

The family functioning and glycemic control of non-insulin dependent diabetes mellitus

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- Objective** : *To assess the family functioning and glycemic control of adults who are diagnosed to have diabetes mellitus type 2*
- Design** : *Descriptive study*
- Setting** : *Outpatient department, King Chulalongkorn Memorial Hospital*
- Method and Material** : *One hundred and twenty seven adults with type 2 diabetes were cross-sectionally assessed for diabetes glycemic control. Fasting plasma glucose and HbA1C were recorded. Chulalongkorn-Family Inventory test was conducted on the patients for evaluating 7 domains of family functioning.*
- Result** : *The patients had a mean age of 60.20 (SD=12.69) years. Approximately 57 % were female, 74 % were married, and 38 % had the duration of diabetes of over 10 years. The mean fasting plasma glucose was 153.35 (SD=59.28) mg %, the mean HbA1c was 7.96 (SD=1.23). The adherence to diabetic glycemic control was associated with higher score on family functioning test, these included problem solving, communication, affective responsiveness, affective involvement and general function ($p<0.05$), except role and behavioral control. Problem solving and affective involvement predicted 25 % of the variance in glycemic control.*

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Conclusion : *Good glycemic control is associated with family functioning, especially problem solving, communication, affective responsiveness, affective involvement and general function. It is important for practicing physician and health care providers to consider education and assessment in family on the family functioning, particularly the family functioning as the adherence factors to the metabolic glycemic control in diabetes patients.*

Keywords : *Family functioning, Diabetes mellitus.*

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สุชาติ ศุภปิตพร, ศิริลักษณ์ ศุภปิตพร. การปฏิบัติหน้าที่ของครอบครัวกับการควบคุมน้ำตาล
ในเลือดของผู้ป่วยเบาหวานประเภทไม่ดั่งฟังกินซูลิน. จุฬาลงกรณ์เวชสาร 2548 พ.ศ; 49(5):
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- วัตถุประสงค์** : เพื่อศึกษาการปฏิบัติหน้าที่ของครอบครัวกับการควบคุมน้ำตาลใน
เลือดของผู้ป่วยเบาหวานชนิดที่ไม่ดั่งฟังกินซูลิน
- สถานที่** : คลินิกเบาหวานและแผนกผู้ป่วยนอก, โรงพยาบาลจุฬาลงกรณ์
- รูปแบบการศึกษา** : การวิจัยเชิงพรรณนา
- วัตถุประสงค์และวิธีการ** : ศึกษาผู้ป่วยเบาหวานจำนวน 127 ราย ผู้ป่วยได้รับการสัมภาษณ์
ประวัติความเจ็บป่วย และตอบแบบสอบถามเพื่อประเมินการทำ
หน้าที่ของครอบครัว โดยใช้แบบวัด Chulalongkorn Family Inventory
และเก็บข้อมูลผลเลือดเกี่ยวกับระดับน้ำตาลในเลือดและระดับ HbA1C
- ผลการศึกษา** : ผู้ป่วยมีอายุเฉลี่ย 60.2 (SD=12.69) ปี ประมาณร้อยละ 57 เป็นหญิง
ร้อยละ 74 มีสถานภาพคู่ ร้อยละ 38 ป่วยเป็นเบาหวานนานกว่า 10 ปี
ระดับน้ำตาลเฉลี่ยในเลือดช่วงอดอาหารเท่ากับ 153.35 (SD=59.28)
มก/ดล ระดับ HbA1C เฉลี่ยเท่ากับ 7.96 (SD=1.23) การควบคุม
ระดับน้ำตาลในเลือดที่ดีมีความสัมพันธ์กับการปฏิบัติหน้าที่ของ
ครอบครัวอย่างมีนัยสำคัญทางสถิติ ซึ่งได้แก่ด้านการแก้ไขปัญหา
การสื่อสาร การตอบสนองทางอารมณ์ ความผูกพันทางอารมณ์ และ
ด้านการปฏิบัติหน้าที่ทั่วไป ยกเว้นด้านบทบาทและการควบคุม
พฤติกรรม จากการวิเคราะห์ความถดถอยเชิงพหุพบว่าการปฏิบัติ
หน้าที่ของครอบครัวในด้านการแก้ไขปัญหา และความผูกพันทาง
อารมณ์ สามารถร่วมทำนายการควบคุมระดับน้ำตาลในเลือดของ
ผู้ป่วยเบาหวานได้ร้อยละ 25 อย่างมีนัยสำคัญทางสถิติที่ระดับ 0.05
- สรุปผลการศึกษา** : การควบคุมระดับน้ำตาลในเลือดที่ดีมีความสัมพันธ์เกี่ยวข้องกับการ
ปฏิบัติหน้าที่ของครอบครัว โดยเฉพาะอย่างยิ่งในด้านการแก้ไขปัญหา
การสื่อสาร การตอบสนองทางอารมณ์ ความผูกพันทางอารมณ์ และ
การปฏิบัติหน้าที่ทั่วไป ดังนั้นแพทย์และบุคลากรทางการแพทย์ควรจะ
ให้ความสำคัญกับครอบครัวผู้ป่วย และการปฏิบัติหน้าที่ของครอบครัว
ผู้ป่วยเพื่อให้การควบคุมระดับน้ำตาลในเลือดของผู้ป่วยเบาหวานได้
ผลดียิ่งขึ้น
- คำสำคัญ** : การปฏิบัติหน้าที่ของครอบครัว, เบาหวาน

Patient compliance refers to the willingness and ability of an individual to follow the health related advice, to take the medication as prescribed, to attend the scheduled clinic appointments and to complete the recommended investigation. ⁽¹⁾ Patient compliance is a major health issue with outcome related to the level of morbidity, mortality and cost utilization. ⁽²⁾ Adherence to treatment is referred to as the characteristics of the behavior that define the extent to which a patient follows a medical treatment. ⁽³⁾

The gap between the current and the ideal practice suggests that the rates of compliance in long term therapy are about 50% regardless of the illness or setting. ⁽⁴⁾ About one-third of patients are said to comply with the recommended treatment. One-third sometimes comply and about one-third never comply. ⁽⁵⁾ Compliance with short-term treatments is generally considered to be higher than with long-term programmes. However, rapid declines in compliance occur even in the first 10 days of short term treatment, suggesting that compliance rates may be variable even in the short term. ⁽⁶⁾ Demographic and disease factors have generally been shown to be poor indicators of compliance and while it has been assumed that elderly people have poor rates of compliance due to cognitive deficit, multiple drug regimens and greater social isolation, research evidences suggest that the compliance rate in this group may, in fact, be very high. ⁽⁷⁾ Patients' relationship to the family members and the participation of spouses in the treatment and training appear to enhance the adherence, with married patients and retirees more likely to be compliant with the appointment and be able to re-explain

the instruction information after leaving the medical staff. ⁽⁸⁻¹¹⁾

For non-insulin dependent diabetes mellitus, studies show the supportive behavior correlates with blood glucose and diet adherence, but the frequency of non supporting behavior dose not correlated with the adherence. Glasgow et al, investigated factors associated with social environment, and they found that family support was the strongest and most consistent predictor of the adherence to treatment in patients with NIDDM. ⁽¹²⁾ The interaction of the family structure and function with the adherence to treatment in NIDDM patients has been however insufficiently studied. Several investigators have proposed that the family system has a role on the initiation, selection of symptom, clinical course, use of clinical facilities and the compliance to medical treatment in diverse chronic diseases. ⁽¹³⁻¹⁶⁾

Healthy families depend on the family functioning that consists of problem solving, communication skill, affective responsiveness, affective involvement, role performance, behavior control and general functions. These factors may be associated with the adherence to treatment in NIDDM patients. Understanding the family functioning of the patients may have a beneficial impact on management of NIDDM. This study has been done to investigate the relationship of family functioning and glycemic control of NIDDM patients.

Material and Method

A cross-sectional study was carried out in NIDDM patients from the endocrine and primary care unit of family physician unit at King Chulalongkorn Memorial Hospital. A total of 127 patients, aged over

18 years old were recruited. All of them were interviewed about their disease, general data through the investigator and answered the questionnaire of the family functioning and the structure of family. The family functioning was evaluated with Chulalongkorn-Family Inventory^(17,18) test, developed from the concept of the McMaster model of family functioning and Family Assessment Device.⁽¹⁹⁾ The questionnaire consisted of 36 items, including 7 domains; (1). problem solving, which is the family evaluated in 5 categories to identification of problem, communication to appropriate resource, development of action alternative, decision of one alternative, action, monitor and the evaluation of action. (2). Communication, rated in 5 categories for four patterns of communication such as clear, direct, masked and indirect communication. (3). Role, including 4 items to assess how the family allocates responsibilities and handles accountability for themselves. (4). Affective responsiveness, to evaluate the effectiveness and range of response in amount and quality to stimulus. (5). Affective involvement, categorized to the spectrum of involvement with six styles: lack, narcissistic, empathic, over, symbiotic and involvement devoid of feeling. (6). Control of behavior, applied to interpersonal socializing processes. (7). General function, involving the trust, understanding each others, personalization, the feeling of indifference and providing loves. The internal consistency reliability of Chulalongkorn Family inventory (Cronbach's alpha) was 0.88. For content validity, the IC value of the test was 0.86 .

Metabolic control of diabetes was evaluated by fasting blood glucose and determination of HbA1C. The recommendation of glycemic control is based

on the American Diabetes Association⁽²⁾ (fasting plasma glucose < 140 mg/dl).

All data studied of the relation of glycemic control and family functioning were analyzed with the procedures from spss 11.0 statistics package. Different subgroups of poor and good glycemic control were compared on the family functioning by using of t-test (two-tailed); the significance was accepted with $p < 0.05$. Finally, logistic regression analyses were performed on the variables to study the multivariate relationship of potential predictors with the glycemic control.

Results

Demographic and clinical variables for the 127 patients included in the sample are as follows. The mean age was 60.20 years (SD=12.69). Approximately 57.5 % were female, and 74 % were married, over 50 % were under-graduates. About 50 % had income lower than 5,000 bahts/month. Most of the patients (43.3 %) had duration of illness of more than 10 years. As shown in table 1.

Sixty-two patients (48.82 %) had good glycemic control, the mean blood glucose level was 153.35 mg % (SD=59.28), and the mean HbA1C was 7.96. As shown in table 2. There was no significant difference in age, gender, marital status, duration of disease between diabetes patients with good and poor glycemic control (table 3). Nevertheless the mean score of family functioning in the patients with good control was higher than those with poor control and the mean difference was statistically significant (95 %CI = 2.44 to 11.77, $t = 3.03$, $P = 0.003^{**}$).

Table 4 shows the score on 7 domains of family functioning in both groups. Five domains were

statistically different except for role and behavioral control. When using stepwise multiple logistic regressions, problem solving ($\beta = -.255$, $\exp(\beta) = .775$, wald $\chi^2 = 4.52$, $p = .033$) and affective

involvement ($\beta = -.204$, $\exp(\beta) = .816$, wald $\chi^2 = 4.45$, $p = .035$) were shown to predict 25% of the variance in glycemic control.

Table 1. Demographic data of patients.

| Characteristics | Diabetes patients (n = 127) | |
|-------------------------------|-----------------------------|------|
| | N | % |
| Gender | | |
| Female | 73 | 57.5 |
| Male | 54 | 42.5 |
| Marital status | | |
| Single | 16 | 12.6 |
| Married | 94 | 74.0 |
| Widow | 16 | 12.6 |
| Divorce | 1 | 0.8 |
| Education | | |
| No or primary school | 54 | 42.5 |
| Secondary school | 48 | 37.7 |
| Graduated or above | 25 | 19.6 |
| Income (bahts / month) | | |
| None | 46 | 36.2 |
| < 5,000 | 5 | 3.9 |
| 5,000-10,000 | 26 | 20.5 |
| > 10,000 | 50 | 39.4 |
| Duration of DM (years) | | |
| Less than 1 | 13 | 10.2 |
| 1 – 5 | 33 | 26.0 |
| 5 – 10 | 26 | 20.5 |
| More than 10 | 55 | 43.3 |

Table 2. Clinical characteristic of patients.

| Characteristics | Diabetes patients (n = 127) | | | |
|--------------------------------------------------------------------|-----------------------------|-----------|------------|------------|
| | N | % | | |
| Fasting plasma glucose | | | | |
| Good control (≤ 140 mg%) | 62 | 48.8 | | |
| Poor control (> 140 mg%) | 65 | 51.2 | | |
| HbA1c | | | | |
| Good control (< 8) | 81 | 63.8 | | |
| Poor control (≥ 8) | 46 | 36.2 | | |
| Family functioning score (75th percentile = 118) | | | | |
| Less than 75 th percentile | 96 | 75.6 | | |
| 75 th percentile or above | 31 | 24.4 | | |
| | Mean | SD | Min | Max |
| Age (years) | 60.20 | 12.69 | 21 | 88 |
| Fasting plasma glucose (mg%) | 153.35 | 59.28 | 56 | 478 |
| HbA1c | 7.96 | 1.23 | 6.1 | 13.9 |
| Family functioning score | 106.64 | 13.65 | 78 | 141 |

Table 3. Characteristics of diabetes patients with good and poor control for fasting plasma glucose.

| Characteristics | Diabetes patients (n = 127) | | | | Analysis | |
|--------------------------|-----------------------------|-----------|------------------------|-----------|----------------|----------|
| | Good control (N=62) | | Poor control (N=65) | | X ² | P |
| | N | % | N | % | | |
| Gender | | | | | | |
| Female | 33 | 53.2 | 40 | 61.5 | 0.89 | 0.37 |
| Male | 29 | 46.8 | 25 | 38.5 | | |
| Marital status | | | | | | |
| Single | 6 | 9.7 | 10 | 15.4 | 3.10 | 0.37 |
| Married | 45 | 72.6 | 49 | 75.4 | | |
| Widow | 11 | 17.7 | 6 | 9.2 | | |
| Duration of DM | | | | | | |
| Less than 5 years | 27 | 43.6 | 19 | 29.2 | 5.79 | 0.12 |
| 5 – 10 years | 11 | 17.7 | 15 | 23.1 | | |
| Above 10 years | 24 | 38.7 | 31 | 47.7 | | |
| | Mean | SD | Mean | SD | T | p |
| Age (years) | 61.63 | 13.11 | 58.83 | 12.24 | 1.24 | 0.22 |
| Family functioning score | 110.27 | 14.18 | 103.17 | 12.25 | 3.03 | 0.003* |

Table 4. Family functioning score in diabetes patients who had good and poor control for fasting plasma glucose.

| Chulalongkorn Family inventory Item | Score on family functioning (N=127) | | | | | | Analysis | |
|-------------------------------------------|-------------------------------------|----------------|--------------------------------|----------------|------------------------------------------|---------------------|-------------|---------------|
| | DM with good control (n=62) | | DM with poor control (n=65) | | Mean difference (95%CI of difference) | | t | p |
| | Mean | (SD) | Mean | (SD) | | | | |
| Problem solving | 16.11 | (2.48) | 14.45 | (2.78) | 1.67 | (0.74-2.59) | 3.55 | 0.001* |
| Communication | 15.19 | (2.67) | 14.06 | (2.35) | 1.13 | (0.25-2.01) | 2.54 | 0.012* |
| Affective responsiveness | 15.32 | (2.47) | 14.02 | (2.56) | 1.3 | (0.42-2.19) | 2.92 | 0.004* |
| Affective involvement | 15.05 | (2.93) | 13.35 | (2.81) | 1.7 | (0.69-2.7) | 3.33 | 0.001* |
| Role | 12.58 | (1.92) | 12.06 | (1.95) | 0.52 | (-0.16-1.19) | 1.51 | 0.13 |
| Behavior control | 9.82 | (1.79) | 10.54 | (4.15) | -0.72 | (-1.85-0.42) | -1.25 | 0.21 |
| General functioning | 26.19 | (4.26) | 24.69 | (3.8) | 1.5 | (0.08-2.92) | 2.09 | 0.038* |
| Total score | 110.27 | (14.18) | 103.17 | (12.25) | 7.10 | (2.44-11.77) | 3.03 | 0.003* |

Discussion

Family function is a set of patterns of interaction among the members of a family. The nature of diabetes treatment requires that a great deal of the responsibility for health maintenance and monitoring be assumed by the diabetes patients and their families.⁽²⁾ Glasgow et al have investigated factors associated with social environment, and have found that family support is the strongest and most consistent predictor of the adherence to the treatment in patients with NIDDM.⁽¹²⁾ Our study has found that the mean age of good glycemic control is 61.63 years(SD=13.11), poor glycemic control is 58.83 years(SD=12.24). It seems to be that the older the patients the better the outcome. Pratt et al⁽²⁰⁾ also have reported better dietary adherence for older people with NIDDM who participated in peer support group. High score on family functioning test is related to diet

self-care especially in the elderly.⁽²¹⁾ Two possible avenues for accomplishing this goal could be the inclusion of family members and others significant in education and treatment programs, and also the establishment of diabetes peer support and family help. The elderly patients after having retired from work (age>60years) might have more time being shared with their families, otherwise adherence to diet may not get strong support from all member in families. These factors may be more significant in Thai traditional society. In this study the mean fasting blood glucose was 153.35 mg/dl, the good glycemic control (plasma glucose < 140 mg/dl) was 48.82 %, the mean HbA1C was 7.96. An analysis by researches at the Center for disease control and prevention suggested that < 5 % of patients with diabetes receive care that conforms to the American Diabetes Association guideline. Similar studies also found that the non-

adherence for diet ranged from 35 – 75 %, that for the technique of administration of insulin is about 80 % and that for the combination of proper insulin, foot care, and blood or urine testing regimens were about 93%.⁽²²⁻²⁴⁾ High adherence to insulin administration was associated with high score for social support.⁽²⁵⁾

The study of family factors that are related to diabetes management and metabolic control is crucial because of the family's central role in this management. No theory of family functioning provides a satisfactory framework for understanding the complex relationship between family development and diabetes. In our study, results showed that diabetes patients with good control of fasting plasma glucose had a significantly higher mean total score on family functioning than those with poor control, in the aspects of problem solving, communication, affective responsiveness, affective involvement and general function. As in many studies, families with low conflict⁽²⁵⁻²⁷⁾, stable families, positive emotion tone⁽²⁸⁻²⁹⁾, cohesive⁽³⁰⁾, were found to have good diabetes control, while rigid-enmeshed, disengaged, over-controlling (not overprotective), and chaotic families⁽³¹⁾ were found to have poor diabetic control. Family can function to make compliance with the medical regimen both positively or negatively.⁽³²⁻³⁴⁾ A rigid control of behavior within a family may imply decreased adaptation to change, particularly to deleterious changes such as a chronic disease in any of its members. These factors however may favor the denial of the disease. Rigid control may also elevate the development of conflict with the authority, thus increasing the denial of the disease. The result of such denial is a diminishing compliance with treatment. Nevertheless we did not find statistically significant

difference of family functioning score for the role and behavioral control between the two groups of patients. The logistic regression demonstrated that achievement of good glycemic control were strongly associated with problem solving ($p=0.0001$) and affective involvement ($P=0.001$). Two variables predictors explained about 25% of the variance in glycemic control (R square = 0.25). These data suggest that diabetic education should be provided to all patients with individual approach and with empathy, not just providing factual information about diabetes, and should pay greater attention to explaining the rationale behind regimen for the effectiveness and to addressing patients' concerns about the discomfort in carrying out the regimen. As Carter-Edwards L et al⁽³⁵⁾ stated that "they care but don't understand". Healthcare providers can help improve communication with the patients by actively seeking to meet their support and needs, and by educating their families so that the provided support is more meaningful and diabetes management more attainable.

The demographic variable, which include age, gender, income, duration of disease, level of education and marital status were generally not related to the degree of adherence. As in Wilson W et al⁽³⁶⁾ study, correlations between these variables and glycemic control were predominately non-significant but from Trief PM et al⁽³⁷⁾ study, they have found that the marital quality can predicted many aspects of self-care and adherence to exercise, diet and doctor recommendations. Like any other studies, this investigation has some limitations. Two of the most important qualification concerned the results are that the design is cross-section rather than longitudinal and the family function measures are self-report

instruments. Nevertheless, this study employed a relatively large sample size and used the well validated measurement of family inventory test. Future adherence researches could be benefited from additional investigation using similar approaches with prospective long-term longitudinal design; it might be useful to expand the scope of predictor variables to include the assessment of efficacy of the prescribed treatment and the measure of biomedical status, physical activity, habit, smoking, alcohol consumption, self-care behavior, body mass index and others.

Conclusion

The nature of NIDDM and its treatment require that a great deal of the responsibility for health maintenance and monitoring be assumed by diabetic patients and their families. Good glycemic control is associated with family functioning, especially problem solving, communication, affective responsiveness, affective involvement and other general functions. These results support the usefulness of good family functioning for diabetes adherence. So it is important for practicing physicians and health care providers to consider educating and assessing family particularly family functioning as factors in the adherence to the metabolic glycemic control in diabetes patients.

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