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Knowledge, Usage and Perceived Benefits of Functional Foods among North Indian Diabetics Subjects: A Cross Sectional Survey

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Abstract

Foods can be considered as functional foods as a whole or processed which provide health benefits beyond the provision of nutrients when they are consumed at efficacious levels as part of a diet on regular basis. A good scientific research should have been done on different aspects which link the consumption of the functional foods with the health benefits. In this study, widespread functional foods are extensively investigated in a link with their effects on pathophysiological condition of diabetes type 1 and type 2 along with their effect on other diabetes related chronological condition. Two groups of patients were taken of type 1 and type 2 and their food habits, body growth, clinical conditions, awareness, and effect on blood glucose level were thoroughly investigated in link with the daily consumption of functional foods. The SPSS tool was used to evaluate the frequencies of demographical variables of the questionnaire. The study performed the independent sample t-test and ANOVA were tested in the data to evaluate whether two or more groups are equal. The results of the questionnaire study with both groups indicate that those being health-conscious, those having a diet-related disease and a higher education, and those having noticed an effect of the foods are more inclined to have positive attitudes and consume functional foods.

It is likely to be highlight here that functional foods are not magic bullets but only one aspect of a comprehensive approach to good health.

Keywords: Diabetes Mellitus, Functional Foods, ANOVA, SPSS, Anthropometric Effect.

Introduction

The Diabetes mellitus (DM) is identified as the third disease burden across the globe after cardiovascular and oncological disorders (WHO, 2014). This Diabetes is found to become a disabler and killer of mankind within the next twenty-five years (Ding, 2006), both in developed and developing countries, especially in Indian scenario the rise of diabetes is found to be increased. It is mainly due to rapid changes in the diet and life style of people. It is an important public health problem and has affected humankind throughout the world costing loss of earning on hospitalization, physician fees, medication and rehabilitation. Thus healthy dietary habit provide ample nutrients that meets every individual's nutritional requirement (Paddon-Jones & Rasmussen, 2009). Moreover, there is subsequent evidence to support the theory of "functional food acting as a beneficial physiological and psychological effect on provisions of the basic nutrients". These functional foods are identified either to be in the form of liquid or solid that are found in the daily consumed conventional normal food (European Food Information Council (EUFIC), 2015). Thus functional food plays a significant role in creating a healthy population with the rising trend in diabetes and changing life style and diet. Yet, there is a debate that poor knowledge and lack of attitude towards the functional food has resulted in the poor perceived benefits. Hence this study was designed to assess knowledge, usage and Perceived benefits of Functional Foods among North Indian Diabetics Subject.

The present paper is organized in the below structure, where Section II discusses the literature review of conceptual and empirical researches on functional foods and its benefits especially in managing diabetes. Section III discusses the materials and methods, which supportsthe researcher to obtain the objective. In section IV, the obtained

data are analyzed and presented with the results. results are discussed and concluded, and recommendations for similar future research are highlighted. The below section illustrates the empirical evidence on prevalence of diabetics and functional foods' health benefits.

Aim of Study

In this study, the effect of commonly used functional foods were examined on diabetic patients type 1 and 2 on account of anthropometric, dietary and clinical aspects and assessed their awareness which help in the consumption of functional food in order to gain advantage for the management of diabetes mellitus.

Review of Literature

Since the mid-of-last century, a radical shift from acute or infectious to chronic disease was reported (Kohut, 2014), Diabetes a chronic disease is identified as the 7th leading cause of death by 2030 (Mathers & Loncar, 2006). Predominantly in the low- and middle-income countries more than 80 percent of the death occurred due to diabetes (WHO, 2015), in the age group of 50 years (59 %) (Guariguata et al., 2014).Diabetes mellitus is predicted to attain epidemic proportions worldwide during the first quarter of the 21st century and will continue to be leading cause of morbidity and mortality. The below table illustrates the prevalence rate of diabetes in 2013 and 2035 in the age group of 20-79 years old.

Table 1
Top Ten Countries for Number of People Aged 20–79 Years with Diabetes in 2013 and 2035

	Country	Prevalence (%) in 2013	Country	Prevalence (%) in 2030
1	China	98.4	China	142.7
2	India	65.1	India	109
3	USA	24.4	USA	29.7
4	Brazil	11.9	Brazil	19.2
5	Russian Federation	10.9	Mexico	15.7
6	Mexico	8.7	Indonesia	14.1
7	Indonesia	8.5	Egypt	13.1
8	Germany	7.6	Pakistan	12.8
9	Egypt	7.5	Turkey	11.8
10	Japan	7.2	Russian Federation	11.2

Source: Adopted from (Forouhi & Wareham, 2014)

From the table it is evident that globally diabetes is found to poses a great challenge in the health care system. Its worldwide prevalence was estimated at 366 million in 2011. of these, 183 million people were believed to be unaware of their condition. If no measures taken, the prevalence is projected to rise to 552 million people by 2030, representing around 10% of the global adult population (International Diabetes Federation, 2011a). In 2011, it was reported that one person died from diabetes related causes every seven seconds. Annual global health care spending on diabetes was up to US$465 billion in 2011 (International Diabetes Federation, 2011a). Moreover, the developed countries have aimed to decreases the infectious disease burden rate and increases in life expectancy by substantially changing the food patterns (Guariguata et al., 2014). Likewise, various other authors examined the Finally, in section V, the analyzed awareness level and knowledge over benefits of functional food against the control of diabetic rate, which is illustrated below.

The fenugreek was found to be the most commonly used functional food. The study by Bawadi *et al*. (2009) stated that the fenugreek seeds had a postprandial hypoglycemic effect on patients with Type 2 Diabetes. This statement was agreed in the study conducted by Kassaian et *al* (2009) which indicates that fenugreek seeds soaked in hot water were found to be adjuvant in preventing type 2 DM. Likewise the study by Roberts (2014) adopted the quantitative study methodology and found that fenugreek seeds contain 45.4% dietary fiber which controls the blood glucose and lipids. Various other results proved that the type 2 DM patient's glycaemic control is controlled through fenugreek (Robert, Ismail, & Wan Rosli, 2014)

In similar manner the study by Kochhar *et al*. (2009) attempted to study the effect of supplementation of tulsi and neem leaves on the signs and symptoms anthropometric parameters and blood pressure of the diabetic subjects. The quantitative study used 90 diabetic patient who did not has insulin for the study and the results revealed that tulsi and neem leaves are helpful in reducing the diabetic symptoms (polydypsia, polyurea, polyphagia, tiredness sweating, burning feet, itching and headache) and blood pressure of the subjects. Significant reductions in all the diabetic symptoms of diabetes were observed and also improvement in the anthropometric parameters of the subjects was significant.

Materials and Methods

In this current study, data is collected by conducting the survey. The study adopted the exploratory and descriptive to examine the consumer dietary behavior and lifestyle. The research involved gathering secondary data as well as primary data. This population based case–control study among functional food (FF) users labelled as 'case' and non-FF users labelled as 'control' was carried out in diabetes health clinics. A large majority of diabetic patients are managed at diabetes health clinics in India. However, patients have to buy FF themselves. The study was conducted in Kanpur and purposive sampling technique was adopted. The study recruited 300 patients in two groups where 150 consist of Type II while other 150 subjects are Type I diabetic subjects. Anthropometric measurements including weight, height, waist and hip measurements were obtained using standardized technique. Descriptive dietary, clinical and usages of functional foods and its effect were obtained from the subjects.

Results

In this section the analyzed quantitative data and results are presented. The SPSS tool was used to evaluate the frequencies of demographical variables of the questionnaire. The study performed the independent sample t-test and ANOVA were tested in the data to evaluate whether two or more groups are equal. The association between two categorical variables was enumerated by Chi-square test. Also, the association between dependent variable and independent variables was calculated by

binary logistic regression. In the study, the participants were grouped as Type 1 and Type 2 of Diabetes Mellitus, were about 150 members from each group participated, while considering the gender majority of the study participants, were male in both Type 1 as well as Type 2. But the majority of the type 1 participants belonged to an age group of 45 years and lesser than 45 years, and majority of the type 2 participants belonged to an age group of 45 to 52 years. In addition, majority of the study participants of type 2 participants was found to be in both Government Service and Private business. While considering the family member in the age group of 18 years and above of the study participants it was found that majority of the participant's i.e. both Type 1 and 2 belonged to the ranged of 1 to 5 members and excluding the study participants the none of the study participant's family had diabetes. The study examined the study participant's habit on substance usage i.e. smoking and alcohol and from the analysis it was evident that none of the participants used the toxic substance. However, they (i.e. both Type 1 and 2) had the habit of watching television for one to four hours per day.

Table 1 Illustrates the association between the type 1 and type 2 diabetic group based on the socio-demographical features of patients. From the significance value of age ($p<0.05$), type 1 and type 2 diabetic group are distinct in relation to the age. Because the average age of type 1 diabetic patients is around 28 while type 2 diabetic patients is 51. Both groups consist majority of the respondents are male compared to female. The obtained p-value of gender (>0.05) indicates that there is no statistically significant association between gender of the respondents and their corresponding diabetic group. In addition, majority (39) of the type 1 diabetic group patients work in private sectors while type 2 diabetic group are 20. Most of the type 2 diabetic group patients work in government sectors/doing business. The obtained p-value of (<0.05) reveals that there is association exist between occupation of the respondents and their diabetic group. When consider the smoking behavior of respondents, majority of them do not have this behavior. The obtained p-value of smoking (<0.05) concludes that there is an association between smoking behavior of respondents and diabetic group. The same manner, most of the respondents do not take alcohol among both diabetic groups. The obtained p-value of alcohol (>0.05) reveals that there is no association between drink alcohol behavior and diabetic group. When considered the weight of the patients, both diabetic groups possess almost same weight. However, based on the significance value of BMI and waist to hip ratio, both diabetic group patients have the distinct BMI and waist to hip ratio.

Table 2 shows the association between the diabetic groups and knowledge about functional food. From the above results, both diabetic group consist equal percent of patients who used functional food and not used functional food. When considered the functional food consumption, majority of the both diabetic group respondents take the functional food once in a day. The obtained p-value (<0.05) of current consumption indicates that there is an association between the diabetic groups and functional food consumption. However, most of the both diabetic group patients had the functional food between six and nine months. Only few patients had the functional food less than three months. From the p-value (>0.05) of years of consumption, we may conclude that there is no association between the diabetic groups and years of consumption. All the patients of type 1 diabetic group follow Doctors' prescription in relation to functional food while type 2 diabetic group are only 64. The obtained significance value (<0.05) of source of information reveal that there is an association between the diabetic groups and sources of information.

Table 3 shows the association between usage of functional food and the diabetic groups. From these results, majority of type 1 diabetic group respondents (84%) take crude form of functional food while type 2 diabetic group are only 43 percent. 57 percent of type 2 diabetic group respondents take processed form of functional food while type 1 diabetic group are only 16 percent. The obtained p-value (<0.05) of form of consumption indicates that there is an association exist between the diabetic groups and form of consumption. When considered the mode of functional food, majority of the type 1 diabetic group (89%) use solid mode of functional food while type 2 diabetic group are 41 percent. 59 % of type 2 diabetic group take liquid mode of functional food while type 1 diabetic group are only 11 percent. In addition the p-value of mode of consumption reveals that there is an association between the diabetic groups and mode of consumption. When considered the diet chart and functional food users, all the patients of type 1 diabetic group use the diet chart and functional food but majority of type 2 diabetic group patients did not use diet chart and functional food. The same manner, most of both diabetic group patients do workout and use functional food. From the significance values of diet chart & FF and workout & FF, both diabetic groups are associated with diet chart & FF and workout & FF. However, there is no association exist between the diabetic groups and meditation & functional food.

Table 4 presents the response about body health condition while after taking functional food. From these results, majority of both diabetic group respondents say that functional food reduces the body weight. However, 19 percent of type 2 diabetic group respondents did not get any effect from functional food while type 1 diabetic group respondents are 27 percent. It reveals that effect of functional food is more on type 2 diabetic group compared with type 1 diabetic group based on reduce the body weight. In addition, the significance value (>0.05) of body weight reveals that there is no association between body weight and the diabetic groups. All the respondents of type 1 diabetic group are diagnose functional food reduces their blood glucose level while 84 percent of type 2 diabetic group agreed this statement. It concludes that effect of functional food is more on type 1 diabetic group compared with type 2 diabetic group in relation to reduce the blood glucose level. The obtained p-value (<0.05) of blood glucose level indicates that there is an association between the diabetic groups and blood glucose level. Majority of

the type 1 diabetic group respondents feel that their cholesterol level are decreased after taking functional food while type 2 diabetic group are only 71 percent. The same manner, most of the type 1 diabetic group respondents have less frequency of urination after taking functional food. From these results, effect of functional food is more on type 1 diabetic group compared to type 2 diabetic group based on reduce the cholesterol level and frequency of urination. From the obtained p-values (<0.05), both diabetic groups are associated with cholesterol level, effect on urination, creatinine level. However, majority of both diabetic group respondents say that there is no functional food effect in relation to creatinine level, peripheral neuropathy, albumin creation rate, proteinuria, fatiguness and hemoglobin level. Majority of both diabetic group patients gain more digestion. The obtained p-value (>0.05) of digestion indicates that there is no association exist between the diabetic groups and digestion. 76 percent of type 2 diabetic group patients gain more immunity while type 1 diabetic group are 19 percent. Based on the obtained p-values, both diabetic groups are associated with proteinuria, hemoglobin levels and fatigueness not associated with peripheral neuropathy, albumin excretion rate and digestion.

Table 5 Illustrates the association between body health condition and socio-demographical features. From the above results, gender of patients is not associate with body weight, blood glucose level, clinical condition, cholesterol level, frequency of urination, stress, creatinine level, albumin excretion, hemoglobin level and digestion. However, age group of patients is associate with clinical condition, cholesterol level, frequency of urination, creatinine level and hemoglobin level. In addition, occupation of patients is associate with blood glucose level, clinical condition, cholesterol level, frequency of urination, stress and hemoglobin level.

Table 6 Illustrates the association between categories of anthropometric variables and functional food users using binary logistic regression. The logistic regression was performed to evaluate the effect of weight, height, smokers, drinkers, WHR, BMI on the likelihood that the diabetic patients to become a functional food users. The model explained 3 percent (Nagelkerke R^2) of the variations. Here, waist to hip ratio has the p value, which is less than 0.05. It indicates that, waist to hip ratio is added significantly to the prediction, but weight, height, smokers, drinkers and BMI groups did not contribute significantly to the prediction. From the 'β' value, increasing WHR-abnormal groups was associated with an increased likelihood of exhibiting to become functional food users.

Discussion

The study assessed the relation between demographic characteristic (i.e. gender, age, occupation, smoking and alcohol habit) of the respondents and their corresponding diabetic group. The study results found that there was significant association in the demographic factors like age, participant's occupation, smoking habit and their corresponding diabetic group (i.e. Type 1 and 2). However, there was no significant association while considering gender and alcohol consumption behavior of respondents in diabetic groups (i.e. Type 1 and 2).

In general there are several anthropometric variable measures were used for screening diabetes, and in the study selected three variables, Weight, Body Mass Index (BMI) and Waist to hip ratio to screen diabetes among the Diabetic group. The study results found that there was significant relation between on BMI and Waist to hip ratio and the diabetic group. Moreover, compared to type 1, the type 2 diabetic was found to be higher BMI and Waist to hip ratio. Thus the study by Qiao and Nyamdorj (2010) showed that either BMI or WC (WHR) predicted or was associated with type II diabetes independently, regardless of the controversial findings on which of these obesity indicators is better. Majority of the study (Nicodemus & Folsom, 2001; Robert et al., 2014) obesity and abnormal WC and WHR is a component of metabolic syndrome which eventually leads to type 2 diabetes.

The study assessed the knowledge and awareness level about functional food among the type 1 and 2 diabetic participants. From the analysis it was revealed that majority of the participants (i.e. both Type 1 & 2) had awareness over the benefit of functional food for diabetic conditions, were as the other half of the participants did not have any knowledge. However, majority (75%) of the source of information about functional food was gained from doctors and used for 6 to 9 months. But the study by Vella et al (2014) stated those newspapers, magazines and books was the key source of functional food which accounted for 69 percent and other food labels of 66.1% and the internet 49 percent.

In addition majority of the participants consumed functional food once a day in the form of crude in a solid mode by type 1 diabetic group and in form of processed food in liquid mode by the type 2 diabetic group. When the study assessed the diet chart and diabetic group, it was revealed that all the patients of type 1 diabetic group use the diet chart and functional food but majority of type 2 diabetic group patients did not use diet chart and functional food. The same manner, most of both diabetic group patients do workout and use functional food. From the significance values of diet chart & functional food user and workout & functional food, both diabetic groups are associated with diet chart & FF and workout & FF. However, there is no association exist between the diabetic groups and meditation & functional food.

The study measured effect of functional food in which both type 1 and 2 agreed that they observed positive effect on their clinical condition after taking the functional food. Majority of both diabetic group respondents say that functional food reduces the body weight. The study examined the response about body health condition of Type 1 and 2 diabetic groups, after taking functional food. From the analysis it was found that majority of participants from the diabetic group's body weight, blood glucose level, cholesterol level and effect on urination were reduced after the intake of functional food. However, while examine the other symptoms majority of both diabetic group respondents say that there is no functional food effect in relation to

creatinine level, peripheral neuropathy, albumin creation rate, proteinuria, fatiguness and hemoglobin level. However, the results revealed that effect of functional food is more on type 2 diabetic group compared with type 1 diabetic group based on reduce the body weight. All the respondents of type 1 diabetic group are diagnosed, functional food reduces their blood glucose level and same results were observed in type 2 diabetic group agreed this statement. It concludes that effect of functional food is more on type 1 diabetic group compared with type 2 diabetic group in relation to reduce the blood glucose level. Majority of the type 1 diabetic group respondents feel that their cholesterol level are decreased when after taking functional food as compared to type 2 diabetic group. The same manner, most of the type 1 diabetic group respondents have less frequency of urination when after taking functional food. From these results, effect of functional food is more on type 1 diabetic group compared to type 2 diabetic group based on reduce the cholesterol level and frequency of urination.

The association between body health condition and socio-demographical features were examined in both groups. From the above results, gender of patients is not associated with body weight, blood glucose level, clinical condition, and cholesterol level, frequency of urination, stress, creatinine level, albumin excretion, hemoglobin level and digestion. However, age group of patients is associate with clinical condition, cholesterol level, frequency of urination, creatinine level and hemoglobin level. In addition, occupation of patients is associate with blood glucose level, clinical condition, cholesterol level, frequency of urination, stress and hemoglobin level.

Conclusion

The results of the questionnaire studies revealed some common themes, but some apparently diverging results emerged. The consumers in the focus groups wondered what functional foods are medicines or normal foods, and what they contain. The consumers also revealed a belief that functional foods are consumed by those already in advantage of healthy lives. Contradicting, the above, the consumers were worried that these foods will be used as a compensation for unhealthy lifestyles. The results of the questionnaire study with consumers indicate that those being health-conscious, those having a diet-related disease and a higher education, and those having noticed an effect of the foods are more inclined to have positive attitudes to and consume functional foods. Thus, some of the predictions and speculations in the focus groups were verified in the questionnaire study. Finally, being health-conscious and being positive towards the development of functional foods increase the likeliness among consumers to choose functional foods. Perceiving high knowledge and having experiences of functional foods appeared to increase the health-care professionals' trust in and willingness to recommend functional foods to patients. Furthermore, finding functional foods beneficial increased the likeliness of recommending them to patients. The disparate knowledge and beliefs of functional foods among the professions should be of concern, not least because confusion could result among patients.

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Appendix - I

List of Tables

Table 1
Socio-Demographic and Anthropometric Characteristics of the Study Participants

Variables	Type I Diabetics (*n=150*)	Type II diabetics (*n=150*)	P value
Age (Years)	27.79±8.33	51.28±12.11	0.001**
Gender, n (%)			
Male	78 (52.0)	85 (56.7)	0.417
Female	72 (48.0)	65 (43.3)	
Occupation, n (%)			
Government Service	23 (15.3)	30 (20.0)	
Private Service	39 (26.0)	20 (13.3)	
Business	16 (10.7)	30 (20.0)	0.001**
Retired	2 (1.3)	15 (10.0)	
Dependent	1 (0.7)	7 (4.7)	
Unable to work	-	1 (0.7)	
Smoking, n, (%)			
Yes	22 (14.7)	7 (4.7)	0.003**
No	128 (85.3)	143 (95.3)	
Alcohol, n, (%)			
Yes	23 (15.3)	17 (11.3)	0.308
No	127 (84.7)	133 (88.7)	
Anthropometrics			
Weight (kg)	67.98±10.94	69.48±12.34	0.266
BMI, Kg/m^2	24.21±3.52	27.19±5.03	0.001**
Waist to Hip Ratio	84.50±8.41	89.19±10.52	0.001**

**P<0.01

Table 2
Knowledge and Usage of Functional Foods among Diabetics' Participants

Variables	Type I Diabetics (*n=150*)	Type II diabetics (*n=150*)	P value
Awareness of FF			
Yes	75 (50.0)	75 (50.0)	1.000
No	75 (50.0)	75 (50.0)	
Users of FF for diabetic condition			
Yes	75(50.0)	75(50.0)	1.000
No	75(50.0)	75(50.0)	
Current Consumption			
Thrice a day	-	-	
Twice a day	32 (42.7)	19 (25.3)	0.025*
Once a day	43 (57.3)	56 (74.7)	

Years of consumption			
More than a year	15 (20.0)	14 (18.7)	0.161
Between 6-9 months	48 (64.0)	41 (54.7)	
Less than six months	12 (16.0)	16 (21.3)	
Less than three months	0 (0)	4 (5.3)	
Source of information			
Self	-	1 (0.7)	0.018*
Doctor	75 (50.0)	64 (42.7)	
Family Friend	-	3 (2.0)	
Friends or neighbours	-	6 (4.0)	
Family	-	1 (0.7)	

*P<0.05

Table 3
Usage of Functional Foods Among Diabetics' Participants

Variables	Type I Diabetics (*n=150*)	Type II diabetics (*n=150*)	P value
Form of consumption			
Crude	59 (84.3)	32 (42.7)	0.001**
Processed	11 (15.7)	43 (57.3)	
Mode of consumption			
Solid	48 (88.9)	29 (40.8)	0.001**
Liquid	6 (11.1)	42 (59.2)	
Diet Chart & FF			
Yes	75 (100.0)	18 (24.0)	0.001**
No	0 (0)	57 (76.0)	
Medication & FF			
Yes	74 (98.7)	71 (94.7)	0.172
No	1 (1.3)	4 (5.3)	
Work out & FF			
Yes	75 (100.0)	68 (90.7)	0.007**
No	0 (0)	7 (9.3)	

**P<0.01

Table 4
Perceived Benefits of Consumption of Functional Foods among Diabetics Participants

Variables	Type I Diabetics (*n=150*)	Type II diabetics (*n=150*)	P value
Body Weight			
Increased	1 (1.3)	2 (2.7)	0.446
Decreased	54 (72.0)	59 (78.7)	
No effect	20 (26.7)	14 (18.7)	
Blood glucose levels			
Increased	-	-	0.001**
Decreased	75 (100.0)	63 (84.0)	
No effect	-	12 (16.0)	
Cholesterol levels			
Increased	-	1 (1.3)	0.001**
Decreased	70 (93.3)	53 (70.7)	
No effect	5 (6.7)	21 (28.0)	
Effect on Urination			
Increased	2 (2.7)	1 (1.3)	0.001**
Decreased	62 (82.7)	32 (42.7)	
No effect	11 (14.7)	42 (56.0)	
Creatinine levels			
Increased	-	-	0.013*
Decreased	3 (4.0)	12 (16.0)	
No effect	72 (96.0)	63 (84.0)	
Peripheral neuropathy			
Increased	1 (1.3)	20 (26.7)	0.386
Decreased	22 (29.3)	4 (5.3)	
No effect	52 (69.3)	51 (68.0)	
Albumin excretion rate			
Increased	1 (1.3)	2 (2.7)	0.456
Decreased	3 (4.0)	6 (8.2)	
No effect	71 (94.7)	65 (89.0)	

Proteinuria			
Increased	0 (0)	3 (4.0)	
Decreased	1 (1.3)	10 (13.3)	0.003**
No effect	74 (98.7)	62 (82.7)	
Hemoglobin levels			
Increased	9 (12.0)	32 (42.7)	
Decreased	0 (0)	2 (2.7)	0.001**
No effect	66 (88.0)	41 (54.7)	
Fatigueness			
Increased	0 (0)	1 (1.3)	
Decreased	37 (49.3)	52 (69.3)	0.020*
No effect	38 (50.7)	22 (29.3)	
Digestion			
Yes	48 (64.0)	58 (77.3)	
No	27 (36.0)	17 (22.7)	0.073
Immunity			
Yes	14 (18.7)	57 (76.0)	0.001**
No	61 (81.3)	18 (24.0)	

**P<0.01, *P<0.05

Table 5
Effect of Functional Foods Consumption on Health Benefits as Perceived by the Participants after Controlling for Demographic Factors

	Chi-square	G
Gender*Body weight	3.677^{ns}	4.814^{ns}
Gender*Blood glucose level	0.799^{ns}	0.797^{ns}
Gender*Clinical condition	0.001^{ns}	0.001^{ns}
Gender*Cholesterol level	1.185^{ns}	1.564^{ns}
Gender*Frequency of urination	0.229^{ns}	0.234^{ns}
Gender*Stress	1.109^{ns}	1.113^{ns}
Gender*Creatinine level	1.315^{ns}	1.313^{ns}
Gender*Albumin excretion	0.836^{ns}	0.856^{ns}
Gender*Hemoglobin level	0.017^{ns}	0.017^{ns}
Gender*Digestion	1.359^{ns}	1.369^{ns}
Age*Body weight	12.454^{ns}	9.271^{ns}
Age*Blood glucose level	9.919^{ns}	8.687^{ns}
Age*Clinical condition	29.209**	26.768**
Age*Cholesterol level	13.458*	9.781^{ns}
Age*Frequency of urination	18.012**	18.021**
Age *Stress	2.365^{ns}	2.457^{ns}
Age *Creatinine level	18.429**	14.926**
Age *Albumin excretion	7.504^{ns}	6.703^{ns}
Age *Hemoglobin level	22.021**	21.529**
Age *Digestion	1.777	1.927
Occupation*Body weight	11.582^{ns}	10.270^{ns}
Occupation*Blood glucose level	28.901**	19.726**
Occupation*Clinical condition	41.079**	24.577**
Occupation*Cholesterol level	30.574**	18.648^{ns}
Occupation*Frequency of urination	28.497**	17.815^{ns}
Occupation *Stress	12.450*	12.815*
Occupation*Creatinine level	12.060^{ns}	10.922^{ns}
Occupation*Albumin excretion	10.195^{ns}	9.737^{ns}
Occupation*Hemoglobin level	29.561**	23.959*
Occupation*Digestion	6.026^{ns}	5.912^{ns}

**P<0.01, *P<0.05, ns-Non significant
Where G represents log likelihood chi-square value

Table 6
Association between Categories of Anthropometric Variables and Functional Food Users Using Binary Logistic Regression

	B	S.E.	Wald	p-value	Exp(B)	95% C.I.for EXP(B)	
						Lower	Upper
Weight	-.007	.018	.154	.695	.993	.960	1.028
Height	.021	.019	1.313	.252	1.022	.985	1.060
Smokers	-.207	.471	.193	.661	.813	.323	2.046
Drinkers	.036	.407	.008	.929	1.037	.467	2.301
WHR-Abnormal	.549	.273	4.034	.045*	1.731	1.013	2.958
BMI			.300	.960			
BMI-nderweight	-.060	.833	.005	.943	.942	.184	4.819
BMI-Overweight	-.097	.381	.064	.800	.908	.430	1.917
BMI-Obese	-.239	.452	.280	.597	.788	.325	1.908
Constant	-3.059	2.579	1.406	.236	.047		

Dependent variable: Functional food (0-non users, 1-users) *p<0.05
Nagelkerke R^2 value: 0.029