ORIGINAL ARTICLE

A STUDY ON LEVEL OF MOTHER INVOLVEMENT, THE INFLUENCING FACTORS AND ITS RELATIONSHIP BETWEEN THE GLYCEMIC CONTROL IN MANAGING CHILDREN WITH TYPE 1 DIABETES MELLITUS AT TERTIARY HEALTH CARE CENTRE IN SELANGOR

Idanerina MS[1], Aniza I[2], Jamsiah M[1], Mohd. Hasni J[1] & Idayu BI[1]

[1] *Department of Community Health, Faculty of Medicine, Universiti Kebangsaan Malaysia, Kuala Lumpur*
[2] *Department of Paediatrics, Faculty of Medicine, Universiti Kebangsaan Malaysia, Kuala Lumpur*

ABSTRACT

Diabetes mellitus is the most common endocrine defect among children. Good diabetes management is important to give better health for both the children and the whole family. The goal of this study was to identify the level of mother involvement in children type-1 Diabetes Mellitus management, to identify factors related with mother involvement and to determine the relationships between mother involvement and glycemic control. A cross-sectional study was carried out with 92 respondents selected by universal sampling from mothers who had diabetic children aged 5-15 years old and from medical visit appointment at University Kebangsaan Malaysia Medical Centre (UKMMC) and Putrajaya Hospital (HPJ). Data was obtained through medical record and self-reporting questionnaire. The study shown that 58.6% mothers had high involvement and 41.4% mothers had low involvement. Mothers' education level had a significant (p=0.02) relationship with a level of mother involvement. Most mothers gave high involvement in diet management (64.1%) and blood glucose monitoring (52.7%), however most mothers gave low involvement in exercise management (63.0%) and insulin injection (60.9%). Mothers involvement in four management tasks were not statistically significant (p>0.05) with glycemic control. Mothers involvement in children diabetic management was high. There was high mother involvement in children's insulin injection and dietary intake and low mother involvement in children's blood glucose monitoring and exercise. This study also showed that there was no significant relationship between level of mother involvement and glycemic control.

Key words: *mother involvement, children, diabetes type-1, glycemic control*

INTRODUCTION

Diabetes mellitus is the most common endocrine defectamong children. In United States, about 1 in 1000 school aged children suffer from Type 1 diabetes mellitus[1]. Malaysia, has recorded low prevalence of diabetes among children below 16 years old, about 0.3 per 100,000. However, there was an increasing trend, which needs prevention[2].

Childhood diabetes management aimed to have children with normal or nearly normal glysemic control (HbA1c)[3]. It is clearly documented that good habits, skills, techniques and understanding of good control would be instilled in young children and their parents, so that the best achievable control is maintained[4].

Children with type-1 diabetes needs insulin injections or infusions, regular home blood glucose test controlling their calorie intake and frequent exercise. Families especially parents play an important role generating basic control information, for them to take more responsibility in managing and decision making in their children treatment. Knowledge about diabetes becomes a vital prerequisite to effective home management[5].

This is an assessment of mothers support for their children in diabetes management, the effectiveness of diabetes management at home, to increase the quality of diabetes service management among diabetic children and to empower the diabetic education program among parents and children.

In Malaysia, none of the studies look on the importance of mother's support in children diabetic control. There fore, this study was carried out to identify level of mother involvement in their children diabetes management, the influencing factors and the relationship to glycemic control.

This study measured the sosio-demographic characteristic of mother of children with, level of mother's involvement in diabetic care including insulin injection, blood glucose monitoring, dietary and exercise. This study also identified the relationship between sosiodemographic characteristic, stress and knowledge with level of mother involvement, between sosiodemographic and level of HbA1c and also to identify the relationship between level of mothers

involvement and glysemic control.

The hypotheses of this study were high level of mother involvements were influenced by young age children, younger mother, non-working mother, higher education level of mother, higher family income, stressful mother and knowledgeable mother. Another hypothesis was that level of mother's involvement in insulin injection; blood glucose monitoring, dietary and exercise is related to glycemic control.

METHODOLOGY

Study design and sampling frame

This was a cross-sectional study and the sample size required was 245 respondents. Sample size was calculated with estimated based on prevalence of mother's involvement in insulin injection at 20%[6]. Universal sampling was carried out in this study due to limited number of cases. University Kebangsaan Malaysia Medical Centre (UKMMC) and Putrajaya Hospital are tertiary health care centres in diabetic care in Selangor. Total cases in both clinics were 150 cases. However several cases were from outside Selangor and Kuala Lumpur.

Participants

Study participants were mother's with children with Diabetes type-1 aged 5 to 15 years old. The children were patients at the Paediatric Clinic, UKMMC and Putrajaya Hospital. They were diagnosed with diabetes more than 1 month. Out of 150 respondents in the sampling, 92 respondents agreed to participate.

The researcher met each mother along with their children, asked for inform consent, conducted an interview and also completed a questionnaire to obtain their sosio-demographic information, mother's involvement score in diabetes tasks, stress and diabetes knowledge.

Measures of mother's involvement in diabetes management tasks, stress and knowledge

The current insulin injection, blood glucose monitoring, diet and exercise were ascertained through 42 items taking from 52 items "Diabetes Social Support Questionnaire (DSSQ)-Version Family". All 4 management tasks were scored and ranged from 1 to 4: 1= never, 2= rarely, 3= seldom, 4= frequent. Stress was measured used 29 item taking from 136 item "Personal Stress Inventory", with ranged also in 1 to 4: 1= not stress, 2= stressful, 3= very stressful and 4= not related. Knowledge was measured used 21 items taking from 23 items "Diabetes Knowledge Test (DKT). During analysis, cut off point was decided using median score. Total score of mother's involvement was categorized into 0-84 low and 85-126 high involvement. Score of mother's involvement in diabetes tasks were categorized into low (0-12) low and high (13-24) in managing insulin injection, low (0-18) and high (19-27) in managing blood glucose monitoring, low (0-40) and high (41-60) involvement in managing dietary intake, low (0-14) and high (14-21) in managing exercise. Stress and knowledge respectively were categorized into (less than 30) no stress, (more and equal 30) stress, low (0-15) and high (16-21) knowledge.

Measure of glycemic control

Glycemic control was determined as glycosylated hemoglobin (HbA1c). Three latest results of HbA1c were obtained from the medical records.

Statistical analysis

Statistical analysis of the data was performed with SPSS Version 13.0 software. Descriptive analysis was presented in term of frequency, percentage and median. Univariate analysis was carried using Chi-square and Man-Whitney U test out.

RESULTS

Description of respondents

The sizes of the sample for some of the independent variables were different as respondents failed to answer some of the questions. About 61.3% (n=92) of the respondents have completed the questionnaire. Regarding ethnicity of respondent, they were 47 (51.1%) Malays, 33 (35.9%) Chinese and 12 (13.0%) Indians. This study also showed 87 respondents (95.6%) were married and only 4 respondents (4.4%) were divorced. Education level of respondent, they were 49 (55.6%) had secondary education level, 20 (22.2%) had primary education level and only 21 of them (22.2%) graduated from college or university. This study had also found out that 47 respondents (51.6%) were working, 44 respondents (48.4%) were not working. (Table 1).

Fig 1. Level of Mother Involvement in Insulin Injection, Blood Glucose Monitoring, Dietary and Exercise

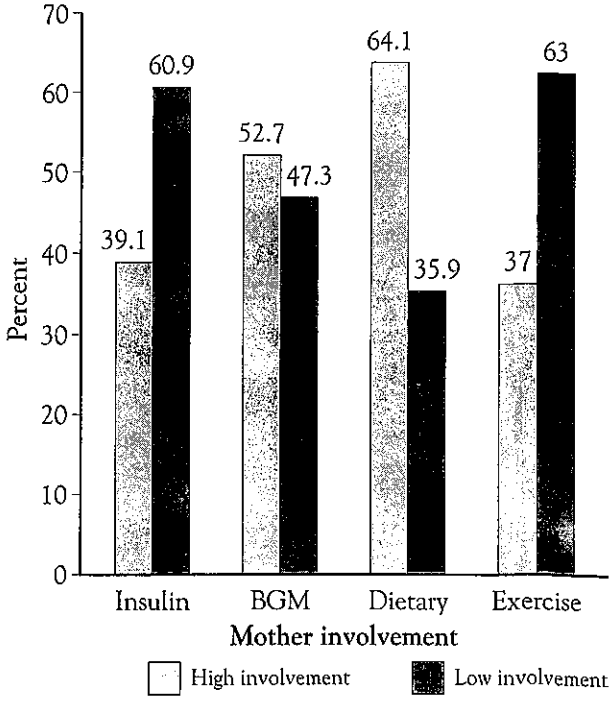

Table 1. Sosiodemographic characteristics of mothers and children

Variable	Frequency	Percent (%)	Median (IQR)
Mothers (N=92)			
Age N=(88)			41.5 (8)
Ethnic N=(92)			
Malay	47	51.1	
Chinese	33	35.9	
Indian	12	13.0	
Religion N=(92)			
Islam	48	52.2	
Christian	3	3.3	
Buddha	27	29.3	
Hindu	9	9.8	
Others	5.4	5.4	
Marriage status N=(91)			
Marriage	87	95.6	
Divorce	4	4.4	
Education N=(90)			
Primary	20	22.2	
Secondary	49	55.6	
Collage/University	21	22.2	
Work status N=(91)			
Working	47	51.6	
Not working	44	48.4	
Family income N=(82)			RM2000 (2500)
Diabetic children (N=92)			
Age (years)			11 (4)
Sex			
Male	40	43.5	
Female	52	56.5	
Weight (kg)			39.7 (19.8)
Height (cm)			142 (21.5)
Diabetic duration (month)			48 (48)
HbA1c			9.3% (2.7)47

Description of diabetic children

Diabetic children in this study were 11 years in median age and 52 (56.5%) were girls. They were 39.7kg in median weight and 142cm in median height. The median duration of diabetes were 48 months and HbA1c were 9.3%. (Table 1).

In general, this study found that 36 respondents (41.4%) had low involvement and 51 respondents (58.6%) had high involvement. Most of the mother had higher level of involvement in managing children dietary intake (64.1%) and blood glucose monitoring (52.7%). And this study show that most of the mother had low level of involvement in managing insulin injection (60.9%) and exercise activity (63.0%).

There was no significant difference ($p>0.1$) between level of mother involvement and age of children, age of mother, work status, family income and stress. However, this study found that there were significant differences between level of mother's involvement and mother's education level ($p<0.02$) as well as mother knowledge ($p<0.05$). (Table 2).

However, there were no association ($P>0.1$) between mother involvement with either insulin injection, blood glucose monitoring, dietary intake ,exercise or children's glycemic control as determined by HbA1c. (Table 3).

DISCUSSION

Normalising metabolism is a main objective in the treatment of children with diabetes. This study determined the level of mother's involvement in their children diabetic management, the influencing factors and the relationship with glycemic control. About 92 of 150 respondents agreed for interviews, (61.3% response rate). The low prevalence of cases the small number of respondents compared to the calculated sample size.

Most of the respondents were Malays and muslims. About half of them completed secondary education and were working. Compared to the overseas study since no local result on similar study, 100% mother completed secondary

Table 2. Influencing factors of level of mother involvement in childhood diabetes

Variables	Management			
	Level of mother involvement			
	Low n (%)	High n (%)	χ^2 value	p value
Child's Factors				
Age				
5-9 years	6 (30.0)	14 (70.0)	1.236	0.27
10-15 years	29 (43.9)	37 (56.1)		
Mother's Factors				
Age				
<40	9 (28.1)	23 (71.9)	2.391	0.12
≥40	23 (45.1)	28 (54.9)		
Work status				
Working	21 (46.7)	24 (53.3)	1.393	0.24
Not working	514 (34.1)	27 (65.9)		
Education				
Primary	12 (66.7)	6 (33.3)	8.148	0.02*
Secondary	14 (28.6)	35 (71.4)		
Collage/University	8 (44.4)	10 (55.6)		
Family income				
<1000	8 (47.1)	9 (52.9)	0.943	0.62
1000- 4999	18 (36.7)	31 (63.3)		
5000- 10 000	9 (47.4)	10 (52.6)		
Stress				
Stress	24 (47.1)	27 (52.9)	1.639	0.20
Not stress	12 (33.3)	24 (66.7)		
Knowledge				
Low	16 (57.1)	12 (42.9)	4.230	0.04*
High	20 (33.9)	39 (66.1)		

*$p< 0.05$

Table 3. Relationship between level of mother involvement and children's glycemic control (HbA1c)

Level of Mother Involvement	Median HbA1c	Mann- Whitney U	p value
Insulin Injection			
Low	9.667	Z= 1.070	0.29
High	9.200		
BGM			
Low	9.667	Z= 1.455	0.15
High	9.083		
Dietary			
Low	9.633	Z= 1.201	0.23
High	9.133		
Exercise			
Low	9.267	Z= 0.356	0.72
High	9.267		

education, 50% completed college and 10.5% graduated from university[6].

The description of diabetic children can be explained that they were 11 years old in median age and half of them were females. This percentage was different from a previous study which was reported males was higher than females[7,8]. In this study HbA1c were high compared to normal level suggested by National Diabetes Institute Malaysia, which is 6.5%. The reason is the difficulty for mothers to control diet of their children and this was informed during interview session.

Levels of mothers' involvement were analyzed through their involvement in insulin injection, blood glucose monitoring, dietary intake and exercise. From the total score and after cut off point decided using median score, this study found that there were more than half of the mothers had high involvement in diabetes management.

This study also found that there was higher level of mother involvement in managing dietary intake and blood glucose monitoring. This study showed that most of mothers take care of their children dietary intake as well as blood glucose monitoring. Furthermore, children were reminded frequently regarding their intake and blood glucose test. This result concur with a past study, which reported 53% and 14% parent was involve in moderate and high involvement respectively[9]. This study also found out low participation mothers in insulin injection and exercise. The high HbAIc in this study could be explained by the low involvement of mother in supervising and monitoring insulin injection.

Analysis on the influencing factor of mother's involvement shows that a significant association in two variables, which is education and knowledge of mother. Mothers with high knowledge of diabetes were aware of the importance of diabetic control and therefore spend more time with their children. In education level, mothers with secondary education had high involvement and this can be explained by mothers with college and university were working and therefore spend less time with their children. No association were noted between children age group, mother's age group, work status, family income and stress with level of mother involvement. Not many study explained the relationship between sosiodemographic factors and level of mother involvement

Previous study found that mothers' involvement in children diabetes management decrease significantly from early adolescence, middle adolescence and late adolescence[10] and the value of HbA1c was increasing with the increasing of group age[11]. Sosioeconomic status was a significant factor influence the children HbA1c level[12]. Another study found that family structure was a predictor of HbA1c, where children who staying with single parent had lower glysemic control compared to children who staying with both parents[13]. Relationship between work status and HbA1c, previous study showed work status not a significant predictor of HbA1c,[14]. A previous study also found that family stress was not a significant predictor of HbA1c[15]

Stress factor also been studied among mothers and found no association of level of mother involvement with stress. However, there was a study shows that family stress and metabolic control had a bi-directional relationship, where poor diabetic control producing family stress as well as family stress inducing poor control in the child[16]. Furthermore, family conflict was the strongest predictor of poor adherence to insulin administration, meal planning, exercise and blood glucose monitoring tasks[17] and mother-child conflict was significantly associated with the lower adherence in child treatment. But in this study not look on the impact of family conflict toward diabetic controlled among children.

Further analysis on mother's involvement in insulin injection, blood glucose monitoring, dietary and exercise activity, this study analyzed the relationship between diabetes management tasks with glycemic control as determined by glycosylated hemoglobin, this study found out that there were no association between mothers involvements in all diabetes tasks studied with glycemic control.

A previous study found that parental involvement with either insulin administration or blood glucose monitoring did not predict glycemic control[6]. However, the same study showed tanner stage (prepubertal, pubertal, postpubertal) and parental involvement in blood glucose monitoring were significant predictors of adherence to blood glucose test. That observation suggests that pattern of parental involvement change with maturation.

Non-involvement of mothers in controlling diabetes of their children was significantly associated with lower compliance of treatment and quality of life of children. Whereas good commitment of mother significantly associate with good compliance and good metabolic control of children[18].

The limitation of this study was the few cases available in both hospitals resulting in a low sample size and power of the study. There were also several biases including information bias; respondents probably not gave the correct information and fear with their information even though have been informed all the information were confidential. Our recommendation is for a further study to be carried out involving all diabetic children in Malaysia. Therefore with adequate sample size and power of the study, the result can be inferred to the general population in Malaysia.

CONCLUSION

There were high involvements of mother in their children diabetes management at Pediatric Clinic UKMMC and Putrajaya Hospital. There were high mother's involvement in children's insulin injection and dietary intake and low mother's involvement in children's blood glucose monitoring and exercise. However, this study showed no significant relationships between level of mother's involvement and glycemic control.

ACKNOWLEDGEMENTS

The authors wish to thank the Pediatric Clinics UKM Medical Centre and Putra Jaya Hospital, the Head Department and staffs at both clinics for their permission to conduct this study. Also thanks to diabetic children and their parents for their participation. The authors wish to express their gratitude to Universiti Kebangsaan Malaysia (UKM) for giving a research grant under Project No:FF-096-2007.

REFERENCES

1. Adele T. 1981. Children health problems: Diabetes. London: Blackwell Science

2. Mohamad Taha arif, Fatanah Ismail & Noor Azah Daud. 2004. Holistic approach of diabetes management. 3rd National Diabetes Care Seminar. Equatorial Hotel. 6-8 May 2004

3. Jeanne P.S. 2000. Children's Health: Type 1 Diabetes Mellitus. Lippincott Williams & Wilkins. Philadelphia

4. Swift PGF 1995. Childhood diabetes in the community. Dalam. David T.J. Recent advances in paediatrics. Churchill livingstone, New York

5. Court S. 1991. Diabetes mellitus: a perspective. In David, T.J. Recent advance in paedeatrics, 75-88. United Kingdom: Churchill Livingstone.

6. Anderson B, Ho J, Brackett J, Finkelstein D & Laffel L. Parental involvement in diabetes management task: relationship to blood glucose monitoring adherence and metabolic control in young adolescents with IDDM. *J Pediatr* 1997; 130(2): 257-265

7. Anderson BJ, Vangsness L, Connel A, Butler A, Goebel-fabbri, & laffel LMB. Famili conflict, adherence and glicemic control in youth with short duration Type 1 diabetes. *Diabetic Med J* 2002; 19: 653-642

8. Stacey LU, Stephen LF, Lori L, Jodi AL, Denis D & Thomas MB. Predictors of glucose control in children and adolescents with type 1 diabetes mellitus. *Pediatr Diabetes* 2005; 6(2): 69-74

9. Anderson BJ, Vangsness L, Connel A, Butler A, Goebel-fabbri & laffel LMB. Famili conflict, adherence and glicemic control in youth with short duration Type 1 diabetes. *Diabetic Med J* 2002; 19: 653-642

10. Kathleen MH & Diana WG. Parental Involvement in Adolescent Diabetes Management. *Diabetes Spectrum* 2003; 16: 184-187

11. Stacey LU, Stephen LF, Lori L, Jodi AL, Denis D & Thomas MB. Predictors of glucose control in children and adolescents with type 1 diabetes mellitus. *Paediatr Diabetes* 2005; 6(2): 69-74

12. Angela R,Gallegos M, Santiago RM, Ellen K, Betty S & Norton K. Relationship between glycemic control, ethnicity and socioeconomic status in Hispanic and white non-Hispanic youths with type 1 diabetes mellitus. *Paediatr Diabetes* 2003; 4(1): 19-23

13. Maureen AF, Thomas T, Deborah E, James G & Cheryl-Lynn P. Predicting metabolic control in the first 5 year after diagnosis for youths with type 1 diabetes: the role of ethnicity and family structure. *Paediatr Diabetes* 2007; 8(4): 220-227

14. Nordly S, Mortensen HB, Andreasent AH, Hermann. & Jorgensent T. Factors associated with glycemic outcome of childhood diabetes in Denmark. *Diabetes Med J* 2005; 22: 1566-1573

15. Kovac M, Hauser ST, Lavori P, Wolfsdorf JI, Herskowitz RD, Milley JE, Bliss R, Gelfand E, Wertlieb D & Stein J. Adherence among children and adolescent with IDDM over four-year longitudinal follow-up: the influence of patient coping and adjustment. *J Paediatr Psychol* 1990; 15: 511-526

16. Vinner R, McGrath GG & Trudinger P. Family stress and metabolic control in diabetes. *Paediatr Diabetes* 1996; 74: 418-21

17. Jacobson AM, Hauser ST, Lavori P, Wolfsdorf JI, Herskowitz RD, Milley JE, Bliss R, Gelfand E, Wertlieb D & Stein J. Adherence among children and adolescents with insulin dependent diabetes mellitus over four year longitudinal follow up.II. Immidiate and long term linkages with the family milieu. *J Paediatr Psychol* 1990; 15: 527-542

18. Jorie MB, Michelle S, Donna G, Cynthia AB & Deborah JW. Maternal Parenting Style and Adjustment in Adolescents with Type I Diabetes. *J Paediatr Psychol* 2007; 32(10): 1227-1237.