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Hindering Factors of Self-Management in Diabetes Mellitus as Perceived by Adolescents Versus Mothers

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Abstract: Type 1 Diabetes mellitus (T1DM) is a chronic disease that is found in different age groups including adolescents. T1DM cannot be cured but can be managed throughout life to prevent complications, experiences of self-management becomes a challenging and complex process during adolescence. The aim of the current study was to provide descriptive information about hindering factors of self-management in T1DM as perceived by adolescents versus mothers. A descriptive, comparative research design was utilized. This study was conducted in out patient's clinic for DM at National Institution of Endocrinology Diseases (NIDE). A purposive sample of 250 adolescents and 250 of their mothers was obtained. Four tools were utilized which were a structured interview questionnaire schedule, adolescents' knowledge about T1DM assessment tool, T1DM hindering factors for adolescents (adolescents' perception) and T1DM hindering factors for adolescents (mothers' perception). Results of the current study revealed that there were highly statistically significant differences between total mean scores of hindering factors of self-management in T1DM as perceived by adolescents versus their mothers. Based upon these results the present study recommended that replication of such study on a lager and different age groups to be able to generalize the results of current study.

Key words: Diabetes Mellitus · Adolescents · Chronic Disease · Self-Management

INTRODUCTION

Type 1 Diabetes mellitus (T1DM) is a serious, lifelong autoimmune condition where an individual's immune system attacks the beta cells in the pancreas responsible for producing insulin, the hormone required to convert food into energy [1]. T1DM is the most common metabolic disease in childhood. Interplay between genetic susceptibility and environmental factors may account for the pathogenesis of T1DM [2].

Annually 76.000 children aged less than 15 years develop T1DM worldwide [3]. DM affects nearly 3.9 million individuals in Egypt with an expected increase by 2025 to be nearly 9 million; this is a significant number, making DM a public health goal [4]. Incidence rate of T1DM in Egypt is reported to be 8-10/100.000 population per year in children □15 years [2].

T1DM characterizes by hyperglycemia, polyuria, polydipsia, polyphagia, weight loss, poor wound healing, generalized weakness, attacks of hyper/hypoglycemic diabetic coma and many of emotional problems [5]. T1DM cannot be cured, meaning that the progression of disease will increase along with the diabetic child's age [6]. Management of T1DM requires a strict daily regimen of insulin injections, finger prick blood tests and dietary monitoring [1].

Adolescents with T1DM show less effective metabolic control than other age groups, partly because of biological changes beyond their control and partly because in this period of developmental transition, psychosocial factors can militate against young people upholding their lifestyle and medical regimen [1]. Self-management is a challenging and complex experience for adolescents with T1DM. For adolescents the daily medical care that should be done, such as glycemic control, insulin injections, diet and exercise patterns makes them feel burden. If adolescents with T1DM are not treated as recommended in the first year of diagnosis, it will lead to complications that may increase their difficulties in self-management disease [6].

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The best nursing intervention for promoting successful care in adolescent with T1DM is achieved by managing psychosocial risks and adhering to preventive care. Nursing strategies toward adolescents and their parents include therapeutic communication, providing education and promoting self-efficacy among adolescents. Nurses should educate adolescents and their parents about the necessary of blood glucose monitoring, medication, lifestyle changes and recognizing physical signs and symptoms of high and low blood glucose level [7].

Significance of the Study: T1DM is an autoimmune disease that affects 1 in 500 per year in children and adolescents and recent estimates show increasing incidence in the USA [8]. In Egypt, the WHO report says Egyptians suffer from a high rate of DM. 12.7 % of diabetes patients die of related complications [9]. Evidence suggests that adherence to T1DM self-care regimes during adolescence is particularly poor. Positive attitude toward complying in self-management is highly needed for adolescents with T1DM in order to avoid both short term complications such as ketoacidosis and hypoglycemia as well as long term complications such as blindness liver and neural impairment [3]. Self-management in adolescents becomes a complex process because it happens in a social context such as at home and at school thus these consequences must be facilitated by optimal social support [6].

As mother is the main care giver in Egyptians' families, so it is important to determine from the mothers' and adolescents perspectives the hindering factors of self-management with T1DM and highlights them which in turn helping in developing of strategies to overcome these factors and enhance adolescents' compliance to their treatment regimen which the current study hopes to achieve.

The aim of the current study had two folds which were to

- Provide descriptive information about hindering factors of self-management in T1DM as perceived by adolescents versus mothers' perception and to.
- Compare between total scores of hindering factors of self-management in T1DM of adolescents and their mothers.

Operational Definition: Self-management: in the current study it includes all diabetes management activities such as giving insulin, monitoring blood glucose level,…etc. by adolescent and his or her mother.

MATERIALS AND METHODS

Research Design: A descriptive, comparative design utilized to achieve aim of the study.

Research Questions:

- What are hindering factors of self-management in T1DM as perceived by adolescents versus mothers' perception?
- Is there is a difference in the total score of the hindering factors of self-management in T1DM between adolescents and their mothers?
- What is the relationship between social background variables of the adolescents with such as age, sex … etc and their overall factors of hindering self-management inT1DM.

Setting: This study was conducted in out patient's clinic for DM at National Institution of Endocrinology Diseases (NIDE), Cairo, Egypt. NIDE provides care for all patients' children and adult, from all over Egypt and free.

Subjects: A purposive sample of 250 adolescents aged from 12-18 years old and 250 of their mothers. Adolescents and their mothers were randomly assigned into study. Determination of sample size was calculated according to statistical procedure known as power analysis of the sample: according to phenomenon of T1DM and power analysis, the size of the sample which resulted was 250 of adolescents and 250 of their mothers. Adolescents and their mothers were included in the study after fulfilling the inclusion criteria which were:

Inclusion Criteria:

- Adolescents diagnosed with T1DM.
- Adolescents on regular insulin therapy for T1DM for at least 1 year.
- Adolescents have no other chronic medical diseases with T1DM.

Tools for Data Collection: There were four tools utilized to collect the required data for the study, all of these tools were developed by research investigators after reviewing the related literature and experts in pediatric medicine and pediatrics nursing, these tools were :

- A structured interview questionnaire schedule, one for adolescents and one for their mothers. A structured interview questionnaire schedule for

adolescents included 10 questions whereas for mothers involved 8 questions, these questions were related to age, sex of adolescents …etc. Questions were in the form of closed ended questions.

- Adolescents's knowledge about T1DM assessment tool, it included 10 questions related definition, signs and symptoms of T1DM..etc. The questions were in the form of closed ended, answers of these questions in the form of correct / incorrect.

Scoring System: Scoring system of adolescent's diabetes knowledge questionnaire.

The total questions were 10. Each correct answer took 1 score and incorrect answer took 0. Total scores of questions were 10 marks, scores from 0-5 was considered unsatisfactory while scores from 6-10 was considered satisfactory.

3- T1DM hindering factors scale for adolescents (adolescents' perspectives).
4- T1DM hindering factors scale for mothers (adolescents' perspectives). Scale number 3, 4 was designed to assess hindering factors of self-management in T1DM which were:

- Negative perceptions about medication regimen scale, to assess negative perceptions about medication regimen.
- Poor interactions with health care professionals scale, to assess poor interactions with health care professionals.
- Lack social support/self-efficacy, to assess lack social or family support.
- Peer influence, to assess peer influence.

Scoring system of T1DM hindering factors tools for adolescents and mothers: for T1DM hindering factors scale for adolescents and mothers had 4 subscales, each subscale has a 3 points Likert scale that is used for answering as 0= disagree, 1=sometimes and 2=agree. Each subscale contained 5 items. Total scores of each subscale were 10. Scores ranged from 1-5 for each subscale were considered unsatisfactory hindering factors of self-management and scores ranged from 6-10 were considered satisfactory hindering factors of self-management.

Procedure: The current stud was carried out in two phases, preliminary phase and implementation phase as the following:

Preliminary Phase: An official permission obtained from the director of NIDE after an explanation the aim of the study, tools and duration to proceed with the study. Adolescents and their mothers who met the criteria for inclusion were included in the study, each adolescent and his/her mother were informed about the purpose, duration, benefits and the nature of the study.

Implementation Phase: The research investigators started to collect the required data from each adolescent, they were interviewed individually during their coming for examination and/or follow up in front of outpatients' diabetes clinic.

Research investigators asked each adolescent to stay away from mothers while being interviewing to feel free and not restricted or embarrassed when answering any questions, research investigators started to collect socio demographic data, followed by asking adolescents about their knowledge about T1DM which took about 10-15 minutes, research investigators assessed hindering factors of self-management of T1DM through using T1DM hindering factors, this took about 15-20 minutes.

Research investigators started first to collect data from adolescents then collect required data from mothers of adolescents, first collect socio demographic data of mothers which took about 10 minutes then research investigators asked them about hindering factors of self-management of T1DM among their adolescents which took about 15-20 minutes. During interviewing each mother was asked to sit away apart from her adolescent to feel free to answer any question. The current study started from the beginning of Jan. 2013 till May 2013.

Pilot Study: An initial pilot study was done on 10% of adolescents and their mothers to evaluate the content of tools, its objectivity and feasibility and to explain any discrepancies in the tools. Adolescents and their mothers involved in pilot study were included in the study.

Validity of Tools: Content validity was done by 5 experts in the field of pediatric medicine and nursing. Construct validity was done by using constructed groups approach; the mean performance between two groups was significantly different ($t= 5.34$, $p \square 0.001$), which supports and gives evidence of construct validity. Criterion related validity was done by using concurrent validity, the results indicated that highly statistically significant positive correlation ($r=.89$, $p \square 0.001$) which supports and gives evidence of Concurrent validity

Reliability of Tools: As regard reliability of tools, Cronbach's alpha between questions was .747. It was obvious that the alpha value is quite high and also split half reliability was done, showed highly statistically significant correlation (r=.748, p □ 0.001), indicating that the tool demonstrated internal consistency.

Ethical Considerations: Adolescents and their mothers were informed about the purpose, tools and duration of the study after explaining to them the benefits of the study. Oral consent of adolescents and their mothers was gained. The researchers assured adolescents and their mothers about confidentiality about the data gathered from them during the study. During the study the researchers informed adolescents and their mothers about their right to withdraw from the study at any time without any effect on the care provided for their children patients.

Statistical Analysis: Data was analyzed using SPSS statistical package version 20. Numerical data were expressed as mean ± standard deviation (SD. Qualitative data were expressed as frequency and percentage). Chi-square test was used to examine the relation between qualitative variables; one way for comparison between quantitative data qualitative data means of the two groups was done using t-test comparison. Pearson (r) Correlation was used to test correlation between variables, P-value ≤ 0.05 was considered significant.

RESULTS

Concerning to socio-demographic data of adolescents and their mothers, the current study revealeds that 73% of adolescents were male (Figure 1). The highest percentage (26%) of adolescents cannot read and write (Figure 2). Regarding to residence, more than two thirds of adolescents in the study were coming from rural areas. The mean age of adolescents was 12.63±1.374 years and in addition, their mean duration of have been diagnosed with T1DM was 8.86±1.231 years. Concerning to adolescent's knowledge about T1DM, Figure 3 represents that about two thirds of adolescents (59.6%) in the study have unsatisfactory knowledge about T1DM.

Regarding to socio-demographic data of mothers of adolescents, the results of present study indicated that the highest percentage of mothers (79.2%) were house wives and the mean age of mothers was 35.98± 7.905 years and (63.2%) of the mothers were not diseased with DM and (88%) of them were relevant to their husbands. Concerning to level of education of mothers, more than one third of them (27%) cannot read and write (Figure 4). In relation to the hindering factors of self-management in T1DM among adolescents, regarding to negative perceptions about medications regimen scale, the current study highlighted that the highest percentage (100%) (Table 1) of adolescents included in the study mentioned that their regimen puts restrictions upon their

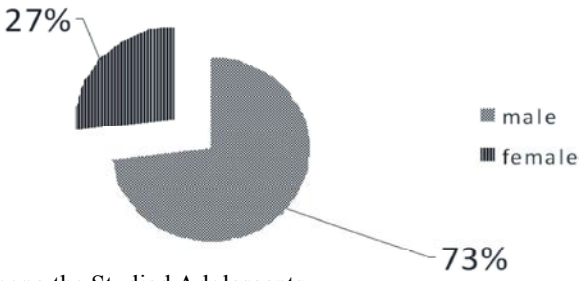

Fig. 1: Distribution of Sex of among the Studied Adolescents

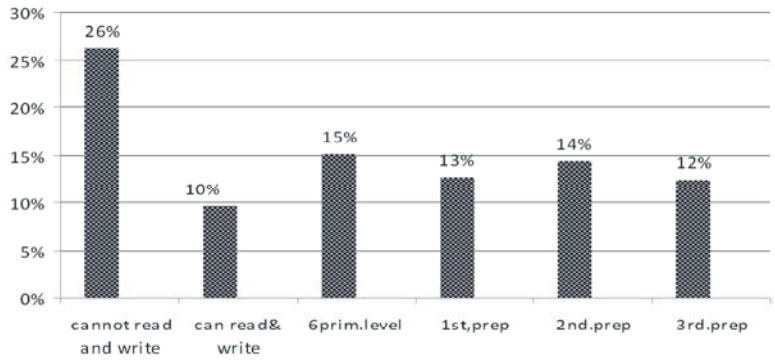

Fig. 2: Level of the Studied Adolescents' Education

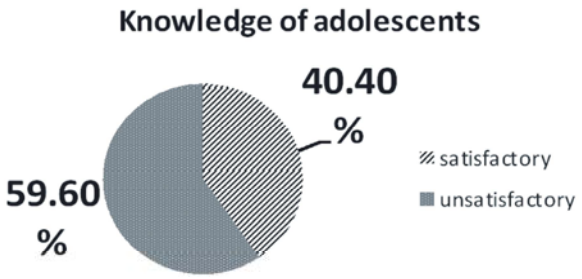

Fig. 3: Knowledge of Adolescents about Diabetes Mellitus

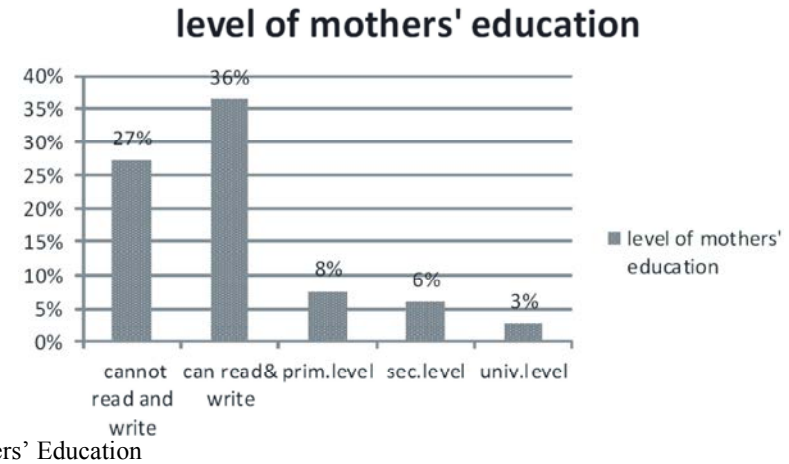

Fig. 4: Level of Mothers' Education

Table 1: Percentage Distribution of Negative Perceptions about Medication Regimen and Poor Interactions with Health Care Professionals Factors among Adolescents (N =250).

	Disagree		Sometimes		Agree	
Items	No	%	No	%	No	%
*Negative perceptions about medication regimen in adolescents:						
-There is no benefit from following my regimen medication	20	8	23	9.2	207	82.8
-My regimen puts restrictions upon my life activities.	0	0	0	0	250	**100**
-Sometimes I can't remember everything I'm supposed to do about my illness/medications	0	0	42	16.8	208	83.2
-When there are changes to my regimen, I sometimes get confused	0	0	42	16.8	208	**83.2**
-My regimen medications is difficult to follow it	15	6	42	16.8	193	77.2
*Poor interactions with health care professionals:						
- I have trouble understanding what the doctors tell me to do for my regimen medication.	41	16.4	115	46	94	37.6
- The nurses do not do a good job of explaining things to me	58	23.2	125	50	67	26.8
- My doctors are not friendly and not easy to talk to me	13	5.2	44	17.6	193	**77.2**
- The doctors are too busy or rushed to talk with me about my illness and regimen	13	5.2	44	17.6	193	**77.2**
-The doctors treat me like a little kid who can't take care of him/herself	13	5.2	44	17.6	193	**77.2**

life activities and the same table shows that 83.2% of them stated that when there are changes to their regimen, they sometimes get confused. Regarding to causes of poor interactions with health care professionals scale, the same table indicates that an equal percent of adolescents (77.2%) reported that their doctors are not friendly and not easy to talk to them, doctors are too busy or rushed to talk with them about their illness and regimen and doctors treat theme like a little kid who can't take care of themselves.

As shown in Table 2 an equal percentage (79.2%) of adolescents reported that many times they feel alone with their disease and many times they don't feel normal/strong as their siblings which resulted in their feeling of lack social support. Table 2 indicates that the same percentage (90.4%) of adolescents explained that they do not want their friends to know anything about their illness, they mind if their friends bring up their illness or ask them questions about it and they refuse to give up time with their friends to take care of their illness are the causes of their feeling of their peer influence.

Table 2: Percentage Distribution of Lack Social Support and Peer influence Factors among Adolescents (N=250).

	Disagree		Sometimes		Agree	
Item	No	%	No	%	No	%
* Lack Social Support/Self-efficacy:						
- My family does not give me a lot of support to help me follow my illness.	13	5.2	44	17.6	193	77.2
- Sometimes I cannot understand what I am supposed to do to take care of my illness	13	5.2	44	17.6	193	77.2
- Many times a feel alone with my disease.	0	0	52	20.8	198	**79.2**
- many times I feel am not normal/strong as my siblings	0	0	52	20.8	198	**79.2**
- I mind if my siblings bring up my illness or ask me questions about it.	19	7.6	52	20.8	179	71.6
* Peer influence:						
-I don't want my friends to know anything about my illness.	0	0	24	9.6	226	**90.4**
-I feel embarrassed when I take my medication in front of my friends.	0	0	24	9.6	226	90.4
-I mind if my friends bring up my illness or ask me questions about it.	0	0	24	9.6	226	90.4
-I refuse to give up time with my friends to take care of my illness	0	0	24	9.6	226	90.4
-My friends mock me when I take my medications	29	11.6	110	44	111	44.4

Table 3: Percentage Distribution of Negative Perceptions about Medication Regimen and Poor Interactions with Health Care Professionals Factors among Mothers (N=250)

	Disagree		Sometimes		Agree	
Item	No	%	No	%	No	%
*Negative perceptions about medication regimen in adolescents:						
- There is no benefit from following adolescents' regimen medication	18	7.2	22	88	12	4.8
-The regimen puts restrictions upon adolescents' life activities.	0	0	46	18.4	204	81.6
-Sometimes adolescent can't remember everything adolescent supposed to do about his/her illness/medications	0	0	18	7.2	232	92.8
-When there are changes to adolescents' regimen, adolescent sometimes get confused	0	0	17	6.8	233	93.2
- Adolescents' regimen medications is difficult to follow it	0	0	18	7.2	232	92.8
*Poor interactions with health care professionals:	0	0				
- Adolescents' have trouble understanding what the doctors tell them to do for their regimen medication	18	7.2	220	88	12	4.8
- The nurses do not do a good job of explaining things to adolescents	18	7.2	0	0	232	92.8
- Doctors are not friendly and not easy to talk to adolescents	18	7.2	220	88	12	4.8
- The doctors are too busy or rushed to talk with adolescents about their illness and regimen	18	7.2	220	88	12	4.8
-The doctors treat adolescent like a little kid who can't take care of him/herself	18	7.2	19	7.6	213	85.2

In relation to mothers opinions about hindering factors of self-management of T1DM among their adolescents, the highest percentage (93.2%) of mothers of adolescents pointed out that when there are changes to their adolescents' regimen, they sometimes get confused which make them feel negative perceptions about medication regimen as present in Table 3. The same table explains that most of the mothers (92.8%) of adolescents mentioned that nurses do not do a good job of explaining things to their adolescents which reflects poor interactions between their adolescents with health care professionals.

Table 4 represents that the highest percentage (92.8%) of mothers of adolescents explained that the family gives their adolescents a lot of support to help them follow their illness. Table 4 represents the majority of mothers (84.4%) reported that their adolescents do not want their friends to know anything about their illness. It is clear from the results of the study that tables (1, 2, 3 and 4) answered the first question of the study.

Regarding to Table (5), most of the adolescents and their mothers (88.8% & 90 % respectively), reported that they considered negative perceptions about medication regimen in adolescents as hindering factors of self-management among adolescents with T1DM. The same table shows that (88.4% & 100 % respectively), of adolescents and their mothers stated that they considered poor interactions with health care professionals as hindering factors of self-management among adolescents with T1DM. Moreover, Table 5 explains that (93.6% & 68.8 % respectively), of adolescents and their mothers mentioned that they considered lack social support as hindering factors of self-management among adolescents with T1DM.

Table 4: Percentage Distribution of Lack Social Support and Peer Influence Factors among Mothers (no=250)

	Disagree		Sometimes		Agree	
Item	No	%	No	%	No	%
* Lack Social Support/Self-efficacy:						
- The family does not give the adolescent a lot of support to help him/her follow illness	232	**92.8**	18	7.2	0	0
- Sometimes adolescent cannot understand what supposed to do to take care of his/her illness	211	84.4	39	15.6	0	0
- Many times adolescent feels alone with his/her disease.	211	84.4	39	15.6	0	0
- Many times adolescent feels is not normal/strong as his/her siblings	211	84.4	39	15.6	0	0
- I mind if his/her siblings bring up his/her illness or ask him/her questions about it.	32	12.8	66	26.4	152	60.8
* Peer influence:						
- Adolescent doesn't want his/her friends to know anything about his/her y illness.	0	0	39	15.6	211	**84.4**
- Adolescent feels embarrassed when he/she takes him/her medication in front of his/her friends	32	12.8	66	26.4	152	60.8
-I mind if his/her friends bring up his/her illness or ask him/her questions about it.	32	12.8	66	26.4	152	60.8
- Adolescent refuses to give up time with him/her friends to take care of his/her illness	32	12.8	66	26.4	152	60.8
- Adolescent's friends mock him/her when Adolescent takes his/her medications	32	12.8	66	26.4	152	60.8

Table 5: Percentage distribution of Hindering Factors of Self-Management in T1DM categories between Adolescents and their Mothers (No=250)

	Satisfactory		Unsatisfactory	
Factors	No	%	No	%
Negative perceptions about medication regimen in adolescents				
-Adolescents	222	88.8	28	11.2
-Mother	225	90	25	10
Poor interactions with health care professionals				
-Adolescents	221	88.4	29	11.6
-Mother	250	100	0	0
Lack Social Support/Self-efficacy				
- Adolescents	234	93.6	16	6.4
-Mother	152	68.8	78	31.2
Peer influence				
-Adolescents	226	90.4	24	9.6
-Mother	152	60.8	98	39.2

Table 6: Comparison of Mean Scores of hindering Factors of Self-Management in T1DM between Adolescents and their Mothers

	Adolescents	Mothers		
Item	X±SD	X±SD	t. test	P value
Negative perceptions about medication regimen in adolescents	9.19±1.660	7.54±1.575	11.358	0.000**
Poor interactions with health care professionals	7.43±1.957	7.72±.691	-2.164	0.031*
Lack Social Support/Self-efficacy	8.65±1.736	1.69±.464	61.263	0.000**
Peer influence	8.85±1.717	7.14±3.763	6.545	0.000**
Total mean	34.22±4.106	27.44±7.037	13.165	0.000**

* Significance at $p \leq 0.05$ ** Significance at $p \leq 0.001$

The same table presents that (90.4% & 68.8 % respectively), of adolescents and their mothers reported that they considered peer influence as hindering factors of self-management among adolescents with T1DM.

Table (6) shows that comparison of mean scores between adolescents and their mothers regarding to hindering factors of self-management of T1DM. It is clear from Table (6) that high statistical significant differences were found between them ($p<0.05$). The same picture was observed regarding to total mean scores of the hindering factors of self-management of T1DM between adolescents and their mothers ($p<0.05$).

It is clear from the results Tables (5& 6) answered the second question of the study.

It obvious from Table 7 that there were statistically significant correlations between sex and negative perceptions about medication regimen in adolescents ($r=0.802$, $p=0.000$), lack social support/self-efficacy ($r=0.391$, $p=0.000$) and peer influence ($r= 0.191$, $p=0.002$), whereas there was no statistically significant correlation between sex and poor interactions with health care professionals. The same table illustrated that there were statistically significant correlations between age and negative perceptions about medication regimen in

Table 7: Correlation between Adolescents and their Mothers Regarding to Sex, Age and Factors of Hindering Self-Management Factors of T1DM.

	Adolescents				Mothers	
	Sex		Age		Age	
Item	r	P value	r	P value	r	P value
Negative perceptions about medication regimen in adolescents	-0.802	0.000**	-0.584	0.000*	0.025	0.693
Poor interactions with health care professionals	0.077	0.228	-0.026	0.685	-0.050	0.428
Lack social support/self-efficacy	-0.391	0.000*	-0.404	0.000*	-0.005	0.933
Peer influence	0.191	0.002*	0.017	0.789	-0.085	0.180
Total factors	-0.389	0.000**	-0.416	0.000*	0-.590	0.000*

* Significance at $p \leq 0.05$ ** Significance at $p \leq 0.001$

adolescents (r=0 .584, p =0.000) and lack social support/self-efficacy as (r=0. 404, p =0.000), whereas there was no statistically significant correlations between age and poor interactions with health care professionals and peer influence.

Regarding to mothers, Table 7 shows that there were no statistically significant correlations between age of mothers and negative perceptions about medication regimen in adolescents, poor interactions with health care professionals, lack social support/self-efficacy and peer influence. The study results highlights that there was highly statistically significant correlations between adolescents' total factors of poor self-management of T1DM and adolescents' sex (r=0.389, p =0.000) and age (r=0.416, p = 0.000), in the same context there was a highly statistically significant correlation between mothers' total factors of poor self-management of DM and mothers' age (r=0.590, p =0.000). It is clear from the results that Table (7) answered the third question of the study.

DISCUSSION

T1DM is the most common metabolic disease in childhood and one of the most common chronic diseases in children. Although it is a chronic incurable disease, yet it can be controlled by a set of self-management behaviors [10].

Regarding to socio-demographic data of adolescents and their mothers, the current study showed that the mean age of adolescents was 12.63±1.374 years and the mean age of mothers was 35.98±7.905 years. More than two thirds of adolescents in the current study were male. This does not mean T1DM is common in males than Egyptians' females' adolescents. This could be return to most of the Egyptian's families care, pay attention and seek medical advice for their boys than girls and this is based upon Egyptians' believes that males are more important to their families than females.

The result of the current study matches with what reported by Hockenberry *et al*. [5] as they found that the incidence of T1DM in boys is higher than girls. But the result of the current study disagree with result by another study carried out by Darwish *et al*. [11] as they found in their study that two thirds of studied sample were females and the rest third was male children, the same result was reported by Ismail [4] in his study in Egypt as they found that T1DM was higher in females than male.

The majority of adolescents and their mothers in the current study were from rural areas this result supported by the results of study done by Mahfouz *et al*. [10] and Darwish, *et al*. [11] who found that three quarters of their study sample were living in rural areas and the rest quarter was live in urban areas. This result indicates to lack of health care services available in rural areas, in addition poverty and lack of compliance of people in rural areas with healthy regimen. This in turn results in most of these adolescents come to NIDE because of availability of facilities and equipment, which in turn reflects the burden puts upon this hospital due to many cases referred to it daily.

The highest percent of adolescents and percentage not little of the mothers in the current study that they cannot read and write. This result matches with results of study carried out by Mahfouz *et al*. [10] and Ismail *et al*. [2] who found that most of the studied sample of children with T1DM and their parents were illiterate. This result gives a picture about magnitude of the problem of T1DM in Egypt and need of adolescents and their mothers to educate them about T1DM. Moreover, this result reflects the difficulty of providing care to such adolescents and their mothers as being unable easily to adjust insulin dose, knowing which diet contains/rich in carbohydrates,…etc and also indicates to the role that ministry of health, health care team should play for solving these obstacles and reaching to these adolescents and providing health education programs about T1DM as possible.

Most of the mothers in the present study reported that they are relatives to their husbands. This result in congruence with what was found by Mahfouz *et al*. [10] and Ismail *et al*. [2] who reported in their study that most of the parents of affected children with T1DM were relatives. Actually this is a big problem in allover Egypt in general and rural areas specifically, this phenomenon in Arab and Egyptian families based on inherited traditions. As many researches proved that there is a family history of T1DM in children, so ministry of health and ministry of mass communication should play an active role in Egyptian's society about risks of inherited diseases from relatives' marriage.

Regarding to knowledge of adolescents about T1DM the current study explained the highest percentage of adolescents have unsatisfactory knowledge about T1DM. This indicates to the need of adolescents to such knowledge and working together for providing all and updating knowledge of this age group especially this age group being misunderstood from their relatives as being old enough and need no care from others.

The result of present study is in congruence with that reported by Nagelkerk *et al*. [12] as they found in their study that the most frequently reported barriers of adolescents for adherence with T1DM treatment were lack of knowledge of a specific diet plan and lack of understanding of the plan of care and feeling of helplessness.

It is evident from the results of the current study that most of the adolescents and their mothers reported that they consider negative perception about medication regimen as one of the hindering factors of adolescents' self-management with T1DM. This result is supported by Taddeo *et al*. [13] who reported in a similar study that there are certain factors that affect negatively on adolescents' adherence to treatment, which are therapeutic regimen, complex therapy and medications with side effects, adolescent's perception about efficacy of proposed therapy and attitude toward therapeutic regimens.

Moreover, Leonard *et al*. [14] and Rapoff [15] added that there is a negative perception about medication regimen in both adolescents and their mothers in making decisions about treatment regimen, to avoid this negative perception the physician should determine the extent to which the adolescents and their families can cope with the regimen in terms of scheduling, side effects and costs. The physician also needs to anticipate side effects and needs to inform adolescent. It is important to listen to the adolescent and try to customize the regimen in accordance with the adolescent's wishes as much as possible. Auslander *et al*. [16] are in congruence with result of current study as they found in a similar study that adolescent and their mothers shared similar perceptions of barriers to self-management which dietary and medical regimen challenges are from these barriers.

As regards to comparison between adolescents versus their mothers' perception regarding to poor interactions with health care professionals, most of both adolescents and their mothers reported that they considered poor interactions with health care professionals and this is one of the hindering factors of adolescents' self-management with T1DM, this result is in the same line with what was found by Asadi-Pooya, [17] and McQuaid, *et al*. [18] as they reported that certain factors can affect negatively on adherence to treatment regimen and vice versa, these factors include the relationship with health care professionals and nurses and physician empathy. In a similar study Kyngas *et al*. [19] reported that the physicians' actions described as routine/negligent and disciplined control by parents are linked with poor compliance.

In addition, Taddeo *et al*. [13] and D'Angelo *et al*. [20] studies are in agreement with results of the current study as they added that a strong relationship with adolescents is the foundation on which all other adherence improving interventions rely and health care professionals should work to improve communication and empower the adolescent. Adolescents prefer a physician who is nonjudgmental, honest and express concern, empathy and respect for the adolescent and their family, interviewing adolescents alone is essential to building rapport and delivers the message that the message that the physician believes in their capacity to take charge of their disease and its treatment. A true partnership requires collaboration in decision making when different options are available.

The result of current study matches with results of study done by Urban *et al*. [7] who found that certain factors can affect negatively if neglected/positively on adherence to treatment among adolescents, one of these factors is relationship with health team providers, based upon this result to improve adherence, nurses should establish a therapeutic relationship, establish a rapport of trust and empathy to facilitate sharing of ideas and concerns which in turn helps adolescent to achieve self-efficacy.

In relation to comparison between adolescents versus their mothers' perception regarding to lack of social support, most of the adolescents and the majority of their

mothers reported they considered lack of social support from their families and this is one of the hindering factors of adolescents' self-management. This result is supported by Maylani *et al*. [6] as they found in their study that adolescents still need support from family to run the management of their diabetes, this situation ultimately led to the conflict to abide by adolescents in management of diabetes. Also Moroe, *et al*. [1] and Sander *et al*. [8], found that maintaining the daily routines necessary for diabetes management is less successful in families with lower parental acceptance (communication of love, warmth, acceptance) and added that depleted family resources and emotions are associated with poorer metabolic control among adolescents of their study.

Regarding adolescents and their mothers' perception of peer influence, most of the adolescents and the majority of their mothers reported that they consider peer influence and it is one of the hindering factors of adolescents' self-management. This result is supported by Nabors *et al*. [21] and Lemhkuhl *et al*. [22] who reported in their studies that influence of peers provides negative effects on adolescents' self-management, adolescents feel rejected by peers and feel stressed to the point that they experienced difficulties in compliance management. In addition, the social activity with peers can interfere with self-management of adolescents with T1DM, especially on dietary adjustment; the results also showed that the most difficult task for adolescents with T1DM is when they have to tell their friends that they suffer from T1DM.

Results of the current study revealed that there are highly statistically significant differences between grand mean scores of all factors hindering self-management in T1DM as perceived by adolescents versus mothers' perception. Although there was an agreement between adolescents and their mothers regarding to hindering factors of self-management among adolescent but when comparing means between total scores of all these factors there are highly statistically significant differences between grand mean scores of all factors, this may be return to adolescents characterized by over estimation of things at this developmental stage and being aggressive and rush in their judgment or maybe they found a chance to express their huge negative feelings toward disease. In addition, parents at this developmental stage become away from their adolescents who are not fully oriented about their adolescents' life.

The study results highlighted that there are highly statistically significant relations between adolescents' perception of total hindering factors of self-management of T1DM and adolescents' sex and age, in the same context there was a highly statistically significant relation between mothers' perception of total factors hindering self-management of T1DM and mothers' age. These results are in agreement with what reported by Ismail [4] and Schmidt [23] as they found in their study that mothers reported that the older children has more negative attitudes about factors of hindering ' self-management than do younger children and girls have more difficulty than boys in adhering to dietary requirements. Nabors *et al.* [21] supported the result of current study as they reported that adolescents' boys have poor T1DM management than adolescent girls and boys may have difficulty in managing their T1DM in mid to older adolescence.

But these results contradict with what was found by Darwish *et al*. [11] as they mentioned that older children has better compliance to self-management than younger children but they agreed that female children has better compliance to self-management than children.

CONCLUSION

The current study concluded that there are hindering factors of self-management of T1DM as perceived by adolescents and their mothers but there are highly statistically significant differences between the total mean scores of hindering factors of self-management of T1DM between adolescents versus their mothers and there are highly statistically significant relations between adolescents' total hindering factors of self-management of T1DM and adolescents' sex and age. So the research questions of the present study were answered.

Recommendations: Based on the results of the current study, the following recommendations were reached:

- Holding periodical siminars by nurses and physicians in each hospital for adolescents with T1DM and their families for determining hindering factors of self –management and teaching them about how to deal with those factors.
- Provision of health education programs by nurses and physicians about T1DM and its care, handouts and booklets for adolescents with T1DM and their families.
- Provision of training programs by nurses and physicians about how measuring and monitoring glucose level in blood and how injecting insulin for adolescents with T1DM and their families and if available providing those procedures on CD/ booklets with pictures.

- Provision of measuring glucose level in blood machine by ministry of health for low socio economic status adolescents/children free as possible.
- Ministry of health and ministry of mass communication should play an active role in educating Egyptian's society about risks of inherited diseases from relatives' marriage.
- Replication of such study on a lager and different age groups to be able to generalize the results of current study.
- Further studies needed to examine if there are other factors that can influence of hindering self-management of DM.

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