



**ORIGINAL RESEARCH PAPER**

**Otorhinolaryngology**

**DEPRESSION AMONG TYPE ONE DIABETES PATIENTS IN BURAYDAH IN 2019.**

**KEY WORDS:** Type 1 Diabetes, Depression, Patient Health Questionnaire, HbA1C

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**ABSTRACT**  
 Background: Type 1 diabetes most commonly seen in the younger age group, during this period young age group may not be matured enough to manage their sugar levels as well as other diabetes care management generally. As a result of this event, tend fall in depression. Present study was aimed to find the prevalence of depression and some risk factors association with type 1 Diabetes mellitus patients. Methodology: A cross sectional study was conducted among the patients attending at Diabetic centre, King Fahad Specialist hospital among 177 participants, for the sample recruitment was done through self administered questionnaire. Data analyzed and necessary statistical tests were applied. Results: In the present study, mean age and standard deviation was 24.42± 9.256. A total of 177 patients were participated and there was 59.3% of females were participated. In the current study, there was depression of prevalence among the type 1 Diabetes patients was 20.3% (36/177). There was significant association was observed with depression among type 1 diabetes with low education level, female gender and high HbA1C level (P<0.05). Conclusions: Based on the study findings, there was decrease prevalence of depression was noticed. This could be due to PHQ-9 tool, also self administered questionnaire and self reported responses. Need to be maintained good diabetic education and communication to the participants.

**Introduction:**  
 Throughout the world Diabetes incidence and prevalence is gradually increasing from developing countries to developed countries in all ages and also in all races. Of which, type 1 Diabetes among the children has got some impact on children as life expectancy will be increased, as well as on parents in relation to management of their kids glycaemic control and quality of life of parents also will be disturbed indirectly.

The International Diabetes Federation stated that “diabetes is one of the largest global health emergencies of the 21st century”<sup>1</sup>. A remarkable increase in rate of incidence of type one diabetes has been shown over the last 30 years in Saudi Arabia<sup>2</sup>.

A study which has been conducted in Almadinah and north west Saudi Arabia has demonstrated that the incidence rate has doubled among children between 0 to 14 years of age from 18.9 to 36.99 per 100,000 children between the year of 1999 to the year of 2007. Which demonstrated a rate of 16.8 % average annual increase was observed<sup>3</sup>.

Depression is a common and serious disorder with a prevalence of 11-15% worldwide<sup>4</sup>. Depression is one of the leading causes of disability, decreased productivity and employment dropping. Depression is one of the leading causes of disability adjusted life years (DALYS) among the diabetes and non diabetic patients<sup>5,6</sup>.

One of theories shows that uncontrolled blood glucose contributed in many changes that affects mood and cognition<sup>7</sup>. In addition, diabetic patients have a higher levels of inflammatory mediators which may increase the risk of having depressive symptoms<sup>8</sup>. Diabetes is mainly depends on patient's compliance to medication and diet control unlike other chronic disorders.

Type one diabetic patients carry a significant burden by their strict daily routine which includes daily blood glucose monitoring, diet control and insulin injections. Therefore, it causes significant stress to those with tight control as a result of their constant care and are in higher risk of hypoglycemic

attacks. An evidence has shown an increase in the prevalence of depression in prediabetic patients and a remarkable increase in diagnosed patients. Prevalence of depression is almost doubled in type one diabetes compared to type 2 diabetes<sup>9</sup>.

Since depression is a key factor in increasing the complications, impair glycaemic control and marked reduction in the quality of life; it is critical to diagnose and treat it. The purpose of this study is to detect the prevalence of depression in type one diabetes and how it affects the glycemic control.

- Objectives of the study:**
1. To find the prevalence of depression among type one diabetes patients.
  2. To identify the risk factors of depression among type one diabetes.
  3. To assess the factors association of depression with the glycemic control among type one DM.

**Methodology:**  
**Study setting and design:**  
 The current study was conducted at King Fahad Hospital Diabetic centre, which was a tertiary care centre and provides the services to the maximum extent of Qassim province diabetic patients. This is a cross-sectional study conducted among the type 1 Diabetic patients of all ages.

**Study population:**  
 The target population of this study included all type one diabetes patients who visited and have follow ups in the diabetic center in Buraydah. The study duration was one year 3 months from January 2021 to March 2022. All the type 2 diabetes patients, non cooperative patients and patients with psychotic disorders were excluded from the study.

**Sampling:**  
 Sample size was calculated using Open Epi Sample size calculator<sup>10</sup>. At 95% confidence level with 6% bound on error and one study of United States of America (USA) revealed that the prevalence of depression among the type 1 Diabetes

patients was 32.1%<sup>11</sup> and same study was utilized for the calculation of sample size. The estimate of the sample was 233. During the pilot study, the patients information were collected from the day of appointments. Participants have been selected from diabetic clinic consecutively until required sample size achieved.

We distributed the self administered questionnaire to the selected study participants and principal investigator was available to clarify some doubts during the filling of the questionnaire by the patients. Out of all 233 patients, 177 patients completed the questionnaire and submitted. Hence, the response rate in the present study was 76%.

**Data collection tool:**

Questionnaire consists of 2 parts. First part dealt with demographic variables like age, gender, marital status, education of the participants and income status. Second part dealt with specific risk factors questions like HbA1C which reflects the glycaemic control of the patients and Patient Health questionnaire (PHQ-9). The data collected by distributing the PHQ-9 questionnaire to patients who follow up in the diabetic center in Buraydah in Al Qassim region which was located in the central north of Saudi Arabia.

**Data and statistical analysis:**

All data collected was entered in Microsoft Excel and then transferred and analyzed by using SPSS. Descriptive analysis was done to calculate frequency and proportion. For categorical variables to find the associations, chi square test was applied. Mean and Standard deviation calculated for continuous variables and probability (P) value 0.05 was considered for significance level.

**Ethical consideration:**

The study was conducted after getting ethical approval from Al Qassim regional ethical committee. Before collection of the data from the patient, informed consent was taken. Explained about the importance of the study and also explained about confidentiality of data at all levels of the study.

**Results:**

In the study population, the mean age and standard deviation in the study group was 24.42± 9.256. As per the PHQ questionnaire, the mean total score and standard deviation in the study population of all ages was 2.16 ± 4.080. In the present study, there was 59.3% of females were participated. In the present study, there was depression among the type 1 Diabetes patients was 20.3% (36/177).

**Table. 1 - Demographic factors among the Type 1 Diabetes patients in the study population.**

Demographic variables	Number	Percentage
Female	105	59.3
Male	72	40.7
Age Mean ± SD	24.42± 9.256	
10-30 years	137	77.4
31-60 years	40	22.6
Marital Status		
Divorced	2	1.1
Married	55	31.1
Single	120	67.8
Education		
High school	68	38.4
Higher education	2	1.1
Secondary school	35	19.8
University	72	40.7
Income		
5000 - 15000 SR	128	72.3

Less than 5000 SR	27	15.3
More than 15000 SR	22	12.4
Total	177	100%

Table 1 revealed that in the study population, about 77.4% were in the age group of 10-30 years of age group. Among the type 1 diabetic patients study group, about 40.7% were completed the University education and less than 5000 SR per month income people were only 15.3%.

**Table: 2 - Frequencies of answers about Patient health questionnaire (PHQ) in the study population.**

PHQ-9	Never	Several days	More than half of days	Nearly everyday
Q-1	137(77.4%)	28(15.8%)	5(2.8%)	7(4.0%)
Q-2	146(82.5%)	20(11.3%)	6(3.4%)	5(2.8%)
Q-3	139(78.5%)	28(15.8%)	7(4.0%)	3(1.7)
Q-4	127(71.8%)	31(17.5%)	10(5.6%)	9(5.1%)
Q-5	140(79.1%)	21(11.9%)	10(5.6%)	6(3.4%)
Q-6	155(87.6%)	15(8.5%)	5(2.8%)	2(1.1%)
Q-7	147(83.1%)	25(14.1%)	5(2.8%)	0(0.0%)
Q-8	161(91.0%)	11(6.2%)	3(1.7%)	2(1.1%)
Q-9	170(96.0%)	6(3.4%)	0(0.0%)	1(0.6%)

Table 2 stated that in the study population, about question 1, about 77.4% were given response as never, 15.8% as several days, 2.8% as more than half days and 4% were responded as a nearly every day. Similarly for the 2nd PHQ-2, about 82.5% were given opinion as never, 11.3% as several days, 3.4% as more than half days and mentioned only 2.8% were responded as nearly every day.

- PHQ1-Little interest or pleasure in doing things?
- PHQ2-Feeling down, depressed, or hopeless?
- PHQ3-Trouble falling or staying asleep, or sleeping too much?
- PHQ4-Feeling tired or having little energy?
- PHQ5-Poor appetite or overeating?
- PHQ6-Feeling bad about yourself — or that you are a failure or have let yourself or your family down?
- PHQ7-Trouble concentrating on things, such as reading the newspaper or watching television?
- PHQ8-Moving or speaking so slowly that other people could have noticed? Or so fidgety or restless that you have been moving a lot more than usual?
- PHQ9-Thoughts that you would be better off dead, or thoughts of hurting yourself in some way?

**Table: 3 - Associations of demographic factors with depression among the Type 1 Diabetes patients in the study.**

Variables	No Depression	Depression	Total
Age 10-30 years	107(78.1%)	30(21.9%)	137(100%)
31 -60 years	34(85.0%)	6(15.0%)	40(100%)
X2 - 0.909, 1df, P -0.340; OR - 0.629, CI: 0.629 to 1.640			
Female	76(72.4%)	29(27.6%)	105(100%)
Male	65(90.3%)	7(9.7%)	72(100%)
X2 - 8.444, 1df, P -0.004; OR - 0.282, CI: 0.116 to 0.687			
Divorced	0(0.0%)	2(100.0%)	2(100%)
Married	46(83.6%)	9(16.4%)	55(100%)
Single	95(79.2%)	25(20.8%)	120(100%)
X2 - 8.388, 2df, P -0.015			
High school	43(63.2%)	25(36.8%)	68(100%)
Higher Education	2(100.0%)	0(0.0%)	2(100%)

Secondary school	33(94.3%)	2(5.7%)	35(100%)
University	63(87.5%)	9(12.5%)	72(100%)
X2 - 19.185, 3df, P -0.001			
Less than 5000 SR	12(44.4%)	15(55.6%)	27(100%)
5000-15000 SR	111(86.7%)	17(13.3%)	128(100%)
> 15000 SR	18(81.8%)	4(18.2%)	22(100%)
X2 - 24.666, 2df, P -0.0001			

Table 3 depicted that in the study population, about 21.9% were having all different depression status in the age group of 10-30 years, only 15% were depressed in the age group of 31-60 years. About 27.6% of females were having depression, while 9.7% of depression among males. There was statistically significant association observed with depression female gender (P<0.05). There was less prevalence (12.5%) of depression was observed among University graduate patients, on the contrary more prevalence (36.8%) was observed among the high school completed patients and also observed significant association.

**Table: 4 - Last Glycosylated haemoglobin level and Depression status among the Type 1 Diabetes patients.**

HbA1C	No Depression	Depression	Total
< 8%	49(98.0%)	1(2.0%)	50(100%)
8-10%	43(74.1%)	15(25.9%)	58(100%)
> 10%	49(71.0%)	20(29.0%)	69(100%)
Total	141(79.7%)	36(20.3%)	177(100%)
X2 - 14.655, 2df, P -0.001			

Table 4 revealed that in the study group, those patients were having < 8% HbA1C level, the depression was 2%. Respondents were having more than 10% HbA1C level, the depression was 29%. There was statistically significant association observed between high HbA1C level and depression.

**Figure 1 : Status of Depression in the study population of Type 1 Diabetes patients.**

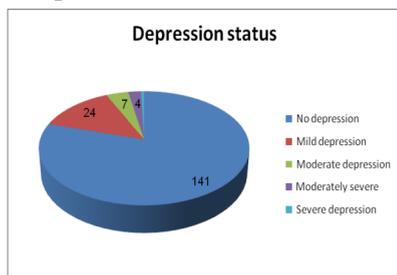


Figure 1 stated that in the study population, about 13.6% (24/177) were having mild depression, moderate depression was 4% (7/177), moderately severe depression was 2.3% (4/277) and lastly severe depression was very less 0.6% (1/177).

**Discussion:**

The present study was conducted at Diabetic centre, Buraidah during the period of year 2021 about the prevalence of depression among the type 1 diabetic patients.

In the current study, depression prevalence among the type 1 Diabetes patients was 20.3%. A similar study was done in Buraidah city at Maternity and children hospital in 2021 among type 1 diabetic patients which showed higher prevalence of depression 27%. In their study, type of the scale used was "Children Depression Inventory " (CDI) to detect the depression 12. A study conducted in Arar region, Saudi Arabia in the year 2018 by Mukrim ME, Alshammari NM et al

used the scale of depression, anxiety and stress scale (DASS) at Diabetic Centre of Prince Abdulaziz bin Musaed Hospital which detected the prevalence of depression 37.4% which was bit higher prevalence than that of our study<sup>13</sup>.

Other international study was conducted in United States of America in the year 2001 by Anderson RJ et al and De Groot M conducted meta analysis and revealed that depression prevalence less among the type 1 diabetes patients (21.3%) than that of depression among type 2 diabetes patients (27%)<sup>14,15</sup>. Another interesting finding from the study done by Roy T, Lloyd CE et al in the year 2012 and stated that prevalence of depression among type 1 diabetes could be higher than with depression among normal people as well as type 2 diabetes mellitus patients<sup>16</sup>. The possible explanation for the variations in the depression status could be due to prevalence varies from the type of patients, selection of age criteria, geographical variations and also risk factors association with the diabetes in the world.

In our study, depression among females was more and statistically significant association observed with female gender. Similar finding was observed with a study done by Freedland KE, Rich MW et al in United states of America revealed that depression was more among the females gender 17. In the current study, less prevalence was observed among University graduate type 1 diabetes patients, more prevalence was observed among the less educated people. Similar finding was observed with a study conducted by Kendzor DE, Chen M et al mentioned in his study as less educated had more depression<sup>18</sup>.

In the present study, glycaemic control measured by HbA1C level, majority of the people were having more than 8%. Hence we made the cut of point for the glycaemic control taken as 8%. Hence classified the glycaemic control status into <8%, 8-10% and more than 10% to see the depression levels with glycaemic control. There was significant association observed between high HbA1C level and depression among type 1 diabetes patients. A study done by Bächle C, Lange K, Stahl-Pehe A et al in Germany, revealed that high HbA1C level was significantly associated with depression among the type 1 diabetes patients<sup>19</sup>. Other studies conducted in Brazil<sup>20</sup> and also study done in Gulf cooperative council countries (GCC) stated that poor glycaemic control was significantly associated with higher prevalence of depression among diabetes patients<sup>21</sup>. On the contrary study done in Australia by Hagger V, Hendrieckx C et al stated that glycaemic status not associated with the depression among the diabetes patients and to the best of our knowledge very less studies observed this type of findings and associations<sup>22</sup>.

**Conclusions:**

Based on the study findings, there was an association between depression and type 1 diabetes patients which satisfy the study hypothesis. However, the prevalence of depression in type 1 diabetes was relatively less compared to other studies conducted in the Saudi Arabia as well as in the western world. More prevalence of depression among the type 1 diabetes patients was observed in female gender, less educated people and lower income patients. Further studies are required to substantiate our study findings.

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**Conflict of Interest:** None

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