The Importance of Health Informatics in Public Health during a Pandemic
J. Mantas et al. (Eds.)

doi:10.3233/SHTI200593

Understanding the Food Habits and Physical Activities of Diabetes Cohort in Qatar

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Abstract. In this study, we analyze the food and lifestyle-related factors for a Diabetic cohort from Qatar, where the prevalence of diabetes is among the top in the Middle East region. Statistical analysis shows that the diabetic group is consuming a lower amount of fast foods, soft drinks and meats as a meal but a higher amount of vegetables and fruits compared to the control group. Though the diabetic cohort consumes a lower number of snacks and desserts, they consume a higher amount of sugar for tea. Interestingly, we find the diabetes cohort is spending a lower amount of time in sedentary life but their involvement in different physical activities is lower than the control group. Overall, we conclude that the Qatari diabetic cohort, considered in this study, is following standard guidelines for food and drinks but they may need to improve the physical activity level following physician guidelines.

Keywords: Diabetes, Fast food, Physical activities, Qatar Biobank (QBB)

1. Introduction

Diabetes mellitus, commonly known as diabetes, can be described as a collection of metabolic conditions which may arise from the defects in insulin discharge [1] and this prolonged hyperglycemia associated with diabetes can be related to long-term impairment and failure of multiple organs. A population-based study forecasted that diabetes prevalence in Qatar would be around 24% by the year 2050 [2]. To mitigate such health-related problems, cohorts are established in different parts of the world to identify the complex interaction of food, lifestyle, environmental and genetic factors that may contribute to diseases like diabetes. The Qatar Biobank (QBB) is the largest repository from the Qatari population to conduct such studies to mitigate the health problems and we, in this study, considered a Qatari diabetes cohort based on QBB data. It has been shown that maintaining a healthy lifestyle and food habit may reduce the susceptibility to diabetes [3]. But we could not find any research work that mainly focused on the dietary habit and lifestyle-related factors of the diabetes cohort from Qatar. To fill this gap, in this study, we compared a Qatari diabetes cohort against the control

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group considering their food habits, drinking habits, and other daily life physical activities.

2. Materials and Methods

2.1 Ethical Approval

This study was conducted under the regulation of the Ministry of Public Health, Qatar. All the procedures were approved by the Institutional Review Board (IRB) of Hamad Medical Corporation, Qatar and only de-identified data were collected from QBB.

2.2 Cohort Description and Questionnaire Considered for this study

In this study, we considered a cohort consisted of 500 subjects, among which 250 were diabetic, and 250 were none-diabetic (control group). The control group was free from any type of diabetes, obesity or cardiovascular diseaess. Each subject, based upon their approval, when they arrive into QBB for participation, was asked multiple questions by the clinicians to collect valuable information about their background, dietary habit, and lifestyle-related factors. The details of the questionnaire can be found in [4, 5]. All the subjects from this cohort were Qatari nationals. Both diabetes and the control group contained ~50% male and ~50% female. In this study, we only considered questionnaires that are related to food habits, drink habits, and the physical activities of the participants.

2.3 Dataset pre-processing

All the responses of the participants were encoded numerically in such a way that a higher number represents the more frequent events. For example, for the question "How often did you eat fried chicken last year?" we encoded the responses as 0 ("never or rarely"), 1 ("1-3 times per month") , 2 ("1-3 times per week"), 3 ("4-6 times per week"), 4 ("once per day"), 5 ("2 or more times per day"). Any question, having more than 50% missing values was discarded and for the remaining cases, we replaced each missing value by the mean value of corresponding metrics calculated from the corresponding group.

2.4 Statistical significance of the variables

We used the Anderson-Darling test [6] to check if the variables are normally distributed. For normally distributed variables, we used the student's t-test [7] to determine the significance level for each variable when comparing the diabetic versus the control group. For other variables, we applied a Mann-Whitney [8] test for the same purpose. We only considered the statistically significant variables (p-value<0.05). For each variable, we also computed the mean value for the diabetes group and the control group.

3. Results & Discussions

We observed that the diabetes group is consuming less fast or junk foods (e.g., French fries, fried chicken, burger, hotdogs, etc.) than the control group (Table 1). This indicates

that after the onset of the disease, the Diabetes group is more cautious about consuming such kinds of food than the control group.

Table 1. Summary of fast food consumption for Diabetes versus Control group

Fast Food Items Consumption	Mean	Mean (Control)	p-value
Chicken shawarma	1.844	2.112	0.001
Middle-eastern style fast food	1.532	1.964	<0.001
French fries	2.060	2.572	<0.001
Potato chips	1.928	2.336	<0.001
Burgers, Hotdogs	1.568	2.300	<0.001
Pizza	1.824	2.272	<0.001
Fried chicken	1.612	2.032	<0.001

We also observed that the diabetes group is consuming less bottled juice, soft drinks or soda, Diet soft drinks or soda, and energy drinks than the control group (Table 2). But the Diabetes group is still consuming more sugar (compared to the control group) in the regular tea or herbal tea as part of their drink habit (Table 2). We also observe that the diabetes group is consuming less snacks or desserts (e.g., cake, doughnut, ice cream, chocolate bar) than the control group (Table 2).

Table 2. Summary of snacks, drinks, and sugar consumption for Diabetes versus Control group

Drinks and Sugar Consumption	Mean (Diabetes)	Mean (Control)	p-value
preserved fruit juice (canned/ bottled)	1.872	2.20	0.004
Soft drinks, sodas	1.780	2.476	<0.001
Diet soft drinks, sodas	1.520	1.788	0.016
Energy drinks	1.144	1.396	<0.001
Number of teaspoons of sugar with tea or herbal tea	2.204	2.532	0.002
Desserts and Snacks			
Cake, Doughnuts	2.036	2.344	0.002
Chocolate bar	2.424	2.684	0.030
Ice cream	2.172	2.480	0.002

Moreover, we observed that the diabetes group is consuming more healthy foods (e.g., raw vegetables, green leafy salad, mixed salad, fresh fruits, dates) than the control group (Table 3). Interestingly the diabetes group is more cautious in consuming canned fruits, most likely to have additional sugar, than the control group (Table 3). We observed that the diabetes group is consuming a smaller amount of meat-oriented dishes (e.g., chicken curry, kofta, meat kebab, chicken kebab, etc.) than the control group (Table 3).

Table 3. Summary of fruits, vegetables, and meat consumption for Diabetes versus Control group

Fruits and Vegetables Items	Mean (Diabetes)	Mean (Control)	p-value
Raw vegetables	3.664	3.316	0.008
Green leafy salad (e.g., lettuce)	3.908	3.500	0.001
Mixed salad (for example with tomato, onion, cucumber, other vegetables)	3.696	3.336	0.005
Fresh fruits	3.644	3.304	0.006
Dates	3.796	2.804	<0.001
Canned fruits	1.224	1.384	0.019
Meat Items as part of Main Meal			
Light meat (chicken)	3.404	3.624	0.049
Chicken curry	1.768	2.060	<0.001
Kofta	1.656	1.924	<0.001
Meat kebab	1.696	1.916	0.001
Chicken kebab	1.748	2.008	<0.001

We analyzed the amount of sedentary time that the cohort was spending in front of the electronic devices. From Table 4, we can observe that the diabetes group spent a

lesser amount of sedentary time, both on weekdays and weekends, with electronic devices like computers, TV, DVDs, and mobile phones. We also considered the amount of time spent on different types of physical activities by the diabetes and control group. Though the differences in physical activities were not statistically significant, we found that, on average, the diabetes group was spending less time than the control group on walking, a moderate level of physical activities (swimming, bicycling at a regular pace, yoga, gym, etc.), and sports (football, weight lifting, fast bicycling, running, aerobics) (Table 4).

Table 4. Time spent in different activities for Diabetes vs. Control group

Days with electronic devices (in sitting position)	Mean (Diabetes)	Mean (Control)	p-value
Weekdays using computers	0.960	1.508	<0.001
Weekends using coputers	0.676	1.176	<0.001
Weekends using TV, DVDs, mobile phone, i-pad, etc.	2.176	2.516	0.004
Physical Activities (in minutes)			
Heavy sports activities (running, fast bicycling, fast swimming, singles tennis, football, weight lifting, aerobics)	2.880	4.228	0.145
Moderate physical activities (swimming, bicycling at a regular pace, gym, double tennis, yoga)	3.600	4.788	0.233
Average walking time per day	9.996	10.636	0.645

4. Conclusions

Based on our analysis, we observed that the diabetes group in Qatar, in general, is following the standard guidelines suggested by the physicians in terms of food habits and physical activities. The participants should be more careful about the sugar intake with tea and improve the physical activity level based on physicians' guidelines. Additionally, the control group (non-diabetic) should be cautious in their lifestyle and dietary habit; otherwise, they might be susceptible to diabetes as well.

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