☐ Original Article ☐

A Study on Eating Habits, Life Styles and Nutrition Care of Diabetic Outpatients

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ABSTRACT

The purpose of this survey was to investigate eating habits, life styles and nutritional care of diabetic outpatients and to provide basic data for developing individualized nutritional care and diabetic education programs. This survey was carried out by nutritional counseling with a questionnaire and checking medical record. Information about the general characteristics of the subjects, eating habits, health-related life styles and attitude and perception of subjects to diet therapy was gathered from 200 randomly-sampled diabetic outpatients at a University Hospital located in Inchon. All data were analyzed by Statistical Analysis System(SAS) software. The results are summarized as follows : Female subjects were 63.5% of total subjects and 65.5% of total subjects were 50 years or more. The average Body Mass Index(BMI) of male and female subjects were 23.06kg/m² and 25.02kg/m² respectively and 44% of all subjects were obese. Among subjects, type II diabetic patients were 81.0% and 82.5% of subjects had suffered from diabetes for more than one year. Also 41% of subjects had diabetic history in their family. More than half of the subjects had nutrition education concerning diabetes. Also 75.5% of them thought that nutrition education was effective. The most important guideline in diet therapy was to eat cooked rice with dietary fiber-rich grains. Therefore, it might be necessary to develop nutrition education program adjusted according to diabetic patient's needs and life styles, which may increase feasibility of self-care and implementation of management guidelines. (*Korean J Community Nutrition* 1(2) : 133~139, 1999)

KEY WORDS : diabetes mellitus · eating habits · life styles · nutrition care.

Introduction

Recently diabetes mellitus has been increasing in Korea, and the rate of death from diabetes mellitus increased from 7.8 persons in 1987 to 17.4 persons per 100,000 persons in 1996(National Statistical Office 1997). This increase of diabetes incidence may be due to changes from traditional eating pattern to westernized life styles during rapid socio-economic development in Korea.

Diabetes mellitus is a complex disorder of metabolism caused by either a deficiency of defective action of insulin, which is characterized by raised blood glucose levels(Macrae et al. 1993 : Mann 1998).

Diabetes is divided into roughly two groups, which are Type I (formerly called non-insulin dependent diabetes mellitus(NIDDM)) and Type II (formerly called insulin-

dependent diabetes mellitus(IDDM))(Berdanier 1999). Type I patients are far less common than type II patients. In Type II diabetes mellitus, a key abnormality is resistance to the action of insulin and in the early stages of the disease insulin levels may actually be raised. In Type I diabetes mellitus, there is destruction of the pancreatic islet β-cells usually resulting from an autoimmune process.

The diabetic patient is at high risk for developing serious complications, which may be preventable with appropriate health-care. Management goals for diabetes are to attain metabolic control of glucose and lipid levels in blood, which can be achieved by healthy meal and snack planning, with or without appropriate insulin treatment, oral hypoglycemic agents, and a moderate physical activity program(Florence & Yeager 1999). Nutrition assessment, initial nutrition education, implementation of a meal plan and ongoing nutrition education and counseling are part of the process of nutritional management for diabetes patients. The diet plan and the health-care system should be individualized and patients should be encouraged to participate actively in the management

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program(Lipkin 1999).

Therefore, the purpose of this study was to investigate the eating habit, life styles, and the nutritional care of diabetic outpatients and to provide basic data for developing individualized nutritional care and diabetic education programs.

Subjects and Methods

1. Subjects

By random sampling, 200 diabetic outpatients were selected at a University Hospital located in Inchon. This survey was carried out by nutrition counseling with a questionnaire and an examination of medical records from August 17 to October 10 of 1997.

The originally designed questionnaire was prepared and modified according to the results of a pilot study. The questionnaire sought information about the general characteristics of the subjects, eating habits, health-related life styles and attitude and perception of subjects to diet therapy. Frequency of food intake was estimated as everyday, occasionally(3 - 6 days per week) and rare(less or 2 day per week).

2. Medical record examination

Anthrophometric data were obtained from medical records of subjects. Height and body weight were measured using a stadiometer and a platform scale respectively. Body mass index was calculated by body weight in kilograms divided by the height in meters squared. Relative body weight(RBW) was calculated by body weight divided by ideal body weight and multiplied by 100

(RBW=body weight/ideal body weight×100). Ideal body weight was calculated using Broca's modified formula (ideal body weight(kg)=(height(cm)- 100)×0.9). Subjects were classified as underweight, normal, overweight, or obese if their RBW values were under 90, 90 - 110, 110 - 120, over 120%.

Clinical characteristics and results of biochemical analysis were obtained from medical records of subjects. Clinical characteristics consisted of duration of diabetes, insulin treatment, family history and type of diabetes. Biochemical analysis included fasting blood glucose level, 2 hour postload blood glucose level, interval of blood glucose test, and blood lipid concentrations.

3. Statistical analysis

Frequency counts(%), mean and standard deviation were calculated for all variables using SAS program for personal computer(PC).

Results and Discussion

1. General characteristics of subjects

Table 1 presents general characteristics of the subjects. It was shown that 36.5% of the subjects were male and 63.5% were female, which agrees with the previous results showing that the number of female diabetic patients were greater than that of male diabetic patients in Korea (Park & Kim 1994). Also 30% of subjects were 60 - 69 years old, 27% were 50 - 59 years old, 18.5% were 40 - 49% years old, 8.5% were 70 years or more, 8.5% were 29 years or less and 6.5% were 30 - 39 years old. As for their educational level, 33.5% of the subjects received an

Table 1. General characteristics of subjects   N(%)

Characteristics		Male	Female	
Sex		73(36.5)	127(63.5)	200(100.0)
Age(years)	≤29	9(4.5)	10(5.0)	19(8.5)
	30 - 39	4(2.0)	9(4.5)	13(6.5)
	40 - 49	13(6.5)	24(12.0)	37(18.5)
	50 - 59	20(10.0)	34(17.0)	54(27.0)
	60 - 69	23(11.5)	37(18.5)	60(30.0)
	≥70	4(2.0)	13(6.5)	17(8.5)
Education level	Illiterate	4(2.5)	17(8.5)	21(10.5)
	Primary school	16(8.0)	51(25.5)	67(33.5)
	Middle school	15(7.5)	20(10.0)	35(17.5)
	High school	24(12.0)	30(15.0)	54(27.0)
	College or higher	14(7.0)	9(4.5)	23(11.5)
Occupation	Working	39(18.5)	22(11.0)	61(30.5)
	Unemployed	34(17.0)	105(52.5)	139(69.5)

Table 2. Anthropometric measurement of subjects

Variable	Male	Female	Total
Height(cm)	166.08± 8.24[1]	155.24±6.39	162.66±7.31
Body weight(kg)	63.85±11.40	60.20±8.55	62.02±9.97
Body mass index(kg/m^2)	23.06± 3.26	25.02±3.49	24.31±3.53

1) Mean±S.D.

elementary school education, 27% received a high school education, 17.5% received a middle school education, 11.5% received a college or higher education and 10.5% were illiterate. The educational level of our subjects was lower compared to that of the subjects of previous studies which were conducted in Seoul(Park & Kim 1994 ; Song & Lee 1993). Also the educational level of male subjects was higher compared to that of female subjects, which agrees with previous results from diabetic outpatients in Seoul and Kuri city of Kyunggi providence respectively(Cho 1995 ; Park & Kim 1994). As for occupation, 69.5% of the subjects were unemployed and 30.5% were working, and female subjects were more unemployed than male subjects, which agrees with previous results from diabetic outpatients in Seoul and Kuri city of Kyunggi providence respectively(Cho 1995 ; Song & Lee 1993).

2. Anthrophometric data

Table 2 shows the anthrophometric data of subjects. The average height of male and female subjects were 166.08 and 155.24cm, respectively. Also the average weight of male and female subjects were 63.85 and 60.20kg, respectively. BMI of male and female subjects were 23.06 and 25.02kg/m^2 respectively. These results are similar to the previous results of hospitalized diabetic patients in Seoul(Kim et al. 1990 ; Kim et al. 1991). It was shown that 44% of subjects were obese, 23.5% were overweight, 21% were normal and 11.5% were underweight(Fig. 1). According to Park & Kim's study conducted in 1994, it was shown from type II diabetic outpatients that 44.7% of subjects were obese in the past and 30.7% were obese in present(Park & Kim 1994). Also, in randomly selected American adult diabetic patients(mean age : 61 years : women : 54%), it was reported that 38.9% of subjects were overweight(Arnold 1993), which is lower compared to the our result in Inchon.

3. Clinical characteristics

Table 3 shows the clinical characteristics of subjects. The duration of diabetes was 2 - 5 years(28.5%), 6 - 10 years(28.0%), 1 year or less(17.5%), 16 years or more(15.5%),
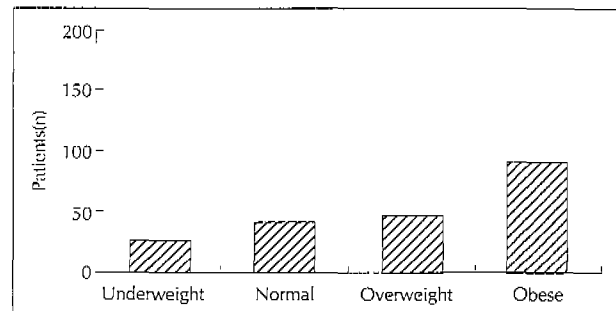

Fig. 1. Distribution of body weight.

11 - 15 years(10.5%), which is similar to the previous results from diabetic outpatients of the health center in Kuri city, one of small cities in Kyunggi providence(Cho 1995). However, Park & Kim's study showed that 33.3% of type II diabetic outpatients suffered from diabetes for 10 years or more, 28.1% did for 1 - 3 years, 21.0% did for 4 - 6 years, 9.7% did for 1 year or less and 7.9% did for 7 - 9 years(Park & Kim 1994). In this study, 76% of subjects were not treated with insulin and 24% were treated with insulin. However, in Park & Kim's study conducted in 1994, 20.2% of type II diabetic outpatient subjects were treated with insulin.

It was shown that 41% of subjects had a family history of diabetes and 59% of subjects did not have a family history of diabetes. A family history of diabetes is a risk factor for diabetes(Vachen et al. 1998), especially for type I diabetes mellitus in which genetic factors are important. In case of type II diabetes mellitus, it appears that genetic and lifestyle factors combine to result in the development of type II diabetes mellitus(Mann 1998). Since diet is associated with diabetes, one possible explanation for non-genetic familial clustering is shared eating habits. It has been reported that familial correlation of dietary intake may be high enough to influence familial clustering of complex diseases including diabetes(Vachen et al. 1998).

Among these subjects, 81.0% had type II diabetes mellitus(formerly called NIDDM), 18.5% had type I diabetes mellitus(formerly called IDDM) and 0.5% had mixed type diabetes mellitus. It has been reported from prospective as well as cross-sectional studies that there is a

Table 3. Clinical characteristics of subjects

Characteristics		N(%)
Duration of diabetes(years)	≤1	35(17.5)
	2 - 5	57(28.5)
	6 - 10	56(28.0)
	11 - 15	21(10.5)
	≥16	31(15.5)
Insulin treatment	Yes	48(24.0)
	No	152(76.0)
Family history	Yes	82(41.0)
	No	118(59.0)
Type of diabetes	Type Ⅰ	37(18.5)
	Type Ⅱ	162(81.0)
	Type mix	1(0.5)

Table 4. Biochemical analysis of subjects' blood

		N(%)
FBG(ml/dl)	≤115	43(21.5)
	116 - 140	46(13.0)
	≥141	117(58.5)
PP₂(ml/dl)	≤140	23(11.5)
	141 - 200	26(13.0)
	≥201	151(75.5)
Blood glucose test	Every day	20(10.0)
	1 week	18(9.0)
	2 weeks	11(5.5)
	1 month	151(75.5)
TG(ml/dl)	≤100	31(15.5)
	101 - 150	67(33.5)
	151 - 200	70(35.5)
	201 - 250	36(18.0)
	251 - 299	7(3.5)
	≥300	20(10.0)
T-chol(ml/dl)	≤151	46(23.0)
	151 - 175	22(11.0)
	176 - 200	49(24.5)
	201 - 225	39(19.5)
	226 - 246	20(10.0)
	≥250	24(12.0)
HDL-chol(ml/dl)	≤30	12(6.0)
	31 - 40	56(28.0)
	41 - 50	66(33.0)
	51 - 59	47(23.5)
	≥60	17(8.5)

FBG : Fasting blood glucose concentration, PP₂ : 2 hour postload plasma glucose concentration, TG : Blood triglyceride concentration, T-chol : Blood total cholesterol concentration, HDL-chol : Blood HDL-cholesterol concentration

striking association between risk of type Ⅱ diabetes and increasing obesity, particularly when the excess body fat is centrally distributed(Knowler et al. 1981 ; Mann 1998). Therefore, it appears that a high ratio of obese or overweight subjects was associated with this high ratio of type Ⅱ diabetes mellitus.

4. Biochemical analysis

As for fasting blood glucose concentration, 58.5% of subjects had above 140mg/dl, 21.5% had below 116mg/dl, and 13% had 116-140mg/dl(Table 4). Also 75.5% of subjects had above 200mg/dl, 13.0% had 141-200mg/dl, and 11.5% had below 141mg/dl of 2 hour postload plasma glucose concentration. These blood glucose concentrations were higher compared to the previous result from diabetic outpatients of the health center in Kuri city(Cho 1995). In this study, 75.5% of subjects had a blood glucose test every month, which means that they had blood tests when they saw a physician or dietitian. Only 10% of subjects had a blood glucose test everyday, which means that they were self-care patients. For glycemic control, daily self-test is important. Therefore, diabetic patients should be educated to check blood glucose concentration for themselves everyday.

As for blood lipid profiles, 35.5% of subjects had 151-200mg/dl, 33.5% had 101-150mg/dl, 18.0% had 201-250mg/dl, 15.5% had below 101mg/dl, 10.0% had above 300mg/dl, and 3.5% had 251-300 mg/dl of blood triglyceride concentration. Also 24.5% of subjects had 176-200mg/dl, 23.0% had below 151mg/dl, 19.5% had 201-225mg/dl, 12.0% had above 250mg/dl, and 11.0% had 151-175mg/dl of blood total cholesterol concentration. As for blood HDL-cholesterol concentration,

which is important for prevention from complication such as coronary heart disease(Mann 1998), 33.0% of subjects had 41-50mg/dl, 28.0% had 31-40mg/dl, 23.5% had 51-59mg/dl, 8.5% had above 59mg/dl, and 6.0% had below 31mg/dl.

5. Dietary patterns, eating habits and life styles

Most subjects ate yellow and green vegetables everyday, fruits and bean and bean products everyday or occasionally(Fig. 2). However, in frequency of egg and meats consumption, subjects ate them occasionally, everyday and rare in order. Also subjects ate sea weeds occasionally, rare and everyday in order. In frequency of milk and milk products consumption, subjects ate them rare, everyday and occasionally in order.

Table 5 shows that 89.5% of subjects did not skip meals and 10.5% skipped meals. This percentage of subjects skipping meals was higher compared to the previous result from diabetic outpatients of the health cent-
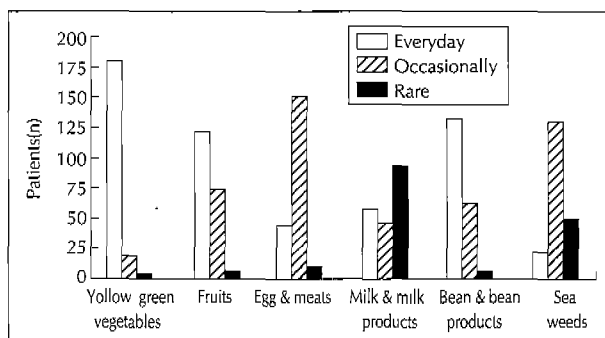
Fig. 2. Food intake frequency of subjects.

Table 5. Eating habits and life styles of subjects

Item		N(%)
Meal skipping	Yes	21(1.5)
	No	179(89.5)
Cooked rice intake	1/2 bowl	20(10.0)
	1 bowl	163(81.5)
	>1 bowl	17(8.5)
Eating habit problem	Hasty and overeating	76(38.0)
	Meal skipping	7(3.5)
	Prejudice for special food	15(7.5)
	Addiction in salty and spicy food	5(2.5)
	Meal remnant eating	3(1.5)
	None	94(47.0)
Preference for salty food	Like	58(29.0)
	Average	111(55.5)
	Dislike	31(15.5)
Preference for spicy food	Like	60(30.0)
	Average	110(55.0)
	Dislike	30(15.0)
Smoking	Yes	33(16.5)
	No	167(83.5)
Drinking	No	143(72.5)
	2 - 3 times week	52(26.0)
	Everyday	3(1.5)
Exercise	Yes	68(34.0)
	No	132(66.0)

er in Kuri city, which was shown that 6.6% of diabetic outpatients skipped meals(Cho 1995). It was shown that 81.5% of subjects ate one bowl of cooked rice, 10% ate half bowl of cooked rice and 8.5% ate more than one bowl of cooked rice. As for eating habit problems, 47.0% of subjects answered that they had no eating habit problem, 38.0% answered hasty and overeating, 7.5% answered meal skipping, 2.5% answered addiction in salty and spicy food and 1.5% answered meal-remnant eating. It may be possible that improved eating habits after diabetes education caused 47% of subject to answer that they had no eating habit problems.

As for preferences for salty and spicy foods, 55.0% and

55.0% answered average preference, respectively. However, 29% and 30% answered strong preference, respectively.

In this study, 83.5% of subjects were non-smokers, 16.5% of the subjects were smokers, which is similar to the previous result from diabetic outpatients of the health center in Kuri city(Cho 1995). It was reported that vascular correlation with diabetes was stronger among people who currently smoked(Mitchell et al. 1998). Therefore, it may be necessary to educate diabetes patients to cease smoking to prevent cardiovascular complications.

In drinking habits, 72.5% of the subjects did not drink alcohol at all, 26% drank alcohol 2 - 3 times a week and only 1.5% drank alcohol everyday. In drinking habits of diabetes outpatients in the health center of Kuri city, 78.0% of the subjects did not drink alcohol at all, 11% drank alcohol 1 - 2 times a week, 6.6% drank alcohol 3 - 4 times a week and 4.4% drank alcohol everyday(Cho 1995). It was reported that alcohol intake was positively associated not with 2 hour glucose concentration but with fasting glucose concentration in men and women, which means that alcohol intake was a significant risk factor for type II diabetes mellitus(Pomerleau et al. 1999).

In exercise which is important for optimum diabetic control(Kabadi 1986), 66.0% of subjects did not exercise at all and 34.0% exercised. It was reported from the previous result of the health center in Kuri city that 48.4% of diabetic outpatients did not exercised at all, 33.0% exercised everyday, 11.0% exercised 4 - 5 times a week and 7.6% exercised 2 - 3 times a week(Cho 1995). Glucose tolerance can be improved by exercise and good aerobic capacity was associated with an increase in HDL-cholesterol(Uusitupa 1996). Also it was reported that a sedentary life style may contribute to risk factors for type II diabetes mellitus(Herman et al. 1995). Therefore, diabetes patients should be encouraged to exercise and individualized exercise programs should be prepared according to the patient's needs and life style.

6. Attitude and perception to diet therapy

As for diabetes patient education, 50.5% of the subjects in this study have attended nutrition education programs and 73.3% of which had nutrition education in the hospital(Table 6). This percentage of those attending diabetes patient education was lower compared to that of a previous study conducted in Seoul(Park & Kim 1994). Nutrition education was considered effective by 75.5% of

Table 6. Attitude and perception of subjects to diet therapy

Item		N(%)
Nutrition education	Yes	101(50.5)
	No	99(49.5)
Place of nutrition education	Hospital	74(73.3)
	Others	26(26.7)
Nutrition education effect	Yes	76(75.5)
	No	25(25.5)
Implementation of	Yes	151(75.5)
diet therapy	No	49(24.5)
Most important self-guideline in diet therapy	Keep a prescription	2(1.0)
	Avoid sweets	27(13.5)
	Reduce intake	4(2.0)
	Eat regularly	13(6.5)
	Eat fiber-rich grains	146(73.0)
	Others	8(4.0)
Nutrition knowledge	Unknown	33(16.5)
	Known roughly	114(57.0)
	Known in detail	53(26.5)
Difficulties in implementation of diet therapy	Unknown	7(3.5)
	Infeasible	50(25.0)
	Insufficient	8(4.0)
	Too hungry	16(8.0)
	No problem	100(50.0)
	Others	19(9.5)
Civil therapy	Yes	26(13.5)
	No	173(86.5)

subjects. As for the implementation of diet therapy, 75.5% of the subjects answered yes, which was higher compared to previous results from diabetes outpatients of the health center in Kuri city : 12.1% answered yes, 33.0% answered trying, 54.9% answered no(Cho 1995). However, it was lower compared to a previous study in Seoul : 79.8% answered yes, 20.2% answered no(Park & Kim 1994). As for the most important self-guideline in diet therapy, 73.0% of the subjects in this study answered that they eat cooked rice with dietary fiber-rich grains, 13.5% answered that they avoid sweets, 6.5% answered that they eat regularly, 4.0% answered other, 2.0% answered that they reduce intake and 1.0% answered that they keep a prescription. Tan et al.(1997) explained that there was greater health improvements from the dietary practice of taking more unpolished rice/high fiber food for diabetic patients who had completed the nutrition education program. However, the result of present study conducted in Inchon was quite different from that of Park & Kim's(1994) study conducted in Seoul which revealed that 26.3% reduce intake, 23.7% avoid sweets, 19.3% eat regularly, 14.9% eat cooked rice with dietary fiber-rich grains, 9.6% keep a prescription, 6.1% others(Park & Kim

1994). As for self-evaluated nutritional knowledge, 57.0% of subjects answered "known roughly", 26.5% answered "known in detail" and 16.5% answered "unknown". The percentage of subjects that answered "known" was higher compared to that of previous study conducted in Seoul(Park & Kim 1994). When asked how difficult it was to implement diet therapy, 50.0% of the subjects answered "no problem", 25.0% answered "infeasible", 9.5% answered "other", 8.0% answered "too hungry", 4.0% answered "insufficient" and 3.5% answered "unkown", which was quite different from the previous results in diabetic outpatients of the health center in Kuri city ; 57.1% answered "unknown", 30.8% answered "not accustomed", 16.5% answered "insufficient", 7.7% answered "too expensive", 6.6% answered "no concern", 4.4% answered "no problem"(Cho 1995). Also it was reported in the previous study conducted in Seoul that 27.5% of subjects answered "infeasible", 26.3% answered "no problem", 20.9% answered "too hungry", 17.6% answered "others", 5.5% answered "unkown", 2.2% answered cooking person's ignorance(Park & Kim 1994). As for use of civil therapy, 86.5% of subjects answered "no" and 13.5% answered "yes". The percentage of subjects using civil therapy was lower compared to that of previous study conducted in Seoul ; 46.4% answered "yes", 59.6% answered "no"(Park & Kim 1994).

Summary and Conclusion

This survey was carried out by nutritional counseling with a questionnaire and checking medical record. Information about the general characteristics of the subjects, eating habits, health-related life styles and attitude and perception of subjects to diet therapy was gathered from 200 randomly-sampled diabetic outpatients at a University Hospital located in Inchon. The results are summarized as follows :

1) It was shown that 44% of subjects were obese, 23.5% were overweight, 21% were normal and 11.5% were underweight.

2) As for eating habit problems, 47.0% of subjects answered that they had no eating habit problem, 38.0% answered hasty and overeating, 7.5% answered meal skipping, 2.5% answered addiction in salty and spicy food and 1.5% answered meal-remnant eating.

3) In smoking, 83.5% of subjects were non-smokers, 16.5% of the subjects were smokers. In alcohol intake,

72.5% of the subjects did not drink alcohol at all, 26% drank alcohol 2-3 times a week and only 1.5% drank alcohol everyday. In exercise, 66.0% of subjects did not exercise at all and 34.0% exercised.

4) As for diabetes patient education, 50.5% of the subjects have attended nutrition education programs and 73.3% of which had nutrition education in the hospital. Nutrition education was considered effective by 75.5% of subjects. As for the implementation of diet therapy, 75.5% of the subjects answered yes.

From these results, diabetic outpatients in this study seem to implement management guidelines except exercise. Therefore, it might be necessary to develop nutrition education program adjusted according to diabetic patient's needs and life styles, which may increase feasibility of self-care and implementation of management guidelines, especially for exercise.

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