

Evaluating Self-Care Practices of Children with Type 1 Diabetes Mellitus in Northern West Bank: A controlled Randomized Study Utilizing Orem- Self Care Theory

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Abstract

Background: Diabetes mellitus, a non-communicable disease and a major public health problem. It is a chronic disorder of metabolism characterized by partial or complete deficiency of the insulin hormone. Diabetes, which historically has been a phenomenon in older people, has now crept into the lives of young children. Self-cared diabetes involves a complex set of tasks and the key to successful management of diabetes is adherence to these tasks. Diabetes self-care education is a critical element of care for all people with diabetes and necessary to improve patient outcomes. **Design:** Quasi-experimental design utilized in the current study. **Sample,** include 176 patients attending diabetic clinics of primary health care centers in Northern West Bank districts (Nablus, Tulkarem, Jenin, Tubas, Salfit, and Qalqellia). **Research instrument:** Two tools developed by the researchers, a structured questionnaire for participants and an observational performance checklist. First tool: A structured questionnaire developed to assess participants' knowledge and self-care practices. Second Tool: An Observational self-care practices checklist developed by the researchers to observe self-care practices of diabetic children. **Aim of the study:** to assess specific knowledge of diabetes mellitus and self-care practices accompanied with observational self-care practices checklist by researchers among children with type 1 diabetes mellitus, based on Orem self-care theory a health education program was developed and administered in the targeted clinics. **Procedure:** the study was conducted in two phases; phase I pre-test for both the intervention and control groups. The intervention group attended health education program and the control group received routine care. After 3 months from intervention program, phase II post-test with the same tool applied for both the intervention and control groups. **Results:** The mean scores of diabetic knowledge in the intervention group at post-test was higher than pre-test 1.94&1.619respectively. For self-care practices was 3.53 in post-test and 2.73 in pre-test. For observational self-care practices checklist in insulin injection technique was 3.45 in post-test and 2.56 in pre-test. For blood glucose test was 3.68 in post-test and 2.84 in pre-test. For urine test for glucose and/or ketones was 3.39 in post-test and 2.07 in pre-test. In addition, for hygiene care was 1.89 in post-test and 1.54 in pre-test at P. value 0.05. **Conclusions:** The current study indicate that the intervention program utilizing Orem's self care theory is effective in transferring diabetic children from wholly or partly compensatory to educative/supportive system to accomplish self care practices.

Keywords: Type1 diabetes mellitus, Self-care practices, Children.

1. Introduction

Diabetes is one of the most challenging health problems in the 21st Century (International Diabetic Federation, 2004). It is one of the most common chronic diseases of childhood after asthma and mental retardation (AL-Twaim, 2003). Studies (Nashiet and Mahmoud, 2004; & Al-Ali, 2004) show that globally the incidence of diabetes in children and adolescents is increasing. It is estimated that approximately 65000 children aged less than 15 years developed type 1 diabetes worldwide (Diabetes Atlas Committee, 2003). Diabetes mellitus was classified to type 1 diabetes mellitus and type 2 diabetes mellitus (American Diabetes Association, 2008). Type 1 diabetes is classically a disease of the young but can occur at any age; onset is generally rapid and presentation acute. The causes in the majority of cases is an autoimmune process, which destroys the insulin-producing pancreatic beta cells. Both genetic and environmental factors have been implicated as important factors in the initiation of the autoimmune process, with viruses often acting as a trigger (British Medical Association, 2004).

In Palestine, at year 2010 the incidence rate of diabetes mellitus among children; for the age group 0-4 years was 2.3% for males and 3.5% for females, 5 -14 years 12.7% for males and 15.9% for females, 15 - 24 years for males 24.0% and 28.9% for females (Ministry of health report, 2011). Guidelines for improving the care of diabetic patients by American Diabetes Association (2007) stated that diabetic patients must change their life styles including eating habits and self-care along with taking diabetes medicine to have a regular and balanced blood sugar level. The nurse as a member of the health care team must be involved in self-management of diabetic children.

Diabetes is largely a self-managed disease and the patients' role is complex and demanding. Education is the key to the successful management of diabetes and is central to clinical management (Silverstein, Klingensmith,

Copeland, Plotnick, Kaufman, Laffel. et al., 2005; Swift, 2009). Achieving a balance between insulin levels, food intake and energy expenditure are cornerstones of clinical management. Diabetes requires extensive self-management and frequent high quality educational input and support (Saudek, Derr &Kalyani, 2006).Diabetes self-care education is a critical element of care for all people with diabetes and is necessary in order to improve patient outcomes (Funnel, Brown, Childs, Haas, Hosey, Jensen, et al., 2011).

Adherence to an individualized prescribed nutrition plan improves glycosylated hemoglobin levels in adults and has repeatedly been identified as the single behavior most positively correlated with good blood glucose control in children (Delahanty, Nathan &Lachin, 2009).Frequency of regular physical activity is a major factor in children with type 1 diabetes mellitus influencing the control of glycemia without increasing the risk for severe hypoglycemia (Herbst, Bachran, Kapellen &Holl, 2006).Children and adolescents can be taught to perform the components of diabetes management and care: insulin medication, diet, exercise, self-monitoring of blood glucose and above all balancing these self-care activities (ward &Hisley, 2009).

Patient education of self-care and the enhancement of the role of nurses in diabetes care lead to improvements in patient outcomes and the process of care (Renders, Valk, Griffin, Wagner, Eijk & Assendelft, 2001). Nurses' responsibilities are numerous, educating the children to the best of their ability to understand their condition in such a way that they know enough about their management and self-care in order to change their life-style (Hockenberry, 2011).

Norris, Engelgau &Narayan(2001) examined 72 separate studies on self-care training, there were a positive effects documented in knowledge, frequency and assurance of self-monitoring blood sugar, dietary habits with self-care training for those with diabetes mellitus. In Iran, Aghamolaei, Eftekhar, Mohammad, Nakhjavani, Shojaeizadeh &Ghofranipour, et al. (2004) conducted a control experimental study, which showed that the intervention group was statistically significant increase in mean of knowledge, behavior, physical and psychological health after diabetic education program. Siripitayakunkit, Hanucharunkul &Melkus(2005) made an integrative review to summarize the accumulated state of knowledge regarding diabetes education intervention research in Thailand from 1977 to 2002; they concluded that behavioral changes were the key outcomes for diabetes education. In Egypt, Abdo & Mohamed (2010) examined the effectiveness of health education program for diabetic patients attending Zagazig University diabetes clinic. The study showed that health education was an effective tool that implicated change in diabetic patients' knowledge, attitude towards diabetes. A quasi-experimental study with pre-post assessment conducted by Ali (2011) revealed improvement of patient's knowledge and self-care practices as an effect of nursing care programs provided for diabetic patients at Helwan hospitals. A study applied in Egypt by Abd Al Moniem, Morsy& El-Sayed (2011) on 52 adolescents aged from twelve to eighteen years, with type 1 diabetes revealed that, diabetes self-care education for adolescent's had a statistical significance effect on gaining diabetes knowledge as well as improves skills. A recent study conducted in Saudi Arabia by Abdel Megeid & El- Sayed (2012) showed a significant improvement in the knowledge of the disease and self-care practices (daily screening of blood, urine glucose and medication) among Saudi mothers of diabetic children.

2. Subjects and Method

2.1. Aim of the study: to assess specific knowledge of diabetes mellitus and self-care practices accompanied with observational self-care practices checklist by the researcher among Palestinian children with type 1 diabetes mellitus.

2.2. Research questions: the following three research questions were formulated to achieve the aim of the current study:

2.2.1. What is the impact of diabetic educational intervention program on children diabetes knowledge?

2.2.2. Is there a difference on levels of self-care practices among children following diabetic educational intervention program?

2.2.3. Is there a difference on observational self-care practices levels checklist among children according to Orem self-care levels following diabetic educational intervention program?

2.3 Research hypothesis

2.3.1. There is a significant difference of diabetes specific knowledge at a level of ($\alpha= 0.05$) between the diabetic children who received the intervention program and with those who did not receive it.

2.3.2. There is a significant difference of diabetes self-care practices at a level of ($\alpha=0.05$) between the diabetic children who received the intervention program and with those who did not receive it.

2.3.3. There is a significant difference of observational diabetes self-care practices checklist at a level of ($\alpha= 0.05$) between the diabetic children who received the intervention program and with those who did not receive it.

2.4 Research design: Quasi-experimental design was utilized in the current study.

2.5Sample and setting:176 patients with type 1 diabetes mellitus (age 10 to 18 years, mean 14.6 ± 2.7) and receive health services from Palestinian Ministry of Health from 2011. Subjects were randomly assigned to intervention (91) and control group (85); the intervention group received a diabetic health education program,

while the control group received routine care in diabetic clinic. The study was conducted in six central diabetic clinics of primary health care centers in North West Bank districts (Nablus, Tulkarm, Qalqillia, Jenin, Tubas & Salfit). These centers were selected because there were readily accessible to the researcher. The study was two-group, pre-test as a baseline and post testing (undertaken 3 months after the intervention) to evaluate effectiveness of intervention. The study started in January 2012 and finished at August 2012.

2.6 Tools of data collection: Two tools were developed by the investigator to be used in this study; a structured questionnaire for participants and an observational performance checklist for the use of the researcher was developed.

2.6.1 A structured Questionnaire: A structural questionnaire was developed to assess participant knowledge and self-care practices. It included the following parts:

Part I. Demographic data with 20 items: age, gender, weight, height, body mass index, level of education, family numbers, monthly income and child's medical history: onset of diabetes, type of diabetic treatment, last result of blood sugar, last HbA1c result and eye exam.

Part II. Child's specific knowledge about diabetes mellitus with 22 items, it included definition, clinical manifestations, management and complication. Thirteen items had a correct/ false selection and the remaining 9 items open ended questions. Scoring system: 2 scores were allocated to each right answer and 1 to the wrong answer. Scores of 1.75 and above high mean, 1.50 -1.74 moderate mean, and 1.49 and below considered low mean.

Part III: Self-care practices which include diet, insulin treatment, exercises and basic self-care (general hygiene, foot care, oral care, nails care, monitoring wounds, and safety practices) with 23 items. 4 point likert scales with "Always" means patients have performed on routine basis or every time (6 -7 days / a week). "Most of times" means patients have performed most of the times, but not every time (4-5 days / a week). "Sometimes" means patients have performed sometimes or irregularly behave (1-3 days / a day) and "Never" means patients have never performed (0 days/ a week). Scoring system: 4 scores were allocated to always answer, 3 scores to most of time answer, 2 scores to sometime, and 1 score to never answer. Scores of 3 and above high mean, 2 - 2.9 moderate mean, and 1.9 and below considered low mean.

2.6.2 An Observational self-care practices checklist

An observational checklist developed by the investigator to observe some self-care practices of diabetic children. This checklist was established after thorough review of nursing literature and previous researches (Lynn, 2011; Brunner & Suddarth, 2010; Nettina, 2010). This tool includes:

Part I: Procedure of insulin injection administration with 11 items.

Part II: Procedure of blood glucose test (Glucometer/strip) with 12 items.

Part III: Procedure of Urine test for Glucose and/or Ketones with 11 items

The observational self-care practices checklist was designed according to Orem self-care framework (Orem et al., 2003). To assess the self-care practices that are made of the diabetic child independently (educative-development) and was given score "4", or with his/her guardian assistance (partially compensatory) and was given score "3", or done by the guardian (wholly compensatory) and was given score "2", or not done and given score "1". Scores of 3 and above high mean, 2 - 2.9 moderate mean, and 1.9 and below considered low mean.

Part IV: Hygienic care, such as skin care, mouth care, foot care with 10 items had a Yes and given score "2" / No and given score "1". Scores of 1.75 and above high mean, 1.50 -1.74 moderate mean, and 1.49 and below considered low mean.

3. Tools validity and reliability: designed tools were examined for content validity by a panel of five experts in the field of diabetes mellitus medicine, and nursing education to test their clarity and objectivity and if they are suitable to achieve the aim of the study. Internal consistency estimate was using Cronbach's alpha. The initial findings ranged from 0.81 to 0.97 with average 0.90 which is strongly reliable.

4. Pilot study: Apilot study was carried out randomly on 20 diabetic children from Jenin and Nablus to test feasibility, objectivity, and applicability of the data collection tools. Carrying out the pilot study gave the investigator experience to deal with the included subjects, and to use the data collection tools. Based on results of the pilot study needed refinements and modifications were done. The subjects who shared in the pilot study were excluded in the actual study.

5. Protection of human rights: The current study was performed in accordance with the Declaration of Helsinki and was approved by the Research Ethics Committee of the Faculty of Higher Education, AL-Quds University. Palestinian ministry of health permission was obtained. As well written informed consents were obtained from participants parents or significant others for those of voluntary agreed after explaining the purpose and nature of the study. Each participant was free to either participate or not in the current study and had the right to withdraw from the study at any time without any rational. In addition, participant's parents were informed that obtained

data will be used only for research purpose and not for their evaluation. Confidentiality and anonymity of each subject were assured through coding of all data.

6. Procedure: The current study was conducted on two phases: the pre-test phase and the post-test phase. As regards to the pre-test phase; it was concerned with obtaining official permissions to carry out the study, construction and preparation of different data, collection and conduction of tools, and in addition conduction an intervention program based on Orem's self care theory for an intervention group. This phase lasted for 5 months. The selected diabetic clinics were visited on daily basis; the nurse in charge approached the subjects with the information sheet. If significant of the subjects agreed to participate, the researcher then approached them with the informed consent. Then involved children were submitted with the first data collection tool (Structured Questionnaire). The researcher was available at the clinic during the time of filling the data collection sheet to answer any question, and to provide the needed explanations. Then the researcher revised the questionnaire to be sure that there are no missing data/ items. Observation of children were carried out utilizing the second tool (Observational Checklist). Participants' direct observation was done so that the children were observed during their practice specific diabetic skills. Each child was observed on one occasion while performing each skill of the observational checklist. Obtained data were converted into numeric data, this took approximately 45 minutes. The total period was 5 weeks to finish all participants in all clinics. Then participants were randomly assigned to either the intervention or the control group. Each participant was assigned an identity number; the identity numbers were written on a piece of paper and randomly selected. The first child identity number drawn was assigned to the intervention group; the second was assigned to the control group and so on. The intervention groups was divided into 10 -14 years and 15-18 years old groups. Concerning the post-test phase, the same instrument was carried out to collect data after three month from conducting the intervention program and it lasted for 1 month.

Data of the current study were collected over a period of 9 months starting from January 2012 to August 2012.

Development of an intervention program: The intervention program included a DVD, diabetes booklet, diabetes self-care practices pamphlet, discussion and presentation sessions and diabetes demonstration skills sessions. The health education material developed by Palestinian Ministry of Health. This study employed 2 days intervention phase.

7. Results

Patients' characteristics at baseline

About half 51.6% percentage were females, all children were in school; 47.2% were within secondary classes, 52.8% were within primary and elementary classes. Around 22.7% of children's fathers were unemployed compared to 6.2% of mothers working or employed. The average number of family members was 6.1 (SD = 1.9) and around 57.4 % of the children were living in nuclear family. Around 39% of the families' income ranges from 1000 to 1999 NIS per month. The average number of years they had suffered from diabetes was 9.8 (SD= 2.9)years. The data indicated that a quite large number to 21.6% of the children had a family member suffering diabetes mellitus. The mean weight was 47.5 kg (SD=12.3), height 151.3 cm (SD=136) and body mass index 20.4 (SD=3.1). Most of subjects used short acting and long acting insulin dose mixed (87.5%). Around 79.0% took insulin two times daily. The mean result of fasting blood sugar was 218.8 (SD= 79.6) and the mean HbA1c result was 7.8 (SD =1.3), which is considered high blood sugar. The majority checked blood sugar one time per week (70%), 40.3% percentage of the children are not doing eye exam, whereas only 22.2 % of children who do every year.

Differences between groups in socio-demographic data and medical history

Table 1: Socio- demographic data

| Variables | Intervention(n= 91) | | Control (n=85) | | Significance |
|---|---------------------|-----------|----------------|-----------|------------------------------------|
| | Mean | SD | Mean | SD | |
| Demographic | | | | | |
| Age | 14.8 | 2.6 | 14.3 | 2.8 | t=1.411 p=0.160 |
| Gender | Count | % | Count | % | |
| Male | 44 | 48.4 | 41 | 48.2 | |
| Female | 47 | 51.6 | 44 | 51.2 | |
| Residence | | | | | |
| Nablus | 18 | 19.8 | 17 | 20 | X ² = 0.139 P= 1.000 |
| Jenin | 22 | 24.2 | 19 | 22.4 | |
| Tulkarem | 27 | 29.7 | 26 | 30.6 | |
| Qalqelia | 12 | 13.2 | 12 | 14.1 | |
| Tubas | 5 | 5.5 | 5 | 5.9 | |
| Salfit | 7 | 7.7 | 6 | 7.1 | |
| Education | | | | | |
| 0-5 years | 14 | 15.4 | 18 | 21.2 | X ² = 1.008 P= 0.604 |
| 6-9 years | 33 | 36.3 | 28 | 32.9 | |
| 10-12 years | 44 | 48.4 | 39 | 45.9 | |
| Type of family | | | | | |
| Nuclear family | 52 | 57.1 | 49 | 57.6 | X ² =1.9 P= 0.593 |
| Extended family | 35 | 38.5 | 34 | 40.0 | |
| Single family | 2 | 2.2 | 2 | 2.4 | |
| Others | 2 | 2.2 | 0 | 0.0 | |
| Degree of parents' marriage relation | | | | | |
| First degree | 26 | 28.6 | 23 | 27.1 | X ² =0.49 P= 0.92 |
| 2nd degree | 16 | 17.6 | 17 | 20.0 | |
| Far relation | 19 | 20.9 | 20 | 23.5 | |
| No relation | 30 | 33.0 | 25 | 29.4 | |
| Does your father work? | | | | | |
| Yes | 69 | 75.8 | 67 | 78.8 | X ² =4.1 P= 0.128 |
| No | 13 | 14.3 | 5 | 5.9 | |
| Intermittent | 9 | 9.9 | 13 | 15.3 | |
| Does your mother work? | | | | | |
| Yes | 8 | 8.8 | 2 | 2.4 | X ² =4.4 P= 0.110 |
| No | 82 | 90.1 | 83 | 97.6 | |
| Intermittent | 1 | 1.1 | 0 | 0.0 | |
| | Mean | SD | Mean | SD | |
| Number of family members | 6.48 | 1.7 | 5.75 | 2.086 | t=2.5 p= 0.012 |
| Household's monthly income | | | | | |
| Less than 1000 NIS | 29 | 31.9 | 40 | 47.1 | X ² = 6.3 P= 0.097 |
| 1000 - 1999 NIS | 40 | 44.0 | 25 | 29.4 | |
| 2000 - 3999 NIS | 17 | 18.7 | 18 | 21.2 | |
| 4000 NIS and more | 5 | 5.5 | 2 | 2.4 | |

Table 1 shows that, there is no statistical significant differences found between the intervention and the control groups on demographic at $\alpha= 0.05$. This means that both groups had similarities in relation to the characteristics of participants.

Medical history

Table 2: Comparisons of medical history between the intervention and control groups at pretest

| Variables | Intervention (n=91) | | Control (n=85) | | Significance |
|---|---------------------|----------|----------------|----------|-----------------------------------|
| | Mean | SD | Mean | SD | |
| At what age you had Diabetes Mellitus? | | | | | |
| | 9.7 | 3.4 | 9.96 | 2.26 | t= 0.740 |
| Is there ever any one in your family suffering from diabetes mellitus? | | | | | |
| | Count | % | Count | % | |
| Yes | 22 | 24.2 | 16 | 18.8 | X ² =0.744 |
| No | 69 | 76.8 | 69 | 81.2 | P= 0.388 |
| What is the type of Insulin you use? | | | | | |
| Short acting insulin | 1 | 1.1 | 0 | 0.0 | X ² =5.5 |
| Intermediate acting | 11 | 12.1 | 3 | 3. | |
| Long acting insulin | 3 | 3.3 | 4 | 4.7 | P= 0.136 |
| Short acting and long acting dose mixed | 76 | 83.5 | 78 | 91.8 | |
| Body measurements | | | | | |
| | Mean | SD | Mean | SD | |
| Weight | 48.6 | 12.04 | 45.9 | 12.18 | t= 1.6 P= 0.106 |
| Height | 152.8 | 14.29 | 149.9 | 12.72 | t=1.327 p= 0.186 |
| Body mass index | 20.55 | 3.09 | 20.04 | 2.95 | t=1.412 p= 0.160 |
| How many times /day you take the Insulin | | | | | |
| | Count | % | Count | % | |
| One time | 0 | 0.0 | 0 | 0.0 | X ² = 2.6 |
| Two times | 68 | 74.7 | 71 | 83.5 | P= 0.267 |
| Three times | 22 | 24.2 | 14 | 16.5 | |
| Four times | 1 | 1.1 | 0 | 0.0 | |
| | Mean | SD | Mean | SD | |
| What is the last result of fasting blood Sugar? | 156.1 | 30.9 | 223.3 | 72.4 | t= 0.73 p= 0.467 |
| How many times you check blood Sugar? | | | | | |
| Two times daily | 8 | 8.8 | 2 | 2.4 | X ² = 5.97 P= 0.201 |
| One time daily | 7 | 7.7 | 5 | 5.9 | |
| 3 times weekly | 2 | 2.2 | 3 | 3.5 | |
| Two time weekly | 4 | 4.4 | 9 | 10.6 | |
| One time weekly | 70 | 76.9 | 66 | 77.6 | |
| The Last HbA1c result | 7.1 | 0.73 | 7.7 | 1.04 | t = 1.091 p= 0.277 |
| Do you have eye examination? | | | | | |
| Yes | 54 | 59.3 | 51 | 60.0 | X ² =0.008 |
| No | 37 | 40.7 | 34 | 40.0 | P= 0.929 |
| If yes, | | | | | |
| Every 6 month | 16 | 29.6 | 15 | 28.8 | X ² =2.25 |
| Every year | 23 | 42.6 | 16 | 30.8 | P= 0.324 |
| More than one year | 15 | 27.8 | 21 | 40.4 | |

Table 2 shows that, there is no statistical significant differences found between the intervention and the control groups on medical history at $\alpha= 0.05$. This means that both groups had similarities in relation to the characteristics of participants.

Differences between intervention and control groups at pre-test.

Table 3: Differences between intervention and control groups at pretest

| Variables` | Intervention group | | Control group | | t. test | P value |
|------------------------------------|--------------------|--------|---------------|-------|---------|---------|
| | Mean | SD | Mean | SD | | |
| Diabetic knowledge | 1.619 | 0.227 | 1.56 | 0.259 | 1.577 | 0.117 |
| Self-care practices | 2.73 | 0.492 | 2.6 | 0.467 | 1.73 | 0.085 |
| Insulin injection technique | 2.56 | 0.477 | 2.45 | 0.441 | 1.55 | 0.122 |
| Blood glucose test | 2.84 | 0.572 | 2.789 | 0.603 | 0.632 | 0.528 |
| Urine test for glucose | 2.07 | 0.1986 | 2.037 | 0.192 | 0.049 | 0.258 |
| Hygiene care | 1.549 | 0.2626 | 1.57 | 0.250 | 0.599 | 0.545 |

Table 3 shows that the mean score of the diabetic knowledge was 1.619 for the intervention group; and 1.56 for the control group. The mean score of the self-care practices was 2.7 for the intervention group; and 2.6 for the control group. The means core of insulin skill was 2.56 for the intervention group; and 2.45 for the control group. The mean score of blood check skill was 2.85 for the intervention group; and 2.78 for the control group. The mean score of urine check skill was 2.07 for the intervention group; and 2.037 for the control group. Finally, the mean score of hygiene care was 1.549for the intervention group; and 1.57for the control group. This mean that there was similar mean scores of key variables for the intervention and control groups at the pre-test assessment, which is low means for both and indicated the need for diabetic educational intervention for these children. Overall results indicated that there is no statistical significant differences at $\alpha= 0.05$.

Post-test data analysis

Diabetes specific knowledge

Table 4: Comparison between the total mean scores of diabetes specific knowledge at pre and post-test of the intervention group

| Test | Mean | N | Std. Deviation | Std. Error mean | t- test | P. value |
|------------------|-------|----|----------------|-----------------|---------|----------|
| Pre test | 1.619 | 91 | 0.227 | 0.0238 | 14.39 | 0.000 |
| Post test | 1.941 | 91 | 0.096 | 0.0101 | | |

Table 4 shows that there were statistical significant differences between pre and post-test for the intervention group, the difference was toward the post-test.

Table 5: Comparison between the total mean scores of diabetes specific knowledge at posttest of the intervention and control groups

| Test | Mean | N | Std. Deviation | Std. Error mean | t- test | P. value |
|---------------------------|-------|----|----------------|-----------------|---------|----------|
| Intervention group | 1.941 | 91 | 0.096 | 0.010 | 13.603 | 0.000 |
| Control group | 1.598 | 85 | 0.218 | 0.0236 | | |

Table 5 shows that there were statistical significant differences between post-test of both intervention and control group, the difference was toward the intervention group.

Self-care practices

Table 6: Comparison between the total mean scores of self-care practices at pre and post-test of the intervention group

| Test | Mean | N | Std. Deviation | Std. Error mean | t- test | P. value |
|------------------|-------|----|----------------|-----------------|---------|----------|
| Pre test | 2.733 | 91 | 0.493 | 0.052 | 16.004 | 0.000 |
| Post test | 3.532 | 91 | 0.286 | 0.029 | | |

Table 6 shows that there were statistical significant differences between pre and post-test for the intervention group, the difference was towards the posttest.

Table 7: Comparison between the total mean scores of self-care practices at post-test of the intervention and control groups

| Test | Mean | N | Std. Deviation | Std. Error mean | t- test | P. value |
|---------------------------|-------|----|----------------|-----------------|---------|----------|
| Intervention group | 3.532 | 91 | 0.286 | 0.029 | 24.391 | 0.000 |
| Control group | 2.446 | 85 | 0.305 | 0.033 | | |

Table7 shows that there were statistical significant differences between post intervention of both intervention and control groups, the difference was toward the intervention group.

Observational Self-Care Practices

Table8: Comparison between the total mean scores of the observational self-care practices at pre and post-test of the intervention groups

| Test | Mean | N | Std. Deviation | Std. Error mean | t- test | P. value |
|--|-------|----|----------------|-----------------|---------|----------|
| Insulin injection technique | | | | | | |
| Pre-test | 2.562 | 91 | 0.477 | 0.050 | 17.944 | 0.000 |
| Post-test | 3.457 | 91 | 0.363 | 0.038 | | |
| Blood glucose test | | | | | | |
| Pre-test | 2.845 | 91 | 0.572 | 0.059 | 16.099 | 0.000 |
| Post-test | 3.683 | 91 | 0.279 | 0.029 | | |
| Urine test for glucose and/or ketones | | | | | | |
| Pre-test | 2.070 | 91 | 0.199 | 0.021 | 24.982 | 0.000 |
| Post-test | 3.396 | 91 | 0.484 | 0.051 | | |
| Hygiene care | | | | | | |
| Pre-test | 1.549 | 91 | 0.262 | 0.028 | 12.82 | 0.000 |
| Post-test | 1.898 | 91 | 0.118 | 0.012 | | |

Table 8 shows that there were statistical significant differences between pre and post-test for the intervention group, the difference was toward the post-test.

Table 9: Comparison between the total mean scores of the observational self-care practices at post-test of the intervention and control groups

| Test | Mean | N | Std. Deviation | Std. Error mean | t- test | P. value |
|--|-------|----|----------------|-----------------|---------|----------|
| insulin injection technique | | | | | | |
| Intervention group | 3.457 | 91 | 0.363 | 0.038 | 15.087 | 0.000 |
| Control group | 2.501 | 85 | 0.474 | 0.0514 | | |
| blood glucose test | | | | | | |
| Intervention group | 3.682 | 91 | 0.279 | 0.029 | 11.385 | 0.000 |
| Control group | 2.861 | 85 | 0.624 | 0.067 | | |
| urine test for glucose and/or ketones | | | | | | |
| Intervention group | 3.396 | 91 | 0.485 | 0.051 | 22.348 | 0.000 |
| Control group | 2.069 | 85 | 0.262 | 0.028 | | |
| hygiene care | | | | | | |
| Intervention group | 1.898 | 91 | 0.118 | 0.012 | 11.108 | 0.000 |
| Control group | 1.626 | 85 | 0.199 | 0.022 | | |

Table 9 shows that there were statistical significant differences in the observational self-care practices between the intervention and the control groups at post-test; the difference was toward the intervention group.

8. Discussion

The overall aim of this study was to evaluate self-care practices of children with diabetes mellitus type 1 in Northern West Bank, utilizing Orem self – care theory as the framework of the intervention.

Effectiveness of the intervention program

Overall, the findings indicated improvement in all outcomes relating to self-care practices for the intervention group. The intervention program based on Orem self-care theory; to assist children in improving self-care expectations about their ability to engage in self-care practices. Orem (1985) proposed that nursing is human action that exists to assist persons with health derived or health associated limitations in self-care, or for those individuals assisting in dependent care. Thus, in order to understand the effectiveness of this program, it was necessary to examine which health outcomes indicated significant changes between both; the intervention and control groups.

The results of this study showed that there were significant improvements in the intervention group in the outcomes of diabetes specific knowledge, and self-care practices complement with observational self-care practices checklist by the researchers. Thus, the three hypotheses in this study were supported.

Diabetes specific knowledge

The results support the first hypothesis "There is a significant difference of diabetes specific knowledge at a level of ($\alpha= 0.05$) between the diabetic children who received the intervention program compared with those who didn't receive it", with improvements found in the intervention group patient's diabetes specific knowledge after receiving the intervention program in this study. Comparing the pretest with the post-test for the intervention group, the findings showed that the mean scores in the post-test (1.94) were much higher than the mean scores in the pre-test (1.619) at ($\alpha=0.000$). Comparing the post-test scores of the intervention with control groups, the findings showed that the mean scores in the post-test for the intervention group (1.94) were much

higher than the control group (1.59) at ($\alpha = 0.000$).

These findings were consistent with the findings of the prior researches which examined the effect of diabetes education programs on diabetes knowledge (Abd Al Moneim et al. 2011; Abdo et al. 2010; &Ali, 2011), their study

found that health education was an effective tool that implicated change in diabetic patients' knowledge.

Diabetes self-care practices

The results support for the second hypothesis "There is statistical significant difference of diabetes self-care practices at a level of ($\alpha = 0.05$) between the diabetic children who received the intervention program compared with those who didn't receive it", with improvements found in the intervention group self-care practices after receiving the intervention program in this study. Comparing the pre-test with the post-test for the intervention group, the findings showed that the mean scores at the post-test (3.53) were much higher than the mean scores at the pre-test (2.73) at ($\alpha = 0.000$). Comparing the post-test of the intervention group with the control group, the findings showed that the mean scores at the post-test for the intervention group (3.53) were much higher than the control group (2.446) at ($\alpha = 0.000$). These findings were consistent with the findings of the researches done by (Abdo et al., 2010; Siripitayakunkit et al., 2005; Aghamolaei et al., 2004); they concluded that behavioral changes were the key outcomes for diabetes education. These outcomes were related to the purpose of intervention, diabetes care activities given, frequency of these activities performed, and duration of intervention to be implemented.

Observational self-care practices checklist

The results support for the third hypothesis "There is significant difference of observational diabetes self-care practices checklist at a level of ($\alpha = 0.05$) between the diabetic children who received the intervention program compared with those who didn't receive it", with improvements found in the intervention group observational self-care practices after receiving the intervention program. Comparing the pre-test with the post-test for the intervention group according insulin techniques, the findings showed that the mean scores in the post-test (3.457) were much higher than the mean scores in the pre-test (2.56) at ($\alpha = 0.000$). The findings showed that the mean scores in the post-test of the intervention group (3.457) were much higher than the control group (2.50) at ($\alpha = 0.000$). In addition, results of this study showed that high percent of children transferred from wholly compensatory to partially compensatory or educative at post-test after the intervention program.

Comparing the pre-test with the post-test for the intervention group according blood sugar test, the findings showed that the mean scores in the post-test (3.682) were much higher than the mean scores in the pre-test (2.845) at ($\alpha = 0.000$). The findings showed that the mean scores in the post-test (3.682) for the intervention group were much higher than the control group (2.862) at ($\alpha = 0.000$). In addition, the results of this study showed that high percent of children transferred from wholly compensatory to partially compensatory or educative at post-test after the intervention program. Comparing the pre-test with the post-test for the intervention group according to urine test for glucose and/or ketones, the findings showed that the mean scores in the post-test (3.396) were much higher than the mean scores in the pre-test (2.070) at ($\alpha = 0.000$). The findings showed that the mean scores in the post-test for the intervention group (3.396) were much higher than the control group (2.069) at ($\alpha = 0.000$). In addition, results showed that high percent of children transferred from wholly compensatory to partially compensatory or educative at post-test after the intervention program. Comparing the pre-test with the post-test for the intervention group according hygiene care, the findings showed that the mean scores in the post-test (1.898) were much higher than the mean scores in the pre-test (1.549) at ($\alpha = 0.000$). The findings showed that the mean scores in the post-test for the intervention group (1.898) were much higher than the control group (1.626) at ($\alpha = 0.000$).

These findings goes with the findings of the researchers who have examined the effect of diabetes education programs on diabetes self-care practices (Ali, 2011; &Abdel Mageid et al., 2012). Abdel Mageid et al. (2012) indicated that compliance with daily screening of blood, urine glucose, and medication has improved, while Ali (2011) in his study indicated that young patients got more improvement and more benefit from the practical part of the educational program, specifically in foot care and insulin injection.

9. Conclusion

The current study highlights the fact that self-care educational program based on Orem's theory for children with type1 diabetes mellitus increases patient's self-care agency to meet therapeutic self-care demands including diet control, exercise, medication taking and personal hygiene and safety practices. Giving knowledge that is congruent with the person's needs can bring about better practice. Nursing for self-care development makes the patients to be active participants in their own self-care practice.

Overall, the findings met the hypothesis and were consistent with Orem's Self-care theory for evaluation of the diabetic health education program of children with type1 diabetes mellitus. The information about the diabetic health education program of self-care for children with type 1 diabetes can be helpful in Palestine.

10. Recommendation

1. Recommendation for families and schools community

- Encourage children in self care practices education programs as soon as possible since diagnosis of diabetes mellitus .
- Ensure good understanding of the self-care practices to the children.
- The majority of the mother's are the main caregivers of the diabetic child. If mothers are encouraged to join the education program this can encourage them to assist in the supervision of the diabetic child.
- The school community has a role to play in assisting and overseeing diabetic children during school hours. There is a need for the school community to be aware and educated on diabetes. This will help pupils and teachers to understand diabetes and the treatment so that diabetic children do not feel ashamed of his or her diabetes.

2. Recommendation for staff in primary health care

- The health-care providers should be trained to provide relevant diabetic interventions based on self-care theory.
- They could invited diabetic children to a day program to educate them on diabetes and self-care practices.

3. Policy and management the following recommendations for policy makers and managers:

- Interventions or patient education for children with type 1 diabetes mellitus should incorporate the concept of self-care in their design and implementation. Moreover, support based interventions to groups rather than individuals.
- Development of manuals on self-care and audiovisual aids will help health provider to educate the children.
- A variety of diabetes knowledge and self-care multimedia should be provided for all patients.
- The multimedia for taking care of patient with diabetes should be revised and updated overtime.

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