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Research Article

A Cross-Sectional Study on the Mediterranean Diet and its Association with Chronic Diseases on General Population in Saudi Arabia

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Abstract

Background: The relationship between the diet of an individual and health outcomes has been emphasized over the years. Chronic health problems particularly have gained popularity due to its association with bad eating habits. Over the years, studies conducted across the globe have linked processed foods and sugary foods to chronic illnesses such as coronary artery disease, dyslipidemia, cancer, hypertension, and obesity. Conversely, the Mediterranean diet is linked to reducing chronic illnesses and is encouraged as a healthier nutrition model across the world.

Objectives: The purpose of this study was to estimate the level of adherence to Mediterranean diet and to identify the association between Mediterranean diet adherence and presence of chronic diseases. Also, finding the proportion of the adult population in Saudi Arabia who have embraced the Mediterranean diet as a strategy to prevent chronic diseases and promote their wellbeing.

Methods: This study was conducted at King Abdulaziz University Hospital, Jeddah, Saudi Arabia. Individuals were aged 15-65 years and above who visited the hospital during the study period were included in the study. However, those below 15 years were excluded.

Results: A total of 100 participants in this study, the discussion of this study will focus on finding the association between the consumption of the Mediterranean diet and the reduction of chronic illnesses among the study population.

Conclusion: The Mediterranean diet plays a vital role in the prevention of chronic illnesses across the globe. It has been proven capable of eradicating the onset symptoms of chronic illnesses like overweight and obesity, cardiovascular diseases, cancers, and type 2 diabetes respectively.

Keywords: Mediterranean Diet; Saudi Arabia; Diet; Chronic Illnesses

Introduction

Background

The Mediterranean diet was first discovered by Angel Keys in the 1960s as a natural way of feeding in olive-growing areas [4]. This natural way encouraged the consumption of olive oil and the consumption of fish instead of red meat. Consequently, the natural way of feeding constituted a health-protective diet. Currently, the CDC encourages healthy food intake including the Mediterranean diet especially in the onset of a chronic illness. With

the implementation of the Mediterranean diet, individuals are able to gain a protective effect against chronic illnesses like obesity. Overall, the Mediterranean diet provides a protective effect against chronic illnesses due to its antioxidant, anti-inflammatory agents, and bioactive nutrient components.

Trends at the initial health care stage

Chronic diseases often last for more than a year and progress in different stages portraying varied symptoms. Chronic diseases have five major stages and the initial stage is when symptoms start to display and become unbearable to an extent of seeking medication. Studies have proven that managing the symptoms at the initial stage of a chronic disease enhances health promotion and prevention of the progression of chronic illness by 90% [1]. Diet adjustment is an evidenced-based intervention implemented at the initial stage of chronic illnesses. The Mediterranean diet has been recommended across the world as a healthier nutrition diet worldwide. The Mediterranean diet entails the consumption of polyunsaturated fatty acids and antioxidant vitamins. Several works of literature have revealed a reduction in the symptoms of breast cancer, type 2 diabetes, and cardiovascular diseases at the initial stages upon implementation of the Mediterranean diet. Besides, a randomized control study among retinopathy patients at their initial stage showed a 43% reduced risk of disease progression [10]. The disease progression reduction was due to the introduction of extra virgin oil a group of the Mediterranean diet for six years. Further, the Mediterranean diet has been proven to protect individuals against obesity and its complications due to the increased periods of chewing the pulp. Therefore, the Mediterranean diet plays a significant role in interrupting the progression of a chronic illness, especially at the initial stage.

Characteristics and association of the Mediterranean diet with chronic illnesses

The Mediterranean diet is composed of foods with essential nutrients that should be consumed on a daily, weekly, or monthly basis. The first characteristic of the Mediterranean diet is that they are rich in vitamins, minerals, and phytochemicals. The consumption of foods rich in vitamins, minerals, and phytochemicals such as whole grains is linked to reduced risks of chronic illnesses like coronary heart disease, cancer, type 2 diabetes, and cardiovascular disease. Similarly, the Mediterranean diet is rich in lutein, folic acid, beta carotene, and vitamins E, C, K, B2, and B6 [4]. The Mediterranean diet also consists of magnesium, zinc, iron, calcium, potassium, and components with similar antioxidant properties. Antioxidant components of food can reduce the harmful effects of reactive oxygen and free radicals as well as prevent cell cessation and insulin resistance. As a result, the antioxidant characteristics of the Mediterranean diet help individuals immune against chronic illnesses such as cancer, hypertension, type 2 diabetes, and atherosclerosis [1]. Further, the Mediterranean diet is a source of pulp, has low-fat content, and is composed of quercetin and resveratrol. Regular and moderate consumption of the Mediterranean diet is generally linked to the regulation of chronic illnesses. The Mediterranean diet prevents cardiovascular diseases due to its low fat and high fiber content. Research has shown that people need educational programs because the level of health knowledge is low especially the knowledge of CVDs [3]. Any health program has specific goals. Some of these goals are to increase patient's knowledge of the most critical diseases [9]. It improves the blood lipid profile, which decreases the risk of coronary thrombosis. Saturated fats like butter clog the arteries and blood vessels' walls to cause atherosclerosis [8].

Health effect of Mediterranean diet and its association with chronic illnesses

The characteristics of the Mediterranean diet have resulted in its rich mechanism in generating positive health effects in the human body. For instance, the Mediterranean diet antioxidant mechanism in reducing inflammatory effects in the body has proven to have a positive health impact on reducing the occurrence of cancers, cardiovascular diseases, type 2 diabetes as well as obesity among populations. Additionally, the Mediterranean diet has antiproliferative, vasodilatation, inhibits CoX2 synthesis, and as a result reducing the occurrence of cardiovascular diseases [10]. Mediterranean diet is composed of bioactive components i.e. the pulp which often increases the chewing process of food. Increased chewing of food tends to enhance and increase satiety, delaying the period of ejaculation and increasing the rates of cholecystokinin. As a result, the Mediterranean diet increased the chewing effect on food reduces the risks of overfeeding and eventually obesity.

Role of the Mediterranean diet and its association with chronic illnesses

The Mediterranean diet plays a significant role in preventing the occurrence of chronic illnesses and enhancing the longevity

of individuals. Research has shown the Mediterranean diet associated with the consumption of olive oil, high consumption of vegetables and fruits help to increase longevity [12]. Moreover, the Mediterranean diet plays a vital role in increasing the longevity of individuals through reductions of blood pressure, BMI and obesity, diabetes, and cardiovascular disease. The Mediterranean diet rich in fish, grains, vegetables, and fruits also helps regulate the occurrence of age-related neurodegenerative illnesses such as Alzheimer's, Parkinson's, and the different forms of dementia. Additionally, the Mediterranean diet helps reduce the incidences of breast cancer occurrence by approximately 35% as evidenced by a case-control study of women aged 25 to 74 years of age in Saudi Arabia [1]. More so, fending for the Mediterranean diet especially in Saudi Arabia is associated with tremendous physical activity. Physical activity plays an important role in energy expenditure and the prevention of overweight and obesity.

Impact of ignoring the Mediterranean diet and its association to chronic illnesses

The impact of ignoring the Mediterranean diet is dire and increases the chances of the occurrence of chronic illness. The Mediterranean diet can only be substituted with the westernized diet which is rich in processed foods and sugary foods that have high carbohydrates and calories. Unfortunately, increased consumption of foods rich in carbohydrates and calories while living a sedentary lifestyle highly increases the occurrence of chronic illnesses. Ignoring the adoption of the Mediterranean diet at the onset of a chronic illness results in the increased progression of the disease [2]. The Mediterranean diet has significant benefits to the body due to its richness in nutrients and antioxidant properties. It is therefore paramount that individuals embrace the Mediterranean diet at the early life stages and initial onset of a chronic illness to enhance their health and wellbeing.

Prevention and control of the Mediterranean diet and its association to chronic illnesses

The Mediterranean diet is considered one of the healthiest diets a human could consume in the world. Current scientific evidence supports the role of the Mediterranean diet in the prevention and control of chronic illnesses. The Mediterranean diet is designed to compose varied food components that can be consumed in moderation and enjoyment. Rich nutrients and components of the Mediterranean diet results in positive mechanisms that help in health promotion [10]. Often, toxicologists argue that the dose makes the poison. There are yet studies done on the effects of excessive consumption of the Mediterranean diet. However, it does not rule out the possibility of negative impacts that may arise from misuse of the Mediterranean diet. Because health knowledge is important for people, the negative consequences of health literacy such as more than 647,000 people die in the US annually because of heart disease [11]. The morbidity and mortality rate have direct links with the level of people health literacy [7]. All in all, the active health promotion of the Mediterranean diet may offer health benefits and reduce the occurrence of chronic illnesses among populations of Saudi Arabia.

Objectives

The purpose of this study was to estimate the level of adherence to Mediterranean diet and to identify the association between Mediterranean diet adherence and presence of chronic diseases. Also, finding the proportion of the adult population in Saudi Arabia who have embraced the Mediterranean diet as a strategy to prevent chronic diseases and promote their wellbeing.

Methods

This cross-sectional study was conducted for 2 months, from September 15th to November 12th, 2020 at King Abdulaziz University Hospital, Jeddah, Saudi Arabia. Individuals were aged 15-65 years and above who visited the hospital during the study period were included in the study. However, those below 15 years were excluded.

This electronic questionnaire consisted of three major parts with a series of questions. The first part is demographics: age, gender, marital status, occupation, and education level. The second part is nutritional and health behaviors during the last 6 months which aimed to answer questions on diet levels of individuals, fruits and vegetable units consumed in a day, application of olive oil in culinary, servings of fish or seafood within a week, amount of water consumed in a day, and the number of times an individual engages in physical activities within a week. The third and final part of the questioner was family history during the last year. This section was designed with questions on the presence of chronic illness among individuals and other family members, and how often the participants visited a healthcare facility. Therefore, the purpose of this study is to find the proportion of the adult population in Saudi

Arabia who have embraced the Mediterranean diet as a strategy to prevent chronic diseases and promote their wellbeing.

Results and public health implications

Results

Socio-demographic characteristics of the study participants

The socio-demographic factors examined in this study include age, gender, marital status, occupation, income, and education level respectively. The mean age for the participants of this study was 31.49 years (SD = 2.95; age range 15-65 years) with the majority of participants being female (61%). Besides, more than 75% 0f the participants were married while 22% were never married and 3% were divorced. Additionally, 99% of participants had attained more than the primary level of education. Overall, the socio-demographic data are presented in appendix A (Table 1).

Variables		Frequency	Percent
Age			
	15-19	9	9
	20-30	49	49
	31-45	32	32
	46-65	10	10
Gender			
	Male	39	39
	Female	61	61
Marital Status			
	Married	75	75
	Never married	22	22
	Divorced	3	3
	Widowed	-	-
Occupation			
	Teacher	8	8
	Student	33	33
	Military	7	7
	Retired	4	4
	Housewife	14	14
	Other Job	25	25
	Unemployed	9	9
Income			
	Less than 3000 Riyal	26	26
	3000 Riyal to less than 5000 Riyal	17	17
	5000 Riyal to less than 10000 Riyal	24	24
	10000 Riyal to less than 20000	22	22
	20000 Riyal or more	11	11
Education Level			
	Postgraduate	33	33
	Bachelor	49	49
	Secondary	17	17
	Less than Secondary	1	1

Table 1: Demographics of Participants that has been Examined for Mediterranean Diet and Association with Chronic Disease.

The discussion of this study will focus on finding the association between the consumption of the Mediterranean diet and the reduction of chronic illnesses among the study population. Mediterranean diet helps reduce the occurrence of chronic diseases among individuals and promote health among individuals with chronic illnesses. Early detection of chronic illnesses while at its early stages allows individuals to emulate the Mediterranean diet which promotes health and wellness hence prolonging their longevity.

Nutritional and health behaviors

Nutritional and health behaviors of a population influence their health outcomes and the occurrence of chronic diseases. In this study, the nutritional and health behaviors of individuals show underutilization trends towards the daily use of the Mediterranean diet. The Mediterranean diet is designed to accommodate proteins, carbohydrates, fats, and other nutrients within acceptable levels [1]. As a result, the Mediterranean diet is nutritionally sound and incorporates diverse foods and flavors. Of the 100 participants, only 3% consume vegetables and fruits more than three times a

week while 21% do not consume vegetables and fruits. Similarly, only 29% of the participants have incorporated olive oil in their diet and 41% of individuals have not consumed seafood in the past 6 months. Additionally, 46% of the population have only drunk one to three cups per day in the past 6 months. Thus, the results show a bad trend in the utilization of the Mediterranean diet to prevent chronic illnesses among populations.

The Mediterranean diet should also incorporate healthy habits such as physical activities which is paramount to health and wellbeing. Insufficient physical activities are linked to the occurrence of chronic diseases like cancer, cardiovascular diseases, and diabetes. The Chronic Care Model has been developed (CCM) to enhance the quality of chronic care. This model helps the healthcare system to educate patients and it can be applied in the health care centers [13]. According to WHO, 1 out of 4 adults are not active and risk the occurrence of morbidities and mortalities [10]. Based on the results obtained from the study population, only 7 persons of the participants engage in daily physical activities. Contrariwise, 32 individuals out of the 100 participants never participate in any physical activity. Further, 47% of the study participants engage in physical activities one to three times a week while 14% do exercises four to six times a week. Table 2 shows the overall results of the nutritional and health behaviors of the participants. So, skills of managing health are too important to improve health literacy, some people don't have these tools such as the skills of managing health. As a result, Health centers face a problem to overcome these health issues. By cooperating people with the health centers, they can decrease the percentage of chronic diseases [5].

Variables		N	%
How would you describe your diet level?			
Bad	(n = 100)	15	(15%)
Good		59	(59%)
Very good		23	(23%)
Excellent		3	(3%)
How many fruit and vegetable units do you consume per day?			
One time a week	(n = 100)	66	(66%)
Two times a week		9	(9%)
More than three times a week		3	(3%)
Non		21	(21%)
Do you use olive oil as main culinary fat?			
Always	(n = 100)	29	(29%)
Sometimes		44	(44%)
Scarcely		20	(20%)
Never		7	(7%)
How many servings of fish or other seafood do you eat per week?			
One time a week	(n = 100)	53	(53%)
Two times a week		5	(5%)
More than three times a week		1	(1%)
Non		41	(41%)
How many cups water do you drink per day?			
One to three cups per day	(n = 100)	46	(46%)
Four to six cups per day		37	(37%)
More than six cups per day		17	(17%)
Physical Activity: How often do they exercise per week?			
One to three times a week	(n = 100)	47	(47%)
Four to six times a week		14	(14%)
Non		32	(32%)
Everyday		7	(7%)

Table 2: Nutritional and Health Behaviors during the last 6 months.

Family history during the last year

The occurrence of chronic illnesses in several countries across the globe shows an increasing trend. Similarly, the results showed a high trend in the occurrence of chronic diseases. Out of the 100 participants, 85% reported having a chronic illness and 63% have a member of the family with a chronic illness. The presence of chronic illness among individuals triggers the need to visit the hospital for regular check-ups [1]. Regular hospital check-ups help patients find a treatment plan and self-care management to promote their wellbeing. In this study, 30 individuals out of the 100 participants do not visit the hospital while only 9 persons visit the hospital more than six times. The results of family history are represented in Table 3 under Appendix 3.

Do you have any chronic disease?			
Yes	(n = 100)	85	(85%)
No		15	(15%)
Do you have any member of your family have chronic diseases?			
Yes	(n = 100)	63	(63%)
No		37	(37%)
How often do you visit the hospital?			
One to three times	(n = 100)	49	(49%)
Four to six times		12	(12%)
More than six times		9	(9%)
Non		30	(30%)

Table 3: Family History during the last year.

Association between the presence of chronic diseases and other factors

The age and gender of the study participants were subjected to chi-square analysis to establish the diet level and occurrence of chronic illnesses among individuals and family members. The results showed that both gender and age have no significant positive statistical relationship with diet and the occurrence of chronic illness. Statistically, when the p-value of variables is >0.05, the results are statistically insignificant hence the researcher fails to reject the null hypothesis. In this study, the p-value for diet level under age was 0.56, while the p-value for the occurrence of chronic illness among individuals was 0.32 and the p-value for chronic illness occurrence among family members was 0.18 respectively. The findings on age association also indicated the level of diet level increased with age and that of bad diel level decreased with age. The reason for this increase in diet level with age can be linked to health knowledge and awareness of the association between diet and chronic illness occurrence among elderly persons than among young people. So, research has shown that low levels of individual knowledge was poor outcomes even after removing confounding factors that help to decrease the percentage of knowledge [6].

Chi-square analysis further indicated no association between gender and diet level as well as chronic disease occurrence. Based on the results presented in Table 4, more females (70.49%) suffer from chronic illness than males (51.28%). Interestingly, many females (63.93%) consume a good diet level when compared to males (48.71%). The interpretation of these results is that there is no clear relationship between the gender of an individual and the implementation of a good diet level and the occurrence of chronic illness. For this reason, there are gaps in the association between diet level intake and the occurrence of chronic illness among males and females. Thus, it will be necessary to increase patient education and access to the Mediterranean diet to ensure the health and wellness of the entire population. Increased health education and access to the Mediterranean diet will help healthcare professionals to monitor and address factors such as economic status and education level that are more likely to increase the occurrence of chronic illness. Overall, the recommendation is to increase health education and address economic factors that expose individuals to the occurrence of chronic diseases.

	Diet Level (n = 100)				Participants have a Chronic Disease (n = 100)		Any member of family with chronic diseases (n = 100)	
Age	**Excellent**	**Very good**	**Good**	**Bad**	**(Yes)**	**(No)**	**(Yes)**	**(No)**
15-19	1 (10%)	2 (20%)	4 (40%)	3 (30%)	3 (33.33%)	6 (66.66%)	5 (55.55%)	4 (44.44%)
20-30	2 (4.08%)	13 (26.53%)	27 (55.10%)	7 (14.28%)	5 (15.62%)	27 (84.37%)	28 (57.14%)	21 (42.85%)
31-45	0 (0%)	6 (19.35%)	20 (64.51%)	5 (16.12%)	5 (10.20%)	44 (89.79%)	25 (78.12%)	7 (21.87%)
46-65	1 (10%)	2 (20%)	7 (70%)	0 (0%)	2 (20%)	8 (80%)	5 (50%)	5 (50%)
P-value	0.56				0.32		0.18	

Gender								
Male	1 (2.56%)	12 (30.76%)	19 (48.71%)	7 (17.94%)	20 (51.28%)	19 (48.71%)	5 (3%)	34 (3%)
Female	2 (3.27%)	11 (18.03%)	39 (63.93%)	9 (14.75%)	43 (70.49%)	18 (29.50%)	10 (16.39%)	51 (83.60%)
P-value	0.42				0.05		0.62	

Table 4: Association between the presence of chronic diseases and other factors.

Public health implications

The public health implications of the Mediterranean diet require that individuals who are most vulnerable to chronic illnesses are encouraged to embrace it. Vulnerable populations to chronic illnesses include the aging populations, individuals at the early stages of life who are exposed to childhood obesity, and persons with a genetic history of chronic illnesses. Encouraging individuals to embrace the Mediterranean diet through education on its benefits enhances life-long health promotion and chronic disease prevention. Besides, good health is significant if elderly populations are expected to remain independent and care for themselves as they age. Saudi Arabia being a Mediterranean region exhibits culinary activities, agriculture, and climate that encourage the thriving of the Mediterranean diet [2]. Therefore, populations in Saudi Arabia have no excuse for not embracing one of the healthiest diets that prevent the occurrence of chronic illnesses.

Conclusion

In summary, the Mediterranean diet plays a vital role in the prevention of chronic illnesses across the globe. Bad feeding habits characterized by calories and carbohydrates increase the occurrence of chronic illnesses among populations. Studies recommend individuals to embrace the Mediterranean diet which is full of the nutritious and antioxidant component which promotes wellbeing. As discussed earlier, the Mediterranean diet has been proven capable of eradicating the onset symptoms of chronic illnesses like overweight and obesity, cardiovascular diseases, cancers, and type 2 diabetes respectively. Further, the Mediterranean diet plays a vital role in enhancing the longevity of individuals while promoting their wellness and health. With regard to Saudi Arabia, already existing conditions support the utilization of the Mediterranean diet among populations. Overall, the Mediterranean diet plays a significant role in public health policies and health implications for health promotion and disease prevention.

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Conflict of Interest

Authors declare no conflict of interest.

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Authors' Contributions

Conceived and designed the analysis: S.R, MGH. Data collection: S.R. Data analysis: S.R, MGH Drafting of the manuscript: S.R, MGH. All authors contributed to and reviewed the final version of the manuscript.

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