Research Paper: Identifying the Dominant Dietary Patterns Among Adults in Gonabad City in 2019

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ABSTRACT

Background: A healthy diet is one of the most important aspects of health. Nowadays, scrutinizing dietary patterns rather than specific nutrients have prime importance. The purpose of this study is to dietary patterns among adults in Gonabad City in 2019.

Methods: In this cross-sectional study, 250 individuals aged 18-70 years living in Gonabad were selected by multistage random sampling from urban zones 1, 2, and 3 covered by community health centers. Regular dietary intakes of individuals over the past year were obtained using the food frequency questionnaire, and demographic characteristics were obtained via face-to-face interviews. Factor analysis was used to identify dominant dietary patterns. The relationship between dominant dietary patterns and demographic characteristics was assessed employing a Chi-square test.

Results: Participants' ages range from 36.40±13.16 years, of whom 44.8% were male, 82.4% were married and 60% were employed. Two healthy and unhealthy dietary patterns were identified. There was a statistically significant relationship between healthy dietary patterns and variables of age (P<0.001), sex (P=0.01), and occupation (P<0.001). Moreover, there was a statistically significant relationship between unhealthy dietary patterns with variables of age (P<0.001), sex (P=0.014), and the number of family members (P=0.035). Demographic characteristics are among the influential factors affecting the type of adult food pattern in Gonabad. It is suggested to consider demographic factors in determining the relationship between dietary patterns and disease.

Conclusion: Demographic characteristics are among the influential factors affecting the type of adult food pattern in Gonabad. It is suggested to consider demographic factors in determining the relationship between dietary patterns and disease.

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Introduction

Nutrition has a direct relationship with physical and mental health, and consuming enough nutrients helps to maintain one's health and efficiency [1]. A healthy diet can decrease the risk of progressive diseases such as cardiovascular diseases, obesity, cancers, and diabetes [2]. Food is one of the essential modifiable factors in health [3], and many patients tend to make changes to their diet to alleviate the pain caused by the disease [4].

Analysis of dietary patterns can provide researchers with more information on the etiology of nutritional diseases. The American Dietetic Association also suggests that good nutritional messages for people should emphasize on nutritional habits rather than foods [5]. Conceptually, the study of dietary habits is even harder in reality because people do not receive nutrients separately and eat different foods that can overlap or have a synergistic effect on each other [6-9]. Dietary patterns provide a good picture of the diets and nutritional habits of individuals in the community. Furthermore, these models help to identify people at risk of chronic diseases and provide appropriate advice [10]. Via identifying nutritional patterns of each region, nutritionists can offer dietary recommendations to improve dietary habits. Nutritionists need to consider the relevance of demographic factors with dietary habits to design nutrition programs, nutrition education, and nutritional interventions for different groups of society [8, 11].

Information on dietary patterns in Iran is limited and sometimes even contradictory [2, 3, 12-16]. Nutrition problems are associated with adverse social, economic, and health consequences. These outcomes include reduce workforce, increase in treatment costs, increase in mortality rates and diseases, reduce the Intelligent Quotient (IQ) and learning skills, and generally decrease in mental and physical abilities that put the country at risk. Given the high prevalence of non-communicable diseases related to nutrition, and no study of nutritional patterns in Gonabad City, Iran, This study aims to determine the dominant dietary patterns in adults living in Gonabad in 2019.

Methods

This study was a cross-sectional analytical study. The study population consisted of male and female adults living in Gonabad City in 2019. For the factor analysis, 24 food groups of dominant dietary patterns were studied based on Table 1 [8]. For each variable, at least 10 people were needed [17, 18], so the sample size was set at 240 individuals. To account for the 10% dropout, the final sample size was set at 264. The samples were selected using multistage random sampling, using a combination of simple, systematic, and random cluster sampling methods. The sampling method was tested on the patients who referred to Gonabad health centers. Then based on the number of populations covered by that center, the required sample size was calculated, and several clusters were selected. In each zone, based on the systematic sampling of each family, one eligible person in a family was randomly interviewed and completed the questionnaires.

The inclusion criteria were aged between 18 and 70 years, Gonabad resident for at least 5 years, stable physiological and psychological status, and Farsi literate to answer questions. Pregnant or breast-feeding women, people with a history of chronic diseases, people with disorders of the thyroid gland, and weight loss or obesity diet, were excluded [19]. After obtaining written informed consent, the researchers collected demographic and nutritional information of the samples via interview and completing the food frequency questionnaire. Those who didn't respond to more than 50% of the food frequency questionnaire were excluded [16, 20, 21], so 250 remained for the final analysis.

Dietary information was collected by the food frequency questionnaire containing 168 types of nutrients along with a standard amount of each nutrient for individuals. The participants were asked to report their consumption frequency of each food item in the past year by the type of food on a daily (e.g., bread), weekly (e.g., rice), or monthly (e.g., fish) basis. The values listed for each meal were calculated using the home-scale guide to grams, then the gram intake of each food per day was calculated for each individual [7]. Food items are grouped into one factor based on their degree of correlation. Each score for a particular dietary pattern was calculated by multiplying the amount of each food consumed in that pattern. Then, the participants were classified according to the quota of dietary habits [7, 19, 22, 23, 24]. Demographic characteristics were age, sex, occupation, education, marital status, and the number of family members. The relationship between dominant dietary patterns and demographic factors was assessed.

For statistical analysis, the obtained data were fed in SPSS v. 14. The dominant dietary patterns (factors) were identified utilizing factor analysis. The participants were scored for each identified food pattern [25]. Factor naming was completed based on the interpretation of the food items per factor and according to previous studies [26]. The Chi-square test was used to investigate the relationship of dominant dietary patterns with demographic fac-

Table 1. Food groups used in the analysis of adult food patterns in Gonabad City

Food Groups	Ingredients
Refined cereals	Lavash bread, baguette bread, ice cream bread, starch, wheat flour, pone bread, rice, macaroni, string, vermicelli, bread, bakery, bakery flour, sugar bread
Whole grains	Sangak bread, taftoon bread, Barberry bread, barley bread, wheat, grits, sprouts, corn, hemp
Potato	Potatoes (all preparation methods)
Tomato	Tomato, tomato juice, tomato paste, ketchup
Egg	Egg whites, egg yolks
Processed meats	Hot dogs, sausages
Legumes	Lentils, cowpeas, beans, peas, cotyledons, soybeans, mung beans
Nuts, seeds, and pips	Chickpea, walnut, hazelnut, almond, pistachio, peanut, Indian almond, sesame, seed
Solid fats	Coconut, butter, creamy, creamy cheese, skim, chocolate, cheese, pizza cheese
Salt	Salt
Salty snacks	Salted crackers, pretzels, chips, snack, pickles
Jam and compote	All kinds of jams and compotes, juice, sesame oil
Vegetables	Lettuce, spinach, greens, herbs, soup, parsley, watercress, cilantro, dill, onion, mint, basil, grape leaves, chard, onions, cucumbers, scallions, radishes, turnips, rhubarb, artichoke, eggplant, zucchini, celery, peppers, bell peppers, beets, shallots, garlic, mushrooms, okra, green peas, beans, green beans, carrots, squash
Offal	Liver, heart, kidney, chicken liver, gizzard, tripe, head, tongue, brain
Red Meat	Beef, mutton, camel meat, hamburger
Mayonnaise	A variety of mayonnaise and salad dressings
Drinks	Industrial juices with added sugar, beverages, syrups, non-alcoholic beer
Coffee and tea	Tea and coffee
Chicken and fish	Fish, tuna, chicken (all methods of preparation)
Fruits, natural juices and dried fruit	Apples, oranges, tangerines, dates, watermelon, cantaloupe, bananas, lemons, apricots, grapes, green tomatoes, cherries, cherry, Chghalh, pomegranates, strawberries, kiwi, grapefruit, persimmons, pears, peaches, plums, nectarine, cranberry, wolfberry fruit, blueberries, figs, hawthorn, all kinds of nuts and fruit roll-ups and natural juices
Dairy	Milk, powdered milk, cocoa milk, yogurt, cheese, pasteurized whey, dough (a mixture of water and yogurt), cranberry, ice creams
Liquid fats	Sunflower oil, corn oil, olive oil
Cookies	Cakes, muffins, donuts, gaz (a local cookie in Isfahan), Sohan (a local cookie in Ghom City), roulette, miscellanea cakes
Sweet snacks	Sugar, chocolate, toffee, Sohan honey, pastel, jelly, caramel cream, chocolate biscuit, creamy biscuit, wafer, chewing gum

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tors. The significance level of less than 0.05 was considered for statistical analysis.

Results

The participants' Mean±SD age was 36.40 ±13.16 years, of whom 112 were male and 138 were female. Also, 206 were married and 44 were single. The number of family members in the study ranged 3-4 (53.2%).

Factor analysis revealed two factors that explained 32.71% of the variance in dietary patterns. The healthy nutritional pattern consisted of poultry, fish, vegetables, offal, potatoes, fruits, natural juices, dried fruit, jams, compotes, tomatoes, and dairy, which accounts for 14.74% of

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Table 2. Factor analysis of groups used for determining of adult food patterns in Gonabad City

Food Groups	Dietary Patterns	
	Healthy	Unhealthy
Sweet snacks		0.77
Salty snacks		0.75
Drinks		0.66
Coffee and tea		0.52
Mayonnaise		0.49
Salt		0.48
Processed meats		0.45
Refined cereals		0.35
Red Meat		0.31
Cookies		0.28
Solid fats		0.21
Chicken and fish	0.65	
Vegetables	0.64	
Offal	0.63	
Potato	0.49	
Fruits, natural juices and dried fruit	0.46	
Jam and compote	0.39	
Tomato	0.36	
Dairy	0.33	

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The KMO index is 0.56; hence, the data are sufficient, and the significance of Bartlett's Spear test shows a significant correlation between food groups (χ^2=1670.62 and P<0.001).

the variance in dietary patterns. The unhealthy dietary habit that included sweet snacks, salty snacks, beverages, coffee, tea, mayonnaise, salt, processed meats, refined cereals, red meats, sweets, and solid fats accounts for 17.97% of the variance in dietary patterns (Table 2). Besides, factor loadings of corn, egg, nuts, seeds and pips, liquid fat, and whole grains were less than 0.2 and did not fit into any of the dominant patterns.

In this study, two dominant dietary patterns were obtained. The most common factor in the unhealthy and healthy dietary pattern is the sweet snack food group (0.77) and then the chicken and fish diet (0.65). The minimum load factor in the unhealthy dietary pattern was observed in the solid fat group (0.21) and the healthy dietary pattern was seen in the dairy group (0.33). The relationship between adherence to each of the healthy and unhealthy dietary patterns with the demographic characteristics of the participants is shown in Table 3.

With aging, adherence to a healthy and unhealthy diet pattern increases. Adherence to a healthy and unhealthy dietary pattern was significantly higher in men than in women. Furthermore, it seems that following a healthy diet pattern is more common in employed people than in jobless individuals. As the number of family members increases, adherence to an unhealthy diet pattern increases.

Discussion

In this study, two major dietary patterns were extracted using factor analysis on data from 250 people between 18-70 years in Gonabad City. Based on prior knowledge and the nutritional ingredients of each dietary pattern, they were named "healthy eating pattern" and "unhealthy eating pattern".

There were many similarities between the dietary patterns obtained in this study and previous studies. An unhealthy pattern observed in this study was similar to the unhealthy habit obtained in the survey by Rezazadeh et al. [27] and the Western model identified in the study of Ismailzadeh and Azadbakht [28]. An unhealthy pattern consists of high consumption of refined grains, fried potatoes, high-fat dairy, red or processed meat, hydrogenated fats, and sweets. The healthy dietary pattern observed in this study

Table 3. The relationship between adherence to each healthy or unhealthy dietary patterns and the demographic characteristics of the participants

Variables	Group	Unhealthy Dietary Habit				Healthy Dietary Hhabit		
		No	Low	Medium	High	Low	Medium	High
Age	<25	73	24.7	64.4	11.0	23.3	68.5	8.2
	25-40	79	24.1	54.4	21.5	13.9	84.8	1.3
	>40	98	4.1	77.6	18.4	16.3	50.0	33.7
	χ^2=21.09, P<0.001					χ^2=42.70, P<0.001		
Sex	Female	138	20.3	68.1	11.6	23.2	65.2	11.6
	Male	112	11.6	64.3	24.1	10.7	67.9	21.4
	χ^2=8.61, P=0.014					χ^2=9.27, P=0.01		
Marital status	Single	44	11.4	79.5	9.1	18.2	59.1	22.7
	Married	206	17.5	63.6	18.9	17.5	68.0	14.6
	χ^2=4.26, P=0.12					χ^2=1.95, P=0.38		
No. of family members	2	69	23.2	52.2	24.6	18.8	71.1	10.1
	3	47	10.6	80.9	8.5	25.5	53.2	21.3
	4	86	18.6	65.1	16.3	17.4	69.8	12.8
	5	48	8.3	75.0	16.7	8.3	66.7	25.0
	χ^2=13.52, P=0.035					χ^2=10.97, P=0.09		
Occupation	Jobless	100	22.0	62.0	16.0	2.0	68.0	7.0
	Employed	150	12.7	69.3	18.0	12.7	65.3	22.0
	χ^2=3.81, P=0.15					χ^2=13.69, P=0.001		
Education	Illiterate	32	12.5	59.4	28.1	12.5	78.1	9.4
	To the diploma	66	12.1	72.7	15.2	15.2	66.7	18.2
	Bachelor	109	20.2	62.4	17.4	17.4	64.2	18.3
	Graduate	43	16.3	72.1	11.6	25.6	62.8	11.6
	χ^2=6.25, P=0.39					χ^2=5.04, P=0.53		

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was similar to the healthy groups of fruits, vegetables, and poultry in the study of Rezazadeh et al. [27], Mirmiran et al. [17], and Azadbakht and Ismailzadeh [29]. The similarity between healthy and unhealthy dietary patterns of the present study and the previous studies is probably due to the survey on Iranians diet, the comparative similarity of the age groups, the use of similar food frequency questionnaires, and the relative similarity of food groupings. On the other hand, differences can also be justified due to different dietary preferences in different parts of the country and the inclusion of both sexes in the present study.

The nutritional patterns of the present study were similar to those found in other studies around the world, such as the Mediterranean dietary pattern in terms of high consumption of vegetables, fruits, poultry, nuts, and potatoes. In the study of Spanish men and women [30], the dietary pattern mostly consists of fruits, cereals, vegetables, and high consumption of low-fat milk. Fruits and vegetables were more frequently consumed according to the study on the nutritional profiles of Hispanic women living in the US [31]. According to a study of dietary patterns in Korean men and women residing in the US [32], dietary patterns are formed by vegetables, fruits, and milk. Another study showed that American men and women [33] dietary patterns include fruits, vegetables, and dairy. In another study on English women [34], it appeared that they had the same nutritional habits found in this study.

A Japanese study of adults identified three nutritional patterns: 1. Japanese dietary patterns, including soy products, fish, algae, vegetables, fruits, and green tea, 2. dietary pattern of animal foods, and 3. dietary pattern of dairy, fruits, vegetables, and low alcohol [35]. Naja et al. identified three nutritional patterns in Lebanese adults: ready meals, traditional foods, and a high-protein diet [36]. Sung

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and Jong identified 3 dietary habits among people over 20 years in Korea. First is the classic diet pattern with high consumption of rice, Kimchi, and local food. Second is meat and alcohol diet pattern with high consumption of processed meats. The third is the healthy Korean habit with high consumption of eggs, milk, bread, and noodles [37]. Chew et al. identified three dietary habits among 30-70 years old Koreans: the vegetable-seafood diet, the meat-fat diet, and the snack diet [38].

The dietary patterns obtained in the present study are derived from the data collected in a specific population of Iran (Gonabad). Therefore, it is not expected to be entirely accurate in communities that have different eating habits. Due to geographical, cultural, racial, and other differences, the food pattern of one city cannot be generalized for another town of the same country.

Knowing the nutritional patterns of each community and its relation to demographic factors can help plan for nutrition education and intervention [11]. Numerous studies have investigated dietary habits and their relationship with demographic factors.

Aging shifts unhealthy dietary patterns to healthy eating patterns [39]. It is likely that as people grow older, their concern for their health will guide them to a healthier diet. Most studies have shown that age has an inverse positive relationship with healthy dietary habits in Western dietary patterns [30, 33, 35]. Aging results in a decrease in fat intake and healthier nutrition [20]. Younger people are more likely to follow an unhealthy dietary pattern, while older people tend to a more robust dietary pattern [40]. The results of our study on healthy habits were consistent with previous studies.

Men consume significantly more fat than women, while women eat more vegetables than men [20]. Higher scores of women in the healthy dietary pattern and men's in the Western nutritional pattern have been shown in previous studies. Higher scores of women could be because of women's higher awareness of food, nutrition, health, considerable attention to their appearance, higher preference for the taste of healthy eating, and spending more time preparing food than men [30, 33, 35]. In the current study, men were more likely to adhere to both healthy and unhealthy patterns.

Hosseini Isfahani et al. study showed that married people were more likely to have a healthy dietary pattern than single people. In men, being single was mostly related to following the Western pattern; however, following the healthy habit was positively associated with being married for women. A study in Hong Kong found that married

women had a more robust habit of eating vegetables and fish than single people [8]. Another study in the UK found that married people had a better habit of fruits and vegetable consumption [34]. The results of this study showed no significant relationship with marital status.

In the present study, adherence to an unhealthy dietary pattern significantly increased with a growing number of family members, which is in agreement with the results of recent studies. Individuals with the highest quartiles of unhealthy dietary patterns had larger families than those with the lower quartiles [19]. Individuals with a nuclear family were associated with a healthy dietary pattern [40]. The results of a study by Lin et al. show that people with an unhealthy diet had a higher number of family members than those with whole fruit and cereal diets [31].

One of the strengths of the present study was to investigate both sexes and controlled the effect of many confounding variables, especially the impact of having a specific diet and a history of type 2 diabetes. Since people with these diseases usually follow an unhealthy dietary pattern during the years of fat accumulation in their bodies or before the disease was diagnosed.

However, this study has its limitations. In assessing food intake, there might be some reporting errors about food items, especially since memory dependence and the ability of direct memory measurements are the main limitations of this study. In this study, the limitations were partially eliminated by excluding people who did not complete 50% of the food frequency questionnaire. Another limitation of the present study is its cross-sectional nature that does not allow for causal conclusions, and the findings should be confirmed in prospective studies.

It is suggested that similar studies, especially prospective ones be conducted in other cities and villages of Iran to consider geographical and cultural differences. It is necessary to identify similarities and differences in diet patterns in different regions and develop appropriate guidelines to improve the nutritional status of the whole country.

Conclusion

In this study, Western (unhealthy) and healthy food patterns were identified. The results of the current study confirm the prevalence of Western dietary habits, especially in younger individuals in Iran. Fast foods, sweet drinks, high-fat meat products, sugar, and salt have become more common. Demographic status plays a vital role in determining the type of dietary pattern. Therefore, these factors should be considered in designing and implementing intervention

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programs to improve the nutritional status of individuals. Of course, the patterns of food in different regions of the world and even in one country vary according to geographical, cultural, social, and economic factors. Consequently, the results cannot be generalized to the whole population.

Ethical Considerations

Compliance with ethical guidelines

This research was reviewed and approved by the Ethics Committee in Gonabad University of Medical Sciences (Code: IR.GMU.REC.1397.060 and proposal code: p/1397/060).

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All authors have read and approved the final version.

Conflict of interest

The authors declared no conflict of interest.

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