

Nursing intervention for the quality of life of diabetic adults

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The purpose of this study is to determine the effectiveness of a nurse-directed intervention (NDI) in terms of improvement in the quality of life (QOL) of the diabetic adults. An evaluative approach with a quasi-experimental design incorporating a non-equivalent pretest posttest control group design was adopted. The sample consisted of 30 diabetic adults in the experimental group and 30 in the control group attending the outpatient departments in the two private hospitals selected by convenience non-random sampling technique. The findings of the study showed that there were statistically significant differences between the QOL mean pretest and posttest scores in the experimental group total QOL, health and functioning, social and economic, psychological and spiritual and no significant differences in the control group. The mean posttest and mean gain QOL scores of the total QOL, health and functioning, social and economic, and family subscales of the experimental group were significantly higher when compared to the control group. Thus findings indicate effectiveness of the NDI in terms of significant improvement in the quality of life of the diabetic adults. The demographic and the clinical characteristics were independent of the QOL scores of the diabetic adults.

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INTRODUCTION

Diabetes mellitus (DM) is an inherited or acquired chronic disease caused by deficiency in the production of insulin or ineffectiveness of the insulin (insulin resistance) produced by the pancreas. This condition causes an increased concentration of glucose in the blood and the condition later affects other organs of the body. Research studies have shown that the progress of diabetes is also associated with a high risk of developing vascular, renal, retinal and neuropathy complications leading to premature disability and death (Samamta et al. 1991; Elmahdi et al. 1991; Misra 1994).

The WHO Health Report (1998, p. 91) quotes that in India diabetes directly causes approximately 38,000 deaths per year and may contribute to as many as 300,000 deaths annually, including many from heart disease and kidney failure. The number

of cases is increasing at approximately 6% a year, making diabetes an important and formidable health problem in India (WHO, 1998, p. 84). The prevalence of diabetes has been found to be approximately 2% in the rural and 3% in urban areas with local peaks as high as 8% with urbanization, changing lifestyles and dietary habits. Thus, diabetes can have a deleterious effect on the overall health and quality of life (QOL) of an individual.

Living with diabetes, an incurable illness affects every aspect of the diabetic person's everyday life and is a stressful event influencing the quality of life. The individuals need to find ways to live a meaningful life despite their illness. The ultimate adult oriented goal of diabetes care aims to maintain a quality of life, defined by Ferrell et al. (1998) as "a personal sense of well-being encompassing physical, psychological, social, and spiritual dimensions" (p. 217). Since QOL is an evolving

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phenomenon, it has to be defined and researched in multiple dimensions covering both satisfaction and importance areas. This interest in QOL stems from trends towards satisfaction of personal needs and wishes of the patients that would contribute to better and meaningful use of resources (Parmenter, 1994, p. 90).

The approaches to quality of life has two broad categories, labelled by Ferrans (1997, p. 216) as the "normal life approach" and the "evaluation approach" with four domains, i.e., health and functioning, social-economic, psychological or spiritual and family life. The 'normal life approach' indicates how well an individual function within society (satisfaction area) and the 'evaluation approach' indicates how a person perceives a particular aspect of life (importance area). The diabetic adult's satisfaction with a domain of greater importance would contribute to higher overall QOL. Since QOL is considered as a subjective sense of well-being involving importance and satisfaction areas, it could be objectively assessed through the QOL tool used for the purpose of the study as expressed by the diabetic adult.

Rationale of the study

As a major epidemic of the late 21st century diabetes poses a threat to the public health and is associated with increased biopsychosocial morbidity and mortality, if left untreated. Therefore, these patients must attain the knowledge and the skills required for developing a favourable attitude essential for diabetic control. The diabetic adults have to plan and carry out their self-care activities such as, testing urine and blood, adjusting and administering insulin, balancing diets, exercising, maintaining relationships ect.

Since, the nurse is the one functionary consistently at the patient's bedside, she has become 'de facto' educator and coordinator of education in the complexity of patient care. Patient teaching being an integral independent function of nursing practice, it also bridges the gap between health information and health practices resulting in altered patient's behaviour in the desired direction. One of the approaches used in the study is a nurse directed intervention (NDI) to improve the QOL, which requires theoretical knowledge and practical experience and skill in assuming the role of the nurse educator.

Objectives of the study

Prepare and validate the nurse-directed intervention for the improvement of quality of life among diabetic adults. Determine the quality of life of diabetic adults before and after the nurse-directed intervention as measured by Ferrans and Powers Quality of life index-diabetes III version. Evaluate the effectiveness of the nurse-directed intervention

in terms of improvement in the quality of life of the diabetic adults.

REVIEW OF LITERATURE

A cross sectional study was conducted by Larsson et al. (1999) to describe the possible differences in clinical characteristics, socio-economic factors and quality of life between diabetes patients in poor and good/acceptable metabolic control, as defined by levels of the glycosylated haemoglobin (HbA1c). Both the diabetic groups reported lower scorings for physical functioning, general health, vitality and mental health, than did a comparable non-diabetic group from another study. Diabetic patients in poor metabolic control had lower educational level, more complications, nervous problems, higher number of sick leave days or disability pension and lower degree of physical activity than patients in good/acceptable metabolic control.

De Grauw et al. (1999) studied a cross-sectional impact of 127, type 2 diabetes mellitus patients under 85 years on daily functioning and functional health status in two Dutch general practices. A control group of 127 non-diabetic patients was also selected. Between these groups the significant differences were in the Sickness Impact Profile subscore physical, the SIP sum score and the CODP/WONCA scores for physical fitness and overall health. Type 2 diabetes mellitus patients were 2.46 (95%) times more likely to experience functional impairment, cardiovascular morbidity, locomotory morbidity and diabetes were significantly associated with the presence of functional impairment.

A factor analysis on the psychometric assessment of the quality of life index (QLI) was carried out by Ferrans and Powers (1992). The sample consisted of 349 patients selected randomly from the adult, in-unit haemodialysis patient population of Illinois. Construct validity was supported by the contrasted groups approach. It was found that those who had higher incomes had significantly higher quality of life scores on the social and economic subscale. Support for convergent validity was provided by a strong correlation ($r = 0.77$) between scores from the QLI and an assessment of life satisfaction. Findings supported the internal consistency reliability of the entire QLI ($\alpha = 0.93$) and the four subscales.

Rubin and Payrot (1999) reviewed the published, English-language literature on self-perceived quality of life among adults with diabetes. Quality of life was measured on physical and social functioning, perceived physical and mental well-being. People with diabetes had a worse QOL than people with other serious chronic diseases. Duration and type of diabetes are not consistently associated with quality of life. Intensive treatment did not impair QOL, and having better glycemic control was associated with better quality of life. Compli-

cations of diabetes were the most important disease specific determinant of quality of life.

Thus the review literature studies show that nursing/educational interventions may help to improve the patients' health status and perceived ability to control their disease resulting in improved quality of life.

Research methodology

Research design

In view of the nature of the problem, objectives and hypotheses of the study, an evaluative approach with a quasi-experimental non-equivalent pretest posttest control group design was planned. This design was preferred as the study lacked randomisation and a true control, but the two groups were treated identically except for the experimental treatment. The control group received the usual care, which could not be controlled for ethical reasons. Usual care refers to the routine care given to the control group by the doctors or nurses in the outpatient department of the hospitals both prior and during the period of the study, which usually includes blood and urine tests for glycemic levels, medicine prescriptions and advice regarding diabetes care.

After the sample selection, the pretest (day 1) was administered to the experimental and control groups. Then the treatment, i.e., the NDI (day 1) was given only to the experimental group. After the pretest and the intervention plan, the experimental group were asked to attend the reinforcement programme (NDI) after one month (day 30) on specific days. After 60 days of the pretest, the posttest (day 60) was given to both the groups. No attempt was made to restrict the usual care given by the hospital staff to the control group. There was no sample mortality.

Selection of the study instruments

Description of the QOL scale

Quality of life (QOL) in this study is defined as the subjective perception of satisfaction and importance with that domain of life, expressed by the diabetic adults. A number of standardised QOL tools were surveyed and the Ferrans and Powers Quality of life Index-Diabetes version III (QLI-D) tool was selected for the study as it was found to be most suitable. A content blue print was prepared based on the four domains of the QLI-D tool.

The QLI-D tool has 66 items in two parts (satisfaction and importance scale), each part consists of 33 similar items. The items cover four domains, which are "health and functioning" (14 items), "social and economic" (7), "psychological and spiritual" (7) and "family" (5). The rating scales for the QLI Satisfaction and the QLI Importance tools has six points: very dissatisfied/unimportant, moderately dissatisfied/unimportant, slightly dis-

satisfied/unimportant, slightly satisfied/important, moderately satisfied/important and very satisfied/important. There were five sets of scores calculated from the total QLI-D scale and the four QLI-D domains or subscales: health and functioning, social and economic, psychological/spiritual and family. The possible scores of each item ranged from 1 to 6. For the total (overall) quality of life score 33 items from each part were used to calculate the total score, which reflects overall quality of life.

Reliability of QLI-D scale. The QLI-D scale was administered to 30 diabetic adults in the hospital with the specified sample criteria. Coefficient of internal consistency of the total QLI-D scale was 0.94 as computed by Cronbach α method.

Sample characteristics. Background proforma (age, sex, marital status, education, occupation, income, habits) and clinical proforma (duration of diabetes, information on diabetes, type of medications, body mass index, blood sugars levels, blood pressure, complications present) was used to collect the baseline information.

Development of the nurse directed intervention

In this study the nurse-directed intervention (NDI) is a planned, systematic, organised and validated diabetic patient education programme, directed by the nurse, designed for instructing diabetic adults with regard to improving their quality of life. Effectiveness of the NDI is measured by the QLI-D scale. Higher the total score of the QLI-D scale, higher is the QOL of diabetic adults. The nurse directed intervention for improving the quality of life was developed for the diabetic adults with the following steps.

The blue print of the NDI was prepared considering the broad classification as given in the blue print of the QOL instrument. These were: health and functioning, social-economic, psychological and spiritual and family domains. The first draft of the NDI for improving the quality of life of the diabetic adults was prepared on the basis of the blue print, literature available on the diabetes and the development of the NDI. The NDI aimed at improving the QOL of the diabetic adults. The areas covered in the NDI were: Introduction to diabetes: definition, role of insulin, mechanism of diabetes, clinical features and the clinical investigations. Health and functioning domain: goals of management and the management areas regarding diet, exercise, medications, hygiene, and the prevention of short and long term complications. Social and economic domain: socialisation and leisure. Psychological and spiritual domain: relaxation and stress management. Family domain: support and participation and finally, Conclusion.

The criteria rating scale for validating the NDI was developed with 26 items spread in six broad criterion areas which were: organisation, selection,

presentation, language, visual aids, and feasibility of the content and extra space was provided for additional suggestions. The rating scale had four response columns i.e., strongly agree, agree, partially agree, and disagree. To determine the content validity, the drafts of the NDI along with the criteria rating scale and the sample visual aids were submitted to fourteen specialized experts in medical and nursing fields. Out of the 26 items, 20 items were strongly agreed or agreed by all 100%. The remaining six items were modified according to the suggestions as provided by the subject experts.

The final draft of the NDI was prepared with appropriate visual aids incorporating the suggestions given by the expert validators. The main method of teaching was lecture cum discussion. Patient learning was through questioning, illustration, sharing life experiences and clarifying doubts. The NDI was finalised with a pamphlet on the guidelines for managing diabetes mellitus, two handouts on diabetes diet, 10 charts and five posters on the management of diabetes, five real objects for the medications and the blood and urine testing measures and eight pictures on the sites of insulin administration, diabetic card and the diabetic diet.

The main objectives of the nurse directed intervention were that the diabetic adults would be able to explain and practice: What is diabetes and the role of insulin? Why diabetes and its clinical features occur? Which are the investigations to monitor diabetes? What are the goals of managing diabetes? Describe the diabetic diet. How does the medications and exercise help? How to monitor sugar levels? How to take care of the body? How to prevent the complications of diabetes? How to socialize with others? How to relax and manage stress? How to improve family care?

The visual aids consisted of charts which showed the goals of management of diabetes, food groups list, quantity of foods, types of exercises, do's and don'ts of foot care, short term and long term complications, prevention of complications and psychosocial and family activities. Posters exhibited human digestive system, balanced diet plan, fruits, vegetables and vitamins. Pamphlet described the mechanism of control of diabetes, clinical features, foods to be had in sizable proportion, used in moderate and those to be restricted, aerobic exercises, foot care, features of low blood sugar and high blood sugar. Handout explained the food exchange list and normal adult height-weight chart. Pictures showed an example of vegetarian and non-vegetarian 1200, 1800, 2200 calorie diet menus, sites of insulin injection and diabetic card. Objects displayed were oral diabetic tablets, insulin vial and syringe, benedict's solution, urine strips and blood glucometer.

Setting, sample, sampling technique and sampling criteria

The study was conducted in the outpatient department of two selected private hospitals consisting of

30 diabetic adults each in the experimental and control groups. A convenience non-random sampling technique was used to select the samples according to the sampling criteria for each group. The sampling criteria included diabetic adults more than 20 years of age, who were able to understand, read, write and communicate in English. And those willing to participate in the study, intervention, and follow up visits.

Pilot study. A pilot study was conducted in a private hospital using a convenience sampling technique with 10 samples in the experimental group and 10 in the control group, selected as per the specified criteria. The pilot study did not show any major problems in the design of the study. No modifications were made in the tool. The study findings showed that the diabetic adults were able to understand the items given in the QOL and were able to follow the intervention programme. The duration, time and the length of the intervention plan (total two hours) were found to be feasible, adequate and convenient to the diabetic adults.

Data collection procedure

Formal administrative permission to conduct the study was obtained from the Medical Superintendents of the two private hospitals. The diabetic patients attending the out patient department of the two private hospital settings were informed about the purpose and usefulness of the study to obtain open and honest responses. Assurance of confidentiality was also given to them. An informed consent was obtained from the subjects indicating their voluntary participation in the study. Data collection procedure ranged from March to June 2001. The investigator collected data from the subjects from the selected hospitals till the specified number of the samples was obtained. Most of the respondents were interviewed at the out patient setting in separate rooms allotted for the purpose.

Ten experimental group patients who fulfilled the sampling criteria were selected for each day (two-day sessions of one hour each) until the required sample size was reached. The data were collected before and after the intervention. The NDI was conducted on two successive days with 1-h duration each in the seminar hall of the hospital with the full co-operation and voluntary participation of the diabetic adults. The data collection was terminated after the posttest data were collected from the diabetic adults. The participants accepted the NDI administered to them. The participants were thanked for their response and co-operation. Similarly the study was conducted for the control group samples, except for the intervention.

Plan for data analysis

The data collected from 60 diabetic adults to assess their quality of life was analysed according to the

objectives and hypotheses of the study. Frequencies and percentages were used to analyse the sample characteristics. Independent *t* test was used to determine the significance of difference between the experimental and control group in terms of QOL pretest, posttest and mean gain scores. Paired *t* test was used to analyse the significance of difference between the QOL pretest and the posttest scores in the experimental as well as in the control group. χ^2 was used to test the association between the independent variables and QOL.

ANALYSIS AND INTERPRETATION

Null hypotheses used in the study were: there is no significant difference between the QOL mean pretest and the posttest scores of the experimental group of the diabetic adults exposed to NDI. There is no significant difference between the QOL mean pretest and the posttest scores of the control group of the diabetic adults exposed to usual care. There is no significant difference between the QOL mean posttest scores of the experimental and the control groups of the diabetic adults. There is no significant difference between the QOL mean gain scores of the diabetic adults in the experimental group receiving the NDI and the control group receiving the usual care. There is no significant association between the QOL scores and the demographic and clinical characteristics in the experimental as well as in the control group of the diabetic adults.

The analyses of the data from the study are presented under the following headings:

Description of sample characteristics. Distribution of the QOL scores of the Diabetic Adults. Differences between the QOL mean pretest and posttest scores in both the groups. Differences of mean posttest QOL scores between both the groups. Differences in the mean gain QOL scores between both the groups. Association between the QOL scores and the demographic and clinical characteristics in the experimental as well as the control group.

Description of sample characteristics

Majority of the diabetic adults in the experimental group (56.7%) and control group (73.3%) belonged to the age group 41–60 years. Majority of the diabetic adults in the experimental group (73.3%) and control group (70%) were males. Maximum of the diabetic adults in the experimental group (70.1%) and the control group (73.4%) had education above higher secondary. More diabetic adults in the control group (43.45%) seemed to have professional or semi-professional occupation than the experimental group participants (20%). While 36.7% of the diabetic adults in the experimental group had diabetes for more than 10 years, whereas in the control

group there were only 3.3% diabetic adults in this category and most of the diabetics (76.7%) had diabetes for 5–10 years.

Majority of the diabetic adults in the experimental group (80%) and the control group (76.6%) were on diet and oral diabetics. Only a few of the adults in the experimental group (20%) and the control group (6.7%) had a high body mass index (more than 25) indicating obesity. In the experimental group 93.3% and the control group 86.7% of the diabetic adults had a normal blood pressure between 140–110 and 90–60 mm Hg. While 43.3% of the diabetic adults in the experimental group had a high blood sugar, in the control group there were 93.3% of the diabetic adults. Many of the diabetic adults in the control and the experimental group had kidney (46.33% and 43.33%) and nerve (50% and 36.6%) complications, respectively.

Distribution of the QOL scores of the diabetic adults

The QOL pretest and posttest scores of the participants in both the groups are given in frequencies and percentages in six class intervals: 0–5, 5–10, 10–15, 20–25, and 25–30. The data are summarised for the total QOL and the four domains of the QOL as shown in Figs. 1 and 2. Frequency polygons in Figs. 1 and 2 were plotted by taking the frequency of the pretest and posttest QOL scores of the diabetic adults in the experimental and the control groups respectively. Since the sample size was small, the frequency polygons were “smoothed” by taking averages from which adjusted frequencies were determined (Garrett, 1973, p. 13).

In Fig. 1 the pretest median (16.22) and mean (18.04) of the diabetic adults in the experimental group lie close to each other and the posttest median and mean (24.54) coincide with each other. The posttest QOL scores are symmetric ($Sk = 0$) in the distribution because the mean equals the

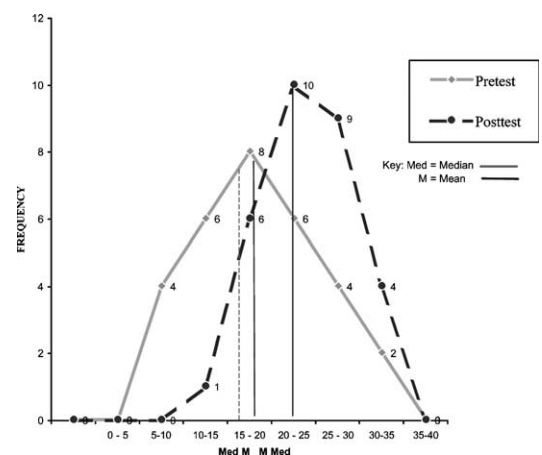


Fig. 1. Frequency polygon showing the total QOL scores of the diabetic adults in the experimental group.

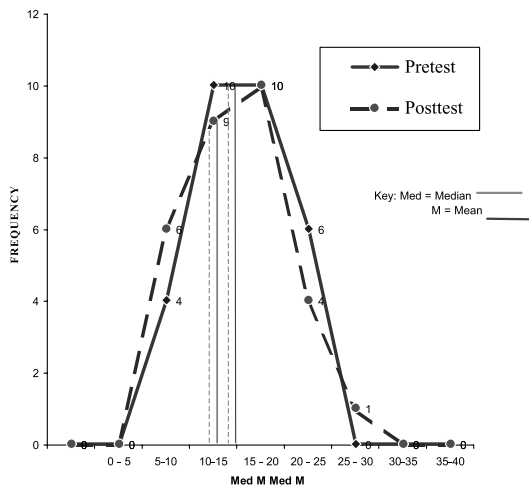


Fig. 2. Frequency polygon showing the total QOL scores of the diabetic adults in the control group.

median. The pretest polygon is skewed positively ($Sk = 0.86$) or to the right as the QOL scores are massed at the low end of the scale and are spread out gradually toward high or right end. It is also evident from the graph that the experimental group posttest QOL scores of the diabetic adults fell beyond the pretest scores, which indicates that there is a considerable improvement in the QOL of the diabetic adults suggesting effectiveness of the NDI.

Fig. 2 shows that the control group's position of the mean and the median lie very close to each other in the pretest (15.98 and 15.63) and the posttest (14.99 and 14.18) HPB scores. The pretest and the posttest polygons are skewed positively ($Sk = 0.42$ and 0.73), respectively. Therefore, the skewness is negligible showing that the distribution approaches normal, in the pretest and the posttest QOL scores. It is also evident from the graph that the posttest HPB scores of the diabetic adults was very close to the pretest scores indicating that the

usual care did not make a difference in the QOL of the diabetic adults.

Differences between the QOL mean pretest and posttest scores in the experimental and control groups

H01: There is no significant difference between the QOL mean pretest and the posttest scores of the experimental group of the diabetic adults exposed to NDI. H02: There is no significant difference between the QOL mean pretest and the posttest scores of the control group of the diabetic adults exposed to usual care.

In Table 1, the mean difference (6.50) between the total mean pretest and the posttest QOL scores of the experimental group was statistically significant, $t_{(29)} = 6.54, P < 0.001$. Also there were apparent mean differences between the pretest and the posttest scores in the health and functioning, social and economic, psychological and spiritual domains which were found to be statistically significant, $t_{(29)} = 6.16, 6.51, 2.32, 3.28$, respectively. Hence H01 was rejected and the difference between the QOL pretest and the posttest scores of the diabetic adults in the experimental group was found to be true.

In the control group, the mean difference of 0.99 of the total QOL scores was not significant, $t_{(29)} = 1.22, P > 0.05$. It was also found that there were no significant mean differences between the pretest and the posttest scores in the health and functioning, social and economic, psychological and spiritual and family domains as the t values were not found to be statistically significant, $t_{(29)} = 1.00, 0.57, 0.61, 1.99$, respectively. Hence, H02 was accepted and the observed differences between the pretest and the posttest total QOL and the subscale scores of the diabetic adults in the control group were not found to be true.

Table 1 Mean, mean difference and t values between the QOL pretest and posttest scores of diabetic adults in the experimental and control groups						
QOL scale	Statistics df 29	Experimental group (n = 30)		Control group (n = 30)		P
		Pretest	Posttest	Pretest	Posttest	
Total	Mean	18.04	24.54	15.98	14.99	0.001
	MD ^a		6.50		0.99	
	t		6.54***		1.22 ^{ns}	
Health and functioning	Mean	17.56	24.74	16.06	15.13	0.001
	MD		7.18		0.93	
	t		6.16***		1.00 ^{ns}	
Social-economic	Mean	17.74	23.55	15.40	14.79	0.001
	MD		6.50		0.61	
	t		6.51***		0.57 ^{ns}	
Psychological-spiritual	Mean	25.37	26.18	15.99	16.14	0.05
	MD		0.81		0.15	
	t		2.32*		0.61 ^{ns}	
Family	Mean	19	23.1	16.35	14.90	0.01
	MD		4.17		1.45	
	t		3.28**		1.99 ^{ns}	

^a MD refers to mean deviation. ns, not significant.

Differences of mean posttest QOL scores between the experimental and control groups

The values presented in Table 2 for the mean pretest QOL scores indicate that the experimental (18.04) and the control group (15.98) did not differ significantly in their total mean pretest QOL scores, $t(58) = 1.65$, $P > 0.05$. Further the groups did not differ significantly in their mean pretest scores for the health and functioning, social-economic, and family mean scores, $t(58) = 1.21$, 1.91 , 1.87 , $P > 0.05$, respectively. However, the mean pretest scores of the psychological-spiritual domain were apparently higher in the experimental group (25.37) when compared with the mean of the control group (15.99). This was found to be statistically significant, $t(58) = 15.30$, $P < 0.001$. Therefore it can be said that both the groups were drawn from the same population having similar QOL scores while considering the total pretest means. The groups were also similar in three out of the four subscales of the QOL scores, i.e., health and functioning, social and economic and family except in the psychological and spiritual domain.

The observed mean posttest QOL scores between the experimental and the control groups were subjected to independent t test as shown in Table 3 to find their true differences. H03 There is no significant difference between the QOL mean posttest

scores of the experimental group and the control group of the diabetic adults.

As seen in Table 3, the mean posttest of the total QOL scores of the experimental group (24.54) was apparently higher when compared with the control group (14.99). The difference was treated statistically and the t value was found to be significant, $t(58) = 11.28$, $P < 0.001$. Further t statistics was applied to find the difference of the posttest means of the experimental and the control group in the four domains and were found to be statistically significant indicating higher mean values for health and functioning, $t(58) = 7.86$; social and economic, $t(58) = 9.50$; and family subscales, $t(58) = 8.89$, $P < 0.001$. Hence H03 was rejected.

Since the mean pretest QOL scores between the experimental and the control groups were significant in the psychological-spiritual subscale, $t(58) = 15.30$, $P < 0.001$ (Table 2), no attempt was made to examine the difference in the posttest scores between the two groups in this area. But an independent t test was computed with the mean gain scores, i.e., the differences between the pretest and the posttest scores of both the groups as shown in Table 4 and it was not found to be statistically significant, $t(58) = 0.75$, $P > 0.05$. This shows that the mean gain score of 0.81 in the experimental group was not statistically higher than that of the control group mean gain score (0.15) in the psy-

Table 2 Mean and t values between the pretest QOL scores of the experimental and control groups

QOL scale	Group	Mean	t , df 58	P
Total QOL	Exp ^a	18.04	1.65 ^{ns}	0.05
	Con ^b	15.98		
Health and functioning domain	Exp	17.56	1.21 ^{ns}	0.05
	Con	16.06		
Social-economic domain	Exp	17.73	1.91 ^{ns}	0.05
	Con	15.40		
Psychological-spiritual domain	Exp	25.37	15.30 ^{***}	0.001
	Con	15.99		
Family domain	Exp	18.97	1.87 ^{ns}	0.05
	Con	16.35		

^a Experimental group is abbreviated as Exp.

^b Control group is abbreviated as Con. ns, not significant.

Table 3 Mean and t values between the posttest QOL scores of the experimental and control groups $N = 60$

QOL scale	Group	Mean	t , df 58	P
Total QOL	Exp	24.54	11.28 ^{***}	0.001
	Con	14.99		
Health and functioning domain	Exp	24.74	7.86 ^{***}	0.001
	Con	15.13		
Social-economic domain	Exp	23.54	9.50 ^{***}	0.001
	Con	14.79		
Family domain	Exp	23.14	8.89 ^{***}	0.001
	Con	14.90		

Note. Exp refers to experimental group. Con refers to control group.

Table 4 Mean difference, standard deviation and t values of the mean gain QOL scores between the experimental and the control groups N=60

QOL	Groups	M _D	SD	t, df 58	P
Total	Exp	6.50	29.50	6.37*	0.05
	Con	0.99			
Health and functioning	Exp	7.18	34.54	7.07*	0.05
	Con	0.93			
Social-economic	Exp	5.81	26.65	5.71*	0.05
	Con	0.61			
Psychological-spiritual	Exp	0.81	10.31	0.75 ^{ns}	0.05
	Con	0.15			
Family	Exp	4.17	37.60	4.01*	0.05
	Con	1.45			

Note. M_D refers to the mean of the mean of differences between the posttest and the pretest QOL scores. SD refers to standard deviation. Exp refers to experimental group. Con refers to control group. ns, not significant.

chological and spiritual domain (refer Table 4). The difference observed is not true.

Differences in the mean gain QOL scores between the experimental and control groups

H0₄: There is no significant difference between the QOL mean gain scores of the diabetic adults in the experimental group receiving the NDI and the control group receiving the usual care.

The results given in Table 4 indicate that the *t* value of the total QOL mean gain scores computed between the experimental group and the control group was statistically significant, $t_{(58)} = 6.37$, $P < 0.05$. The *t* values between the experimental and the control groups in the health and functioning, social and economic and the family domains, $t_{(58)} = 7.07, 5.71, 4.01$, $P < 0.05$ were statistically significant respectively. There was no significant mean gain between the experimental and the control group in the psychological and spiritual domain, $t_{(58)} = 0.75$, $P > 0.05$.

Thus it is inferred that the mean gain scores of the total QOL and in three out of the four of the subscales, i.e., health and functioning, social and economic and family domains of the experimental group was statistically higher than that of the control group. Hence H0₄ was rejected. The mean gain QOL score in the psychological-spiritual subscale was 0.81 in the experimental group, which was apparently higher than that of the control group (0.15), but the difference in the mean gain was found to be by chance.

Association between QOL scores and the demographic and clinical characteristics of the diabetic adults in the experimental and the control groups

H0₅: There is no significant association between the QOL scores and the demographic and the clinical characteristics in the experimental and control group of diabetic adults. The χ^2 values between the QOL scores and the demographic (age, sex, education, occupation, income, marital status,

and habits) and the clinical (duration of diabetes, type of treatment, information received, blood pressure, fasting blood sugar, complications present) characteristics of the experimental group are not significant at 0.05 level. The χ^2 values for the control group between the QOL scores and the demographic and the clinical characteristics are not significant at 0.05 level. Hence the investigator failed to reject the H0₅.

The findings of the study are summarised as follows. A significant statistical difference was observed, where the posttest scores were higher than the total QOL and subscale pretest scores among the diabetic adults in the experimental group as compared to the control group. The mean posttest and mean gain QOL scores of the experimental group were found to be significantly higher than that of the control group. Thus the findings of the study showed that the QOL significantly improved in the total scale and the four subscales: health and functioning, social-economic, psychological-spiritual and the family, in the experimental group who received the NDI as compared to the control group who received the usual care. None of the demographic and the clinical characteristics was associated with the QOL for the diabetic adults in both the groups.

DISCUSSION AND CONCLUSIONS

Discussion

There are numerous research studies reported in the area of QOL but only few nursing intervention studies related to the QOL of diabetic adults. Several researchers have conducted clinical interventions for various diseases like asthma, cancer, coronary, dialysis, etc. and found its relationship with the domains of QOL. These studies are included for the purpose of comparing the study results.

Lok (1996) revealed that limitation of physical activity was the most troublesome stressor followed by decrease in social life. QOL was perceived as below average in both haemodialysis and CAPD

patients. CAPD patients experienced a higher QOL than haemodialysis patients. Killngworth and Akker (1996) demonstrated difficulties with psychological adjustment of QOL and physical symptoms in renal patients. Corden et al. (1997) reported greater impairment in the QOL and low levels of compliance with nebulised therapy in COPD patients. Rustoen et al. (1998) found that the nursing intervention programme significantly increased the levels of hope in newly diagnosed cancer patients, but there was no impact on their QOL.

Rukholm et al. (1998) found that the QOL of the 95 cardiac patients increased after a cardiac rehabilitation programme. Lindqvist and Sjoden (1998) found that the optimistic coping style used by all the patients on continuous ambulatory peritoneal dialysis (CAPD) was most effective in dealing with stressful treatment aspects. Significantly more men than women found emotive coping to be less effective. The patients had lower values on QOL except in the family and emotional functioning. The UK Prospective Diabetes Study Group (1999) results showed that there was a significant difference in the QOL scores of the diabetic adults allocated to intensive than to the conventional therapy. Hashizume and Kanagawa (1999) found that participation in adult day care had positive correlation with QOL for ambulatory frail elderly female participants than the male participants in Japan. Kong and Mollasiotis (1999) found no statistical differences in the QOL, coping and concerns between the Chinese patients with renal transplantation within 6 months and those within 5 years.

Conclusion

The "total" mean posttest QOL scores as well as the mean gain QOL scores (i.e., difference between the pretest and posttest scores) of the experimental group were also found to be statistically higher than that of the control group. Thus it can be inferred that an increase in the posttest and mean gain QOL scores show the effectiveness of NDI in the experimental group of the diabetic adults. This implies that nursing interventions like teaching and educating about diabetes care helps the diabetic patients to comply with their treatment regimen. Thus it is also concluded that the NDI was effective in raising the quality of life as a whole and also in the three domains in the diabetic adults.

However, a closer examination of the mean pretest QOL scores of the experimental group in the "psychological-spiritual" domain shows that the diabetic adults had attained a very high mean, i.e., 25.37 (Table 1) where the maximum possible score was 30. Their mean posttest scores increased to 26.18. This gain in the scores of the experimental group was not significant. This result may have occurred because the experimental group already reached a 'ceiling effect' in the psychological-spiritual domain, where higher scores may not

appear in the differences, which although different, are not statistically significant. Families need to participate, encourage and support the diabetics in their daily care. Alternative therapies like, stress management, yoga, relaxation techniques, meditation, spiritual activities need to be included in diabetic management for the psychological-spiritual care.

The determinants, i.e., the demographic and the clinical characteristics were independent of the QOL of the diabetic adults. More research is required to clarify the factors that would explain whether higher age, education, income or normal body mass index, blood sugar, blood pressure, decreased complications would lead to an increase in the QOL. The conclusions cannot be drawn from this study since the sample size was very small. To generalise the findings of the determinants requires a longitudinal study with a large sample using a stratified sampling technique.

Recommendations

Based on the findings of the study, the recommendations offered for future research are: A correlation study to assess the psychosocial correlates (such as, personality, anxiety, social support, environmental barriers, self-esteem, and emotional well being) of diabetics and adherence to diabetes regimen. Learning needs and teaching strategies for the nursing personnel working in different health care setting for adult diabetic care and education with a view to update their knowledge, skill and attitude for developing self care management of diabetics. A comparative study on determinants of QOL of diabetic adults with various psycho-socio-economic-cultural backgrounds would contribute to the development of different dimensions on QOL of diabetic adults.

Limitations recognised in the study

As there was no random selection of the subjects and the groups were not randomly assigned the findings cannot be generalised. Non-probability sampling (convenience sampling) of the subjects limited the heterogeneity of the sample characteristics. The diabetic adults of the experimental and the control groups showed significant difference for certain domains in the pretest QOL scores since a non-equivalent control group was used. Therefore statistical measures had to be taken for analysing the mean differences and mean gain scores.

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