arabian diet at the expense of fruits and vegetables, and the uncommon intake of raw vegetables and fruits in the course of meals among the Saudi population^[20]. It has been demonstrated that inadequate eating patterns is widespread among teenagers, mainly males. In fact, it is well documented that during adolescence, both males and females start developing their autonomy^[21]. Similar data of low vegetable and fruit intakes were reported on adolescents and university students in United Arab Emirates, Iran and Syria^[22-24]. Similar results were observed from a study done in Riyadh, Al-Khobar and Jeddah Cities^[25], and from a study done on male university students in Qassim and Dammam Cities^[26].

Principal Component Analysis

Figures 5 and 6 illustrate the plots of the scores and the corresponding correlation loadings of the PCA, respectively. The scores plot of PCA illustrates the

large variability of the four different sets on the basis of their favorite cooking methods. Our study was in agreement with the previous study^[19]. It stated that the consumption of raw fruits and vegetables is uncommon among Saudis. Each principal component was defined by coefficients, which are loading of the initial. Inertia percentage and correlated variables for axes 1 and 2 are presented in Table 5. Axis 1 shows 63.67% of the total inertia. 23.65% of the inertia is given by axis 2, which was positive by all sets. The inertia was negative in the children set. In Figure 5 are represented the plots of the scores, which shows the distribution of the data according to two axes. With respect to the explanatory variables, Figure 6 shows three clusters of cooking methods. The first cluster included the boiling and stewing. The second cluster included grilling and frying. The third cluster (raw and evaporating) was individualized.

Study Limitations

The data of the present study are limited due to several reasons: data collection was by self-administered questionnaire and may be subject to missing data or recall bias; study sample included females only, so the result cannot be taken to apply in general for the same

Table 5. Discriminate variables factors of principal analysis components of the favorite cooking methods .

| | F1 | F2 |
|-----------------|--------|-------|
| Proper value | 2.55 | 0.95 |
| Variability (%) | 63.67 | 23.65 |
| Cumulative (%) | 63.67 | 87.32 |
| Children | -27.32 | - |
| Adolescents | +32.77 | 1.25 |
| Adults | +36.5 | 1.79 |
| Elderly | -3.42 | +96.5 |

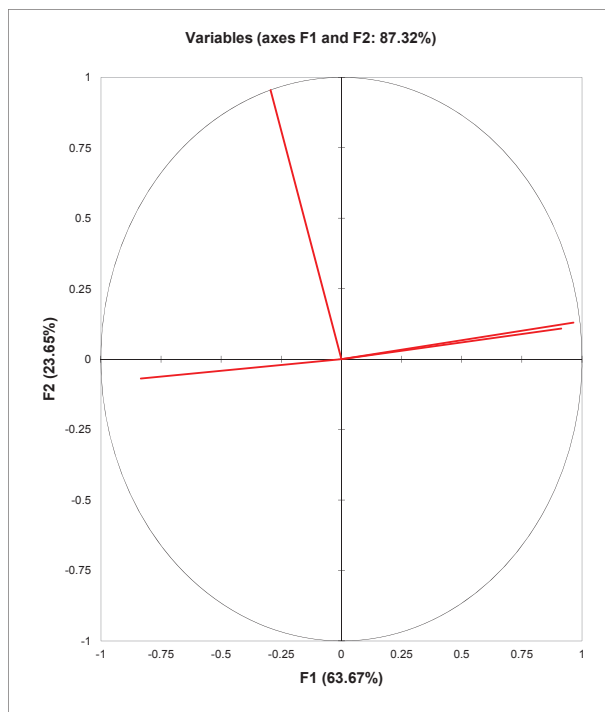


Figure 5. Plots of the scores.

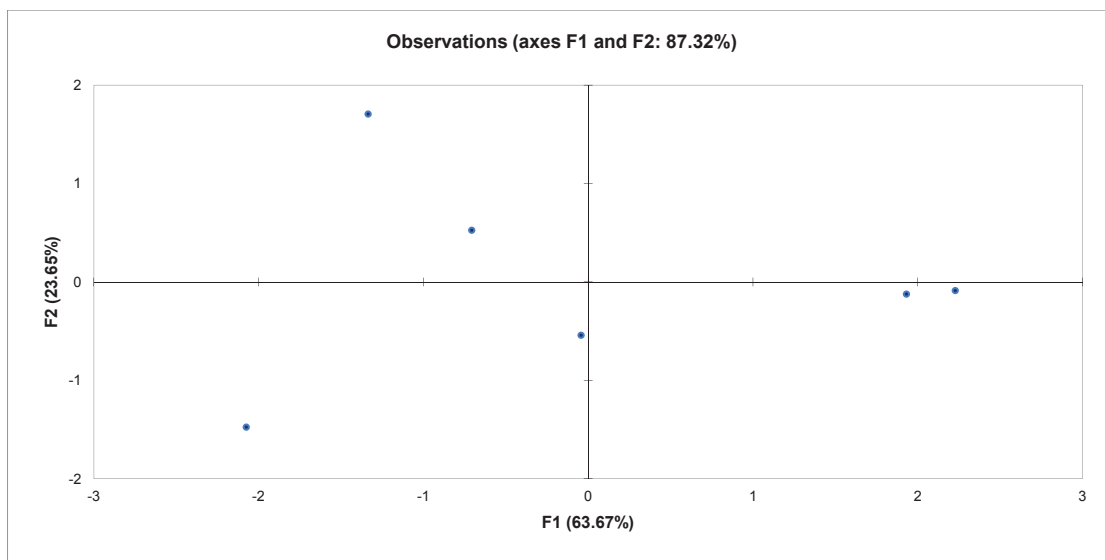


Figure 6. Plots of the x-loadings.

age. Further, women may feel ashamed to admit to certain habits in Saudi Arabia.

Conclusion

Based on our data, nutritional problems were mostly due to dramatic lifestyle changes among people in Saudi Arabia such as less daily activity, physical inactivity, consumption of a non-healthy diet and sedentary behaviors correlated with a high family monthly income. In light of our results, we recommend that more studies are necessary among males and females in Saudi Arabia for more investigations. Also, results recommend additional education in nutrition to eliminate the errors related with the food intake of the nutritional antioxidant supplies.

Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

Disclosure

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Ethical Approval

Obtained.

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تقييم الحالة الغذائية لبعض الفئات الحساسة وعلاقتها بمضادات الأكسدة الطبيعية

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المستخلص. ان تغير نمط معيشتنا وكل ما يصاحبها من رفاهية ادى الى تغير عاداتنا الغذائية والتي تسبب لنا مشاكل صحية. لذلك ظهرت الحاجة لمعرفة الاغذية التي تقاوم الاثار السلبية للعادات الخاطئة ومنها مضادات الاكسدة الطبيعية، والتي تدخل الى الجسم مباشرة عن طريق الغذاء، حيث انها تعمل على التخلص من الجذور الحرة، والتي تحدث نتيجة عدة عوامل خارجية والتمثلة في بعض العوامل مثل للإشعاع، التدخين، الهواء الملوث، المبيدات الحشرية، بعض انواع الأدوية التي نتناولها لمعالجة الأمراض، تناول الأغذية المحتوية على مواد حافظة، الهرمونات الصناعية وتناول الأغذية المحتوية على الدهون المشبعة كالوجبات السريعة. وعلى الرغم من أن أجسامنا تصنع مضادات للأكسدة إلا أننا نحتاج إلى كمية إضافية لتعزيز حماية الجسم والتي يمكن ان نجدها في المصادر الطبيعية كالخضراوات الطازجة والفواكه والأغذية البحرية وبعض المكسرات. تعد الرياضة ايضا من محفزات الجسم لإنتاج مضادات الأكسدة، لذلك فان القيام بالرياضات القوية ولفترة زمنية قصيرة قد يكون من شأنه مضاعفة انتاج مضادات الأكسدة بالجسم. تم اجراء القيم على مجموعة من (الاطفال - المراهقين - البالغين - المسنين) حيث تم عمل استبيانات تتضمن النواحي الاجتماعية، الانشطة والعادات المختلفة وكذلك الماخوذ الغذاءى بحيث تمت الاستعانة ببعض المرشدين لتعبئة الاستمارات بالنسبة للمدارس الابتدائية. اظهرت النتائج الحاجة الى تطوير برامج التنقيف الغذاءى لكى يتم تغير العادات الغذائية لتجنب العواقب السلبية الصحية.