Knowledge and Practice of Prevention of Foot Ulcer Among Patients with Diabetes Mellitus

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Abstract

This descriptive correlational study aimed to identify relationship between the knowledge and practice of prevention of foot ulcer patients with diabetes mellitus. Foot ulceration is the common major end point among diabetic complications. Proper foot care and early recognition and management of risk factors prevent foot ulcer of diabetic patient. One hundred and twenty subjects were recruited from out-patient department at Diabetic Center Rangpur, Bangladesh. Questionnaire consisted of three parts; Demographic, Knowledge Regarding Prevention of Foot Ulcer Questionnaire, and Practice Regarding Prevention of Foot Ulcer Questionnaire was developed by the researcher. Cronbach’s alpha Coefficient was used to test for internal consistency reliability of the instruments. Cronbach’s alpha Coefficient of Knowledge Regarding Prevention of Foot Ulcer Questionnaire was .71 and Practice Regarding Prevention of Foot Ulcer Questionnaire was .81. Data collection started from November 2009 to January, 2010. Frequency, percentage, mean, standard deviation, and Pearson’s correlation were employed for data analysis. The mean of the total knowledge score was at high level (M = 84.55) and the mean of the total practice score was at moderate level (M = 61.47). The result revealed that statistically significant low correlation between total knowledge and total practice (r = .33, p<0.01). There is a need to develop an intensive program to promote foot care practice. Further interventional study is recommended to enhance foot care practice.

Key words: Diabetes, foot ulcer, Knowledge and Practice.

Background and Significance of the Problem

Foot complication in persons with diabetes has become an increasing significant public health concern in both the developed and developing world (Wu, Driver, Wrobel, &
Armstrong, 2007). It is estimated that the developing countries will bear the brunt of diabetes epidemics in the 21st century (Sayeed et al., 2003).

Diabetes is a group of diseases marked by high levels of blood glucose resulting from defects in insulin production, insulin action, or both (World Health Organization, 2005). In Bangladesh, the majority of people are with diabetic foot disease and also suffering from diabetic peripheral neuropathy. Poor socioeconomic condition and lack of proper diabetic foot care education and incorrect footwear are considered for the development of diabetic foot ulcer in Bangladesh (Wadud, Samad, Enaayet, Rubayat, & Bhowmik, 2006).

In order to control the foot ulcer complications, patient’s knowledge and practice may contribute to prevent foot ulcer (Pollock, Unwin, & Connolly, 2003). Patients with diabetes should have the knowledge about dietary habits. The significance of control of blood glucose level needs dietary modifications (Uchenna, Ljeoma, Peace, & Ngozi, 2009). In addition to dietary management, exercise is also important. Exercise will reduce fasting plasma glucose level (Prueksaritanond, Tubtimtes, Asavanich, & Tiewtranon, 2004). Foot care is the most important for prevention of foot ulcer. Preventive strategies will decrease the burden of foot problems in the patients suffering from diabetes (Malgrange, Richard, & Leymarie, 2003). If patient have adequate knowledge they will be able to practice in order to prevent diabetic foot ulcer. Dietary practice with prepared meal plans led to weight loss, improvement in blood lipid and glucose profile and chronic complication of diabetes (Mumu, Saleh, Afnan, Akter, & Ahmed, 2009). In addition, dietary practice exercise is also needed to prevention of foot complication. Study shown that 122 (13.20 %) subjects were observed to have abnormal glucose tolerance AGT. Prevalence of AGT was significantly greater in people having sedentary physical activity (33.84 %), as compared to people having heavy physical activity (11.53 %) (Kokiwar, Gupta, & Durge, 2007). Foot care practice will prevents foot ulcer of patients with diabetes mellitus. It is estimated that the foot problems may account for as much as forty percent of the total available resources and can be improved by the foot care practice (Sayeed, Banu, Khan, & Hussain, 2005). Patient’s foot care practices that may prevent foot ulcer are foot hygiene, toenails care, skin care, inspection of feet and legs and footwear (Pollock et al., 2003). So knowledge and practice may prevent of foot ulcer of patients with diabetes mellitus.
Objectives:

1. To examine the level of knowledge regarding the prevention of foot ulcer among patients with diabetes mellitus.
2. To examine the level of practice regarding the prevention of foot ulcer among patients with diabetes mellitus.
3. To examine the relationship between knowledge and practice regarding the prevention of foot ulcer among patients with diabetes mellitus.

Technical terms

Knowledge regarding the prevention of foot ulcer is defined as patients’ understanding of foot care management. It involved maintenance of 1) general knowledge about diabetes, 2) diet habit, 3) exercise or physical activity, and 4) foot care. It was developed by the researcher.

Practice regarding prevention of foot ulcer is defined as patients’ skill to perform prevention of foot ulcer. Prevention of foot care practice involves 1) general practice about diabetes, 2) diet habit, 3) exercise or physical activity and 4) foot care. It was developed by the researcher.

Conceptual framework of this study

The conceptual framework of this study was based on knowledge-attitude and practice (KAP) model and literature review related to prevention of foot ulcer of diabetic patients. The KAP model was first used in the field of family planning and population studies in the 1950s (Launiala, 2009). The model suggests that the right information (knowledge) will influence attitudes, and thus change the behavior (practice) (Launiala, 2009). Patients should have knowledge about foot care; they should maintain foot hygiene, nail care, footwear, and avoidance of trauma. (Pollock et al., 2003). Foot care keeps feet healthy and prevents foot ulcer (Delmas, 2008). Health providers should involve diabetic patients in all stages of the education process in order to enhance the knowledge and develop the skill for self-care (Rocha, Zanetti, & Snatos, 2009). Knowledge will influence the attitude so, knowledge and practice explored in this study for prevent of foot ulcer among patients with diabetes mellitus.
Research Methodology

Sample and sample size

Samples in this study were type 2 diabetes patients. The estimated sample size was calculated for an accepted minimum level of significance of 0.05 and accepted power of 0.80. Estimated population effect size of the study was based on previous study which $r = 0.24$ (Chan & Molassiotis, 1999), and it was adjusted to the closest number in Estimated Population Correlation Coefficient table ($r = 0.25$). The total number of subjects was 126.

Instruments

Knowledge regarding Prevention of Foot Ulcer Questionnaire was developed by the researcher. It consisted of 35 true and false items. The true response item got a score of (1) and (0) for false response item. Foot care items were nineteen. The range of scores varies from 0-35 and scores were transformed into percentage. The scores were divided into three levels as low $= \leq 60$, moderate $= 61-80$, and high $= > 80$. Practice regarding Prevention of Foot Ulcer Questionnaire was developed by the researcher. It consisted of 35 items and foot care items were nineteen. Each items were rated on a 4 point Likert scale with response options ranging from (0) = never practice, (1) = seldom practice, (2) = sometimes practice, and (3) = always. The item ratings were summed for a score ranging from 0-105 and it was transformed into percentage. The scores were divided into three levels as low, moderate, and high. The content validity of the instruments was assessed by the three experts in diabetic area. Cronbach’s alpha Coefficient was used to test for internal consistency reliability of the instruments. Cronbach’s alpha Coefficient of Knowledge Regarding Prevention of Foot Ulcer Questionnaire was .71 and Practice Regarding Prevention of Foot Ulcer Questionnaire was .81.

Data Collection and Ethical Considerations

After getting permission from the Faculty of Nursing, Prince of Songkla University Institute of Review Board (IRB), the investigator asked permission from a one Diabetic Center Rangpur, Bangladesh for collecting data. After permission, the researcher visited the potential subjects at out-patient department in order to identify the eligible subjects. The study was conducted with the intention of protecting the human rights of all subjects.
**Data Analysis**

Both descriptive and inferential statistics were used to analyze the data. Pearson’s product moment correlation (r) was used to examine the relationship between patients’ knowledge and practice regarding prevention of foot ulcer. Since the knowledge and practice score were not normally distributed and six subjects had the extreme lowest score. The decision was made to delete those cases and sample size fixed in 120.

**Results**

**Subjects’ Demographic Characteristics**

One hundred and twenty subjects mean age was 50.61 old (SD =11.73, minimum = 30, maximum = 82). Fifty five (45.8%) of the subjects were male and 65 (54.2%) were female. Most of the subjects (88.3%) were Muslim followed by Hindu (11.7%). The education level of subjects were mainly in high school (42.5%) and followed by vocational, college and university.

**Subjects’ Health Characteristics**

Health and illness history of the subjects sixty nine subjects (57.5%) were diagnosed with diabetes under 5 years, whereas, > 10 years were 13 (10.8%). The diabetes duration ranged from <5 to > 10 years (M = 5.02, SD = 4.46, minimum = 1.00, maximum = 21.00).

<table>
<thead>
<tr>
<th>KRPFU (≤ 60 = Low, 61 – 80 = Moderate &gt; 80 = High)</th>
<th>Mean</th>
<th>SD</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>General knowledge about diabetes</td>
<td>84.67</td>
<td>16.45</td>
<td>High</td>
</tr>
<tr>
<td>Diet habit</td>
<td>92.66</td>
<td>10.02</td>
<td>High</td>
</tr>
<tr>
<td>Exercise / Physical activity</td>
<td>81.94</td>
<td>13.21</td>
<td>High</td>
</tr>
<tr>
<td>Total Foot care knowledge</td>
<td>83.20</td>
<td>10.01</td>
<td>High</td>
</tr>
<tr>
<td>Total knowledge</td>
<td>84.55</td>
<td>7.83</td>
<td>High</td>
</tr>
</tbody>
</table>

**Practice Regarding Prevention of Foot Ulcer**

The overall mean score of practice regarding the prevention of foot ulcer was at high level (M = 61.47, SD = 10.06). The mean scores of four sub dimensions about practice regarding the prevention of foot ulcer were as follows. General practice about diabetes (67.78, SD = 11.31), diet habit (M = 62.83, SD = 13.60), exercise/physical activity (M = 60.88, SD = 16.83) and total foot care practice (59.09, SD = 12.53).
Table 2 Mean and Standard Deviation and Level of Subject’s Practice Regarding Prevention of Foot Ulcer (PRPFU) (N = 120)

<table>
<thead>
<tr>
<th>PRPFU (≤ 60 = Low, 61 – 80 = Moderate &gt; 80 = High)</th>
<th>Mean</th>
<th>SD</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>General practice about diabetes</td>
<td>67.78</td>
<td>11.31</td>
<td>Moderate</td>
</tr>
<tr>
<td>Diet habit</td>
<td>62.83</td>
<td>13.60</td>
<td>Moderate</td>
</tr>
<tr>
<td>Exercise / Physical activity</td>
<td>60.88</td>
<td>16.83</td>
<td>Moderate</td>
</tr>
<tr>
<td>Total Foot care practice</td>
<td>59.09</td>
<td>12.53</td>
<td>Low</td>
</tr>
<tr>
<td>Total practice</td>
<td>61.47</td>
<td>10.06</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

Relationship between Knowledge and Practice to Prevent Foot Ulcer of the Patients

Table 3 shows the correlation between total practice and total knowledge and each of the sub-dimensions. The result showed that there was a positive relationship between total knowledge and total practice (r = .33, p < 0.01).

Table 3 Correlation Between Total Practice, Total Knowledge and the Sub-dimensions of Knowledge (N = 120)

<table>
<thead>
<tr>
<th></th>
<th>1.</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. General knowledge</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Diet habit of knowledge</td>
<td>.09</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Exercise knowledge</td>
<td>.06</td>
<td>.24**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Foot care knowledge</td>
<td>.29</td>
<td>.27**</td>
<td>.18</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Total knowledge</td>
<td>.52**</td>
<td>.48**</td>
<td>.48**</td>
<td>.87**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6. Total practice</td>
<td>.06</td>
<td>.12</td>
<td>.23**</td>
<td>.30**</td>
<td>.33**</td>
<td>1</td>
</tr>
</tbody>
</table>

** P < 0.01
* P < 0.05

Conclusions

The mean of the total knowledge score was at high level (M = 84.55) and the mean of the total practice score was at moderate level (M = 61.47). The result revealed statistically significant correlation between total knowledge and total practice at a low level (r = .33, P = <0.01).
Discussions

The discussion of the result is presented in the following sequence: knowledge regarding prevention of foot ulcer; practice regarding prevention of foot ulcer, and the relationship between knowledge and practice to prevent foot ulcer of diabetic patients.

Subjects’ Knowledge Regarding Prevention of Foot Ulcer

Findings of this study indicated that the total level of knowledge was at high level. Subjects’ knowledge regarding prevention of foot ulcer is based on four sub-dimensions also at high level. The expectation raised from diabetic health facilities which provided ‘diabetic guide book’ that may influence the patients to gain high level of knowledge. In addition, mass media such as television, newspaper alert the people to gain knowledge to prevent complications of diabetes. This finding was supported by the previous study diabetic guide book that consisting of patients’ diabetic information including medical test report for guidance (Mumu et al., 2009).

Sub-dimension general knowledge about diabetes was at high level; general knowledge helps the patient to avoid danger. Subjects stated that they always visit health center to avoid danger. Previous study explained that general knowledge is provision of patients’ general information and education that can reduce foot problems (McIntosh, 2008). Diet habit dimension was general knowledge regarding diet, importance of diet habit and balance of diet for diabetes type 2 patients. Patients also gained knowledge about diet habit from reading the ‘diabetic guide book’. This study was supported by the Mahtab and colleagues, guidelines for care of type 2 diabetes mellitus in Bangladesh. Dietary advice of the patients is improved knowledge and quality of life (Mahtab et al., 2003). In addition, sub-dimension exercise/physical activity was at high level. Most of the subjects knew that exercise helps in controlling the blood glucose level and increase blood circulation that promotes foot health. Subjects also knew that exercise improves blood glucose level and reduce blood glucose resistance. This finding was supported by the previous study that physical activities assist controlling of blood glucose level and improves insulin sensitivity (Mahtab et al., 2003).

Sub-dimension foot care knowledge which was composed of nineteen questions for assessment of subjects’ knowledge about foot care. Findings of this study revealed that all questions were good and they needed to know more about danger of foot ulcer and the management. Subjects had high knowledge as the questions were basic foot care and personal hygiene related. However, Bryant and colleagues mentioned that the concept of
managed foot care is well suited to the outpatient setting and offers comprehensive foot care education with ongoing evaluation to patients for the purpose of health promotion (Bryant & Beinlich, 2003).

**Subjects’ Practice Regarding Prevention of Foot Ulcer**

Findings of this study revealed that total practice was at moderate level. Subjects’ practice regarding prevention of foot ulcer is based on the four subdimensions. Findings of this study indicated that three sub-dimensions of them were moderate and the total foot care was at low level. Sub-dimension general practice about diabetes was at moderate level as most of the subjects revealed that they had no medical equipments in their home; such as weight machine for measuring body weight, blood sugar, or urine sugar measuring materials. These subjects used their symptoms strip equipment for measuring discomfort to assess during their visit to the physician at health center for check up. Previous study also supported that most of the subjects gained higher marks on factual knowledge on diabetes but lost marks on the application of knowledge to their real life practice (Chan & Molassiotis, 1999). Sub-dimension; diet habit practice level was at moderate level due to many reasons as subjects were stated that cultural eating habit and food taboos. Socioeconomic condition was also responsible for maintaining diet habit. Socioeconomic condition of developing country likes Bangladesh is low. Findings from previous study supported this study. It was stated that the poor glycemic control, poor socioeconomic condition, inadequate foot care lead to foot ulcer (Wadud et al., 2006). Sub-dimension exercise/physical activity was at moderate level. Findings of this study revealed that most of subjects maintain themselves only by walking. This may be due to the conditions like, lack of exercise place, no habit of exercise, cultural barrier. Sriskantharajah and colleagues supported this study that cultural barrier such as, religious, avoidance of mixed – sex activity and fear of going out alone inhibit the participation in joint exercise (Sriskantharajah & kai, 2006).

Finding of this study about sub-dimension total foot care practice level was at low level. Low practice level had many reasons; such as most of the subjects stated that their feet had no problems, so there was no need to inspect foot daily. This study was supported by previous study, (67.1%) patients did not examine their feet on day basis (Rocha et al., 2009). Subjects knew that they need to wear soft suitable footwear. Eighty six subjects stated that they always bought soft shoes to avoid trauma but researcher observed that most of the subjects bought and choose open and hard shoes. Rocha’s study supported that this study (98.2%) patients wore open home and street footwear (Rocha et al., 2009). Moreover most of
the subjects cut their hand nails by nail clipper and toenails by blade, as it is easy for them and also toe nails were cut round and short. This study was supported by previous study (83.6%) patients was cut their toe nails very short and round (Rocha et al., 2009). In order to change their habit, health care providers need to influence them for better practice. Previous study also supported this study among large population of individuals with type 2 diabetes, more than half reported that they did not had their feet examined by physician (Pataky & Vischer, 2007).

**Relationship between Knowledge and Practice to Prevent Foot Ulcer of Diabetes Patients**

This study has shown statistically significant positive low relationship between total practice and sub-dimensions of total knowledge, exercise/physical activity and total foot care knowledge and no relationship with general knowledge about diabetes and diet habit. This finding was supported by KAP model which suggested that the right information (knowledge) will influence attitudes, and thus change the behavior (practice) (Launiala, 2009). Even though total knowledge and total practice had correlation but not all sub-dimensions of knowledge correlate to practice. Exercise/physical activity and total foot care knowledge had correlation with total practice as these were familiar to subjects and a part of personal hygiene. This finding was supported by Rocha and colleagues study that the health team needs to develop strategies to encourage diabetic patients to follow adequate foot care behaviors and to find ways to overcome the obstacles to their adaptation (Rocha et al., 2009).

General knowledge about diabetes and diet habit had no relationship with total practice. The other factors which contributed the practice are socioeconomic cultural eating habit and urbanization. This finding was supported by the of Mumu and colleagues, study that daily carbohydrate intake was higher than recommended value and the diabetic patients are increasing in developing countries due to rapid transition from traditional life style to an urbanized culture and socioeconomic condition (Mumu et al., 2009).

**Recommendations**

To improve patients’ knowledge and practice about foot care, foot care activities by the nurse practitioners should be emphasized. Further interventional study is recommended to enhance foot care practice. In addition, the instrument of this study needs further deeply exploration and revision in order to enhance its validity and detailed result.
References


