Time Trend Mortality of Egyptian Major Non-Communicable Diseases in Relation to Age, Vegetables and Fruits Intake

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Abstract

Background: The relationship between fruit and vegetables intake and mortality with implications for health policy has been studied to assess the protective effect of vegetables and fruits on major non- communicable diseases (NCDs) such as cardio- vascular, respiratory gastrointestinal and cancer.

Aims: To study the relationship between vegetables and fruits intake, NCDs, age group (0- 18) years and gender.

Methodology: It is a cross- sectional descriptive secondary data study obtained from Central Agency for Public Mobilization and Statistics, and Egyptian Ministry of Agriculture along the years 2009 to 2015 Statistical Analysis was done by Epi Inf 7, CDC 2016.

Results: Results indicated that the amount of vegetables and fruits consumption per each year showed statistically significant relation effects on prevention of the major non- communicable The major NCDs leading cause of mortality among Egyptians are; CVDs, digestive diseases, respiratory diseases, and cancer (66.37%, 14.16%, 10.96%, and 8.52%, respectively). Multiple regression analysis for the studied predictors, i.e. vegetable intake and fruits intake [Kgm/year and gm/days] show m R= 1.0 for CVDs (P= 0.006). The most important predictor is in this model, beta= - 3.901(P= 0.007) for fruit intake in Kgm/year.

Recommendation: It is to encourage public more consumption of fresh fruits for prevention of those major non- communicable diseases.

Keywords: NCDs Mortalities CVDs Cancer Respiratory Digestive Vegetables Fruits Intake Age Gender.

معدل الوفيات من أمراض المجتمعية غير معدية وعلاقتها مع السن وتناول الخضراوات والفاكهة في جمهورية مصر العربية

الخلفية: العلاقة بين تناول الفاكهة والخضراوات ومعدل الوفيات وتطبيقها على السياسة الصحية للدولة، تم دراستها بتقييم وسائل الحماية بتناول الخضراوات والفاكهة من الأمراض المجتمعية غير المعدية، مثل أمراض الأوعية الدموية والجهاز التنفسي والجهاز الهضمي والسرطان.

الهدف: دراسة العلاقة بين تناول الخضراوات والفاكهة ومعدلات الأمراض المجتمعية غير المعدية في أعمار الأطفال حتى سن ١٨ والتباين بين الجنسين.

الخطة: دراسة تحليلية توصيفية لاستخدام نتائج من دراسات سابقة من الجهاز المركزي للتعبئة العامة والإحصاء ووزارة الزراعة من سنة ٢٠٠٩ إلى ٢٠١٥.

التحليل الإحصائي: باستخدام Epi Inf 7, CDC 2016.

النتائج: نتائج الدراسة أظهرت أن كمية الخضراوات والفاكهة المتناولة في كل عام أظهرت علاقة مؤثرة للحصانة ضد الأمراض المجتمعية غير المعدية، وهي أمراض الأوعية الدموية ٦٦,٣٧% والجهاز الهضمي ١٤,١٦% والجهاز التنفسي ١٠,٩٦% والسرطان ٨,٥٢% على الترتيب من حيث معدلات الإصابة.

التوصيات: ذلك لتشجيع تناول الخضراوات والفاكهة الطازجة بصفة عامة للحصانة ضد الأمراض المجتمعية غير المعدية.

الكلمات الدالة: الأمراض المجتمعية غير المعدية، أمراض الجهاز الدوري، أمراض الجهاز التنفسي، أمراض الجهاز الهضمي، السرطان، الفاكهة والخضراوات، السن والجنس.

Introduction:

Fruit and vegetables intake is considered as a main component of a healthy diet for their role in the prevention of chronic diseases (Daucher et.al., 2006).

Cardiovascular disease and cancer are known as the two leading causes of mortality all over the world (Hu, 2008). Recently, the relationship between fruit and vegetables intake and mortality has been studied, with implications for health policy. Interpreting this relationship is important to guide consumer choices and help establishing dietary guidelines with the aim of reducing risk.

Several meta analyses have studied the protective effect of fruit and vegetables on CVD (Van't Veer et.al., 2000). This has been supported by recent results from a large scale study using data from the European Prospective Investigation into Cancer and nutrition (EPIC) cohort (Decramer, 2011).

The protective effect of fruit and vegetables intake on cancer has been studied for more than 30 years, but none have been firmly established. Concerning upper gastrointestinal tractcancers, a moderately reduced risk have been observed in people with a relatively high intake of fruit and vegetables. However, possible confounding factors by smoking and alcohol must be taken into consideration. As regards lung cancer, recent large prospective analyses, and after detailed adjustment for smoking, have failed to show protective effect of fruit and vegetable intake on lung cancer (Steinmetz et.al., 1996).

On the other hand, studies have shown little or no association between fruit and vegetable intake and risk of other common cancers such as colorectal, breast and prostate cancer. However, there may be benefits that have not been identified yet. Actually, benefits could be apparent in people with low average consumption of fruit and vegetables evidenced by the fact that populations eating moderate amounts of fruits and vegetables have a reduced cancer risk than those eating very small amounts. Moreover, as composition of fruit and vegetables are varied, there could also be effects of particular nutrients in certain fruits and vegetables (WHO, 2008).

Based on the previous data, healthy diets should include at least moderate amounts of fruit and vegetables, as higher levels would not have much effect on cancer rates. It is now recommended to consume adequate amounts of fruit and vegetables and emphasize mainly on adverse effects of obesity and high alcohol intakes. In 1990, the WHO recommended a minimum daily intake of 400 g of fruit and vegetables, guided by the fact that it is protective against cardiovascular disease (CVD) and some cancers.

Methodology:

It is a cross- sectional descriptive secondary data study obtained from Central Agency for Public Mobilization& Statistics& Egyptian Ministry of Agriculture along the years 2009 to 2015 to show the relationship between fruit and vegetable consumption and prevalence of non communicable diseases. Statistical Analysis was done by Epi Inf 7, CDC 2013.

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Results And Discussion:

Table (1) Frequency Of Mortality From Birth To 18 Years, Of Male Ncd, Egypt (2009- 2015)

Year / Disease	2009	2010	2011	2012	2013	2014	2015	Total
Cancer	16089	17172	17099	18081	18423	19600	18904	125368
CVDs	97987	94233	9474	101993	135437	134864	144060	803315
Resp S.	13627	14196	14593	16385	22108	22820	24083	127812
Digestive S.	30693	32725	34169	35464	35203	36163	35023	239440

S.= System, Chi2= 5862.4, p= 0.000001

Table (2) Percent Of Mortality From Birth To 18 Years, Of Male Ncd, Egypt (2009- 2015)

Year / Disease	2009%	2010%	2011%	2012%	2013%	2014%	2015%
Cancer	10.20	10.85	10.64	10.52	8.72	9.18	8.51
CVDs	61.86	59.52	58.99	59.32	64.14	63.18	64.87
Resp S.	8.60	8.97	9.09	9.53	10.47	10.69	10.84
Digestive S.	19.38	20.67	21.28	20.63	16.67	16.94	15.77

S.= System,

Table (3) Frequency Of Mortality From Birth To 18 Years, Of Female Ncd, Egypt (2009- 2015)

Year / Disease	2009	2010	2011	2012	2013	2014	2015	Total
Cancer	11974	13433	13355	13960	15050	15749	15842	99363
CVDs	92723	88919	84601	92271	113870	119952	126710	719046
Resp S.	11678	12417	12153	13655	19142	19474	20609	109128
Digestive S.	18006	18883	20342	21624	21335	22427	22726	145343

S.= System, Chi2= 2506.2, p= 0.000001

Table (4) Percent Of Mortality From Birth To 18 Years, By Percent Of Female Ncd, Egypt (2009- 2015)

Year / Disease	2009%	2010%	2011%	2012%	2013%	2014%	2015%
Cancer	8.91	10.05	10.24	9.87	8.88	8.87	8.52
CVDs	69.00	66.53	64.85	65.20	67.22	67.54	68.17
Resp S.	8.69	9.29	9.32	9.65	11.30	10.96	11.09
Digestive S.	13.40	14.13	15.59	15.28	12.59	12.63	12.23

S.= System

Table (5) Frequency Of Total Mortality From Birth To 18 Years, Of Both Sex Of Ncd, Egypt (2009- 2015)

Year / Disease	2009	2010	2011	2012	2013	2014	2015	Total
Cancer	28063	30605	30454	32041	33473	35349	34746	224731
CVDs	190710	183152	179342	194264	249307	254816	270770	1522361
Resp S.	25305	26613	26746	30040	41250	42294	44692	236940
Digestive S.	48699	51608	54511	57088	56538	58590	57749	384783

S.= System, Chi2= 7990.1, p= 0.000001

Table (6) Percent Of Mortality From Birth To 18 Years, Of Both Sex Of Ncd, Egypt (2009- 2015)

Year / Disease	2009%	2010%	2011%	2012%	2013%	2014%	2015%
Cancer	9.59	10.48	10.46	10.22	8.80	9.04	8.52
CVDs	65.13	62.73	61.62	61.98	65.51	65.16	66.37
Resp S.	8.64	9.11	9.19	9.58	10.84	10.82	10.96
Digestive S.	16.63	17.68	18.73	18.21	14.86	14.98	14.16

S.= System

Table (7) Correlation of major NCDs mortalities and vegetable intake

Major Ncds	Vegetable intake in Kgm/y	P Value	Vegetable intake in gm/d	P Value
CVDs	- 0.914	0.000	- 0.977	0.000
Digestive	- 0.979	0.000	- 0.984	0.000
Respiratory	- 0.982	0.000	- 0.985	0.000
Cancer	- 0.983	0.000	- 0.985	0.000

Table (8) Correlation of major NCDs mortalities and fruits intake

Major Of Ncds	Fruits Intake in Kgm/Y	P Value	Fruits intake in gm/d	P Value
CVDs	- 0.969	0.000	- 0.996	0.000
Digestive	- 0.997	0.000	- 0.998	0.000
Respiratory	- 0.997	0.000	- 0.998	0.000
Cancer	- 0.998	0.000	- 0.998	0.000

Table (9.1) Multiple regression analysis of major NCDs mortalities and vegetables and fruits intakes

Major Of Ncds	Multiple R	F	P Value
CVDs	1.0	16429.6	0.006
Predictors; Vegetable& Fruits intake	Standardized Coefficients, Beta	t	Significant
Fruits intake, Kgm/y	Beta= - 3.901	- 87.244	0.007
Fruits intake, gm/d	4.748	106.182	0.006

Note; Vegetable intake kgm/y and vegetable intake gm/d, excluded from analysis

Table (9.2) Multiple regression analysis of major NCDs mortalities and vegetables and fruits intakes

Major Of Ncds	Multiple R	F	P Value
Cancer	0.993	74.979	0.081
Predictors; Vegetable& Fruits intake	Standardized Coefficients, Beta	t	Significant
Fruits intake, Kgm/y	Beta= 6.691	10.143	0.063
Fruits intake, gm/d	- 7.199	- 10.912	0.058

Note; Vegetable intake kgm/y and vegetable intake gm/d, excluded from analysis

Table (9.3) Multiple regression analysis of major NCDs mortalities and vegetables and fruits intakes

Major Of Ncds	Multiple R	F	P Value
Digestive	0.969	15.722	0.176
Predictors; Vegetable& Fruits intake	Standardized Coefficients, Beta	t	Significant
Fruits intake, Kgm/y	Beta= 3.552	2.496	0.243
Fruits intake, gm/d	- 4.407	- 3.097	0.199

Note; Vegetable intake Kgm/y and vegetable intake gm/d, excluded from analysis

Table (9.4) Multiple regression analysis of major NCDs mortalities and vegetables and fruits intakes

Major Of Ncds	Multiple R	F	P Value
Respiratory	0.877	3.582	0.350
Predictors; Vegetable& Fruits intake	Standardized Coefficients, Beta	t	Significant
Fruits intake, Kgm/y	Beta= 0.802	0.283	0.824
Fruits intake, gm/d	- 1.728	- 0.609	0.652

Note; Vegetable intake kgm/y and vegetable intake gm/d, excluded from analysis

Circulatory system diseases such as rheumatic heart disease of childhood and adolescence are one of the leading causes of mortality (Pearson et.al., 1993) the table (5) shows the number between years (2009) and (2015) was total of 1522361 with total percentage of mortality rate per year in relation of total mortality shown in table (6).

The distribution of mortality rates among both sexes is shown in tables (1, 2, 3, 4) where total mortality of 803315 in males with percentage of total mortality shown in table (2), while in females was total of 719046 with percentages of total mortality shown in table (4).

In developing countries, the high morbidity rates of cardiovascular diseases are related to the increase in the prevalences of atherosclerotic diseases, also obesity, diabetes and hypertension play an important role (Murray et.al., 1996).

There is another similar predicted increase in cardiovascular disease mortality 124% and 107% increase among men and women in developing countries versus 78% and 56% increase among men and women in developed countries (Reddy et.al., 1998).

Epidemiological evidence suggests that dietary habits changes as increase the use of energy- dense diets with unhealthy fats, oils and sugars has contributed to an increase in cardiovascular diseases in developing countries (Hu, 2008).

Fruits and vegetables consumption has the potential to protect against cardiovascular diseases (Daucher et.al., 2005). Daucher and co- worker (2006) carried out meta analysis of cohort a studies and observed that the risk of developing coronary heart disease decreased by 4% for fruit and vegetable consumption for each additional portion per day intake and 7% for fruit consumption indicating that fruit offer a more protective effect in reduction the risk of developing coronary heart disease. In our present study tables (7, 8, 9, 10) show our results in terms of the effects of fruit and vegetable consumption on the prevalence of coronary heart disease.

The second cause of death offer cardiovascular disease is the gastro-intestinal system. The most common cause of gastro- intestinal morbidity leading to mortality is hepatitis C virus complications as liver cirrhosis portal hepatocellular carcinoma (WHO, 2010).

Total mortality from birth to 18 years of age from (2009) to (2015) is 384783 while percentage per year is shown in table (6). Tables (1, 2, 3, 4) show the total mortality and percentage per year in both males and females with total of 239440 in males and 145343 in females. The third causes of mortality is respiratory system disease which dramatically increased from 5.390 at (2008) up to 8% at (2014) in Egypt without any difference between both sexes (December, 2011).

The most common is (chronic obstructive Lung disease) which responsible for about 20% of mortality worldwide (Lodenkem et.al., 2013). Total mortality from birth to 18 years of age from (2009) to (2015) is 236940 while percentage per year is shown in table (6). Tables (1, 2, 3, 4) show the total mortality and percentage per year in both males and females with total of 127812 in males and 109128 in females.

An association between reduction risk of developing chronic obstructive pulmonary disease and fruit and vegetable consumption has been documented (Romance and Trenga, 2001). Epidemiological studies showed that higher fruit intake particularly can be associated with higher forced expiratory volume values and a better lung function (Tabak et.al., 2001).

The results of the present study shown in tables (7, 8, 9) which indicate to the amounts of fruits and vegetables consumption per each year in supporting these findings. The fourth leading cause of death in Egypt is cancers. The rates increase year by year from 5.4% at (2008) to 6.7% at (2014) without any notable differences between both sexes. Several risk factors lead to cancer mortality these include diet and physical activity, air pollution and reproductive health. The population attributable fraction for all cancer sites worldwide considering the joint effect of these factors is about 35% (Weiderpass, 2010).

Total mortality rate from birth to 18 years of age from (2009) to (2015) is 224731 while percentages per year are shown in table (6). Tables (1, 2, 3, 4) show total mortality rates and percentage per year with total of 125368 for males and 99363 for females.

Dietary factors are estimated to account for about 20% in developing

countries but it may decrease with fruit and vegetable consumption (WHO, 2008). Evidence from case- control and cohort studies has indicated that the intake of fruits and vegetables have a strong protective effect against various types of cancer and that people with a higher intake may have less risk than people with low or very low fruit and vegetable intake (Steimetz and Jansen, 1996). Van't Veer and co- workers (2000) indicated that people with higher intakes of fruits and vegetables could reduce the risk of developing cancer by 19%. These findings are in agreement with the results of our recent study which are shown in tables (7, 8, 9) with the consumption rates of vegetables and fruits between years (2009) and (2015).

Table (7, 8) shows the correlation between major non- communicable diseases mortalities and vegetables intake in Kgm/ year, gm/day and fruits intake in kgm/ year and gm/day respectively. All these negative associations are strongly, around- 0.914, and significant0.000. Moreover, Tables (9.1, 9.2., 9.3, 9.4) show multiple regression analysis for the studied predictors, i.e. vegetable intake and fruits intake [Kgm/ year and gm/ days] show multiple R= 1.0 for CVDs, P= 0.006. The most important predictor is in this model, beta= -3.901, P= 0.007 for fruit intake in Kgm/ year. Other multiple analysis models for cancer, digestive, and respiratory diseases are not significant.

References:

1. Daucher L, Amouye P, Dallongeville J (2005). Fruit and vegetable consumption and risk of stroke; a meta- analysis of cohort studies. **Neurol**. 65: 1193- 1197.

2. Daucher L, Amouye P, Hercberg S, Dallongeville J (2006). Fruit and vegetable consumption and risk of coronary heart disease: a meta- analysis of cohort studies. **J Nutr** 136: 2588- 2592.

3. Decramer M (2011): The European Respiratory Roadmap. **Multidiscip Respir Med**, 2011; 6(5): 272- 273.

4. Hu FB (2008): Globalization of food patterns and cardiovascular disease risk. **Circulation**. 2008; 118(19): 1913- 1914.

5. Loddenkemper R, Gibson GJ, Sibille Y (2003): **European Lung White Book: the first comprehensive survey on respiratory health in Europe**. Sheffield European Respiratory Society. 2003. pp. 16- 23

6. Murray CJL, Lopez AD (eds) (1996): **The Global Burden of Disease: A Comprehensive Assessment of Mortality and Disability from Diseases, Injuries, and Risk Factors in 1990 and Projected to 2020**. Boston, Mass: Harvard School of Public Health; 1996.

7. Pearson TA, Jamison DT, Trejo- Gutierrez H(1993): **Cardiovascular diseases**. In: Jamison DT, ed. Disease Control Priorities in Developing Countries. New York, NY: Oxford University Press; 1993: 577- 599.

8. Reddy KS, Yusuf S (1998): Emerging epidemic of cardiovascular disease in developing countries. **Circulation**. 1998; 97: 596- 601.

9. Romieu I, Trenga C (2001). Diet and obstructive lung diseases. **Epidemiol Rev** 23(2): 268- 287.

10. Steinmetz KA, Jansen JD (1996): Vegetables, Fruit and cancer prevention: a review. **J Am Diet Assoc** 96: 1027.

11. Tabak C, Arts IC, Smit HA, Heederik D, Kromhout D (2001). Chronic obstructive pulmonary disease and intake of catechins, flavonols and flavones: the MORGEN Study. **Am J RespCrit Care Med** 164(1): 61- 64.

12. Van't Veer P, Jansen MC, Klerk K& Kok FJ (2000). Fruits and vegetables in the prevention of cancer and cardiovascular disease. **Publ Health Nutr** 3: 103.

13. Weiderpass E. (2010): Lifestyle and cancer risk. **J Prev Med Public Health**. 2010 Nov; 43(6): 459- 7.

14. WHO (2008). **Population nutrient intake goals for preventing diet- related chronic diseases**. www. who. int/nutrition.

15. World Health Organization (2010): Secretariat. Viral hepatitis. **Sixty- Third World Health Assembly** A63/ 15, Provisional agenda item 11.12. Geneva: World Health Organization; 2010.