In the present study, the mean differences of some parameters according to study groups including (Control group, diabetic rats, diabetic rats with Nano silymarin, Nano silymarin and Diabetic rats with extract of silymarin) were studied. The mean of diabetic rats groups with Nano silymarin was more decrease in sugar (mg/dl) when compared with diabetic rats groups, while when compared diabetic rats groups with extract silymarin, the mean was less decrease than groups with Nano silymarin. The mean of insulin in diabetic rats groups with Nano silymarin was increased when compared with diabetic rats groups, while when compared diabetic rats groups with extract silymarin, the mean was no effected with groups diabetic rats treated with Nano silymarin. The mean of IGF in diabetic rats groups with Nano silymarin was decreased when compared with diabetic rats groups, while when compared diabetic rats groups with extract silymarin, the mean was more decrease than groups with Nano silymarin. The mean of HOMA Insulin resistance in diabetic rats groups with Nano silymarin was decreased when compared with diabetic rats groups, while when compared diabetic rats groups with extract silymarin, the mean was more decrease than groups with Nano silymarin. The mean of protein in diabetic rats groups with Nano silymarin was not effected when compared with diabetic rats groups, also when compared diabetic rats groups with extract silymarin, the mean was not affected. However, there was significant differences between means of albumin according to study group. The mean of cholesterol and Triglyceride in diabetic rats groups with Nano silymarin was decreased when compared with diabetic rats groups, while when compared diabetic rats groups with extract silymarin, the mean was mild decrease than groups with Nano silymarin. High density lipoprotein (HDL) in diabetic rats groups with Nano silymarin was increased when compared with diabetic rats groups, while when compared diabetic rats groups with extract silymarin, the mean was mild increase than groups with Nano silymarin. In addition, low density lipoprotein (LDL) and very low density lipoprotein (VLDL) in diabetic rats groups with Nano silymarin was decreased when compared with diabetic rats groups, while when compared diabetic rats groups with extract silymarin, the mean was mild decreased than groups with Nano silymarin. This study aims to compare between Silybum marianum extract and Nano- particles activity in treatment of diabetes mellitus.

Keywords: Silybum marianum extract, diabetes mellitus, insulin, insulin-like growth factor.
Preparation of animals

A total seventy five Mature Wister albino rats (75 male) with a mean weight of 180 ± 20 g, obtained from the animal house at the College of Veterinary Medicine, Al Qasim Green University. All animals were kept in isolated room and maintained on controlled conditions (temperature 20-25 °C, humidity 30-70% and alternating light and dark 12h dark/light cycle).

Induction of Diabetes

Diabetes was induced in diabetic and diabetic treated groups by a single intraperitoneal injection of alloxan monohydrate (150mg/kg of body weight), (sima chemical Co., USA), freshly dissolved in 5 sterile normal saline. The rats were fasted 12hr. before and 12hr. after alloxan injection.

Preparation of silymarin-TPGS nanoparticles

According to (Gauttam and Kalia, 2013).

Determination of Fasting Serum Glucose Concentration

According to (Chao et al., 2003).

Determination of Serum Total Cholesterol

According to (Allain et al., 1974).

Determination of Serum HDL-Cholesterol

According to (Warnick, 1995).

Determination of Serum Triglycerides, VLDL-C, LDL-C

According to (Al-gazally et al., 2014).

Determination of Serum Insulin, IGF-1 Concentration

According (Hermeneau et al., 2016).

Statistical Analysis

Statistical analysis was carried out using SPSS version 23. Continuous variables were presented as (Means ± SD). Student t-test was used to compare means between two groups.

Results and Discussion

In the present study, in table (1), it was observed that, the mean differences of sugar (mg/dl) according to study groups including (Control group, diabetic rats, diabetic rats with Nano silymarin, Nano silymarin and Diabetic rats with extract of silymarin). The results showed that, there were significant differences between means of sugar according to study group (P<0.001), the mean of diabetic rats groups with Nano silymarin (197.5 ± 12.6) was more decrease when compared with diabetic rats groups (269.7 ± 29.7), while when compared diabetic rats groups with extract silymarin, the mean was less decrease (220.2 ± 14.2) than groups with Nano silymarin. These results were agreement with results obtained by (Caceres-Cortes et al., 2014) who found that, Serum levels of IGF-I were decreased, in diabetic rats compared with controls, while disagreement with results obtained by (Shaker et al., 2012) who found that, Serum IGF-I levels were found to decrease from (577.2 ng/ml) to (253.0 ng/ml) after Silymarin injected (p<0.005). There was significant differences between means of HOMA Insulin resistance according to study group, (P<0.001), the mean of diabetic rats groups with Nano silymarin (4.35 ± 1.04) was decreased when compared with diabetic rats groups (4.91 ± 1.47), while when compared diabetic rats groups with extract silymarin, the mean was more decrease (5.15 ± 1.06) than groups with Nano silymarin. This indicated that, the extract Silymarin was regulated of released of insulin growth factor more than extract silymarin. The Effect of silymarin on IGF-1 was acted by modulation the activity and function of protein and receptor such as IGF-1. The results in this study were identical with results obtained by (Shaker et al., 2012) who found that serum levels of IGF-I were decreased, in diabetic rats compared with controls, while disagreement with results obtained by (Shaker et al., 2012) who found that, Serum IGF-I levels were found to decrease from (577.2 ng/ml) to (253.0 ng/ml) after Silymarin injected (p<0.005). There was significant differences between means of HOMA Insulin resistance according to study group, (P<0.001), the mean of diabetic rats groups with Nano silymarin (4.35 ± 1.04) was decreased when compared with diabetic rats groups (4.91 ± 1.47), while when compared diabetic rats groups with extract silymarin, the mean was more decrease (5.15 ± 1.06) than groups with Nano silymarin. This indicated that, the extract Silymarin was regulated of released of insulin growth factor more than Nano silymarin. These results were agreement with results obtained by (Shaker et al., 2012) who found that, administration of Silymarin produced decrease in insulin resistance in the diabetic rats. Silymarin was administered to diabetic rats, due to decrease of insulin resistance. Therefore, No intolerance, side effects, or allergic reactions were observed(Crozet et al., 2013).However, the results in this study were identical with results of (Long et al., 2012) who found that, the insulin resistance was significantly increased in diabetic rats induced, whereas the glucose levels were decreased in diabetic rats with Nano silymarin. There was not significant differences between means of protein according to study group (P=0.767), the mean of diabetic rats groups with Nano silymarin (7.59 ± 0.58) was not effected when compared with diabetic rats groups (7.66 ± 0.66), also when compared diabetic rats groups with extract silymarin, the mean was not effected (7.58 ± 0.59). However, there was significant differences between means of albumin according to study group (P=0.002). The presence of albumin in blood is considered as indicator or raring signal to diabetic, albumin does not necessary reflect on diabetic, so, there is a need to find biomarkers that help in identification of patients risk of
the disease and monitoring preventive and therapeutic effect. Albumin heavily glactiated with diabetic, the decrease of albumin level was effected on protein glycation and glycosylated hemoglobin which is measure high glucose level. There was significant differences between means of lipid profile according to study group (P<0.001). the mean of cholesterol and Triglyceride in diabetic rats groups with Nano silymarin (199.73±10.60;185.20±12.67) was decreased when compared with diabetic rats groups (208.40 ±12.52, 205.07±12.95), while when compared diabetic rats groups with extract silymarin, the mean was mild decrease (202.40 ±9.65, 195.27±12.74) than groups with Nano silymarin. However, high density lipoprotein (HDL), low density lipoprotein (LDL) and very low density lipoprotein (VLDL) silymarin. In addition to that, the mean of low density lipoprotein (LDL) and very low density lipoprotein (VLDL) in diabetic rats groups with extract silymarin, the mean was increased when compared with diabetic rats groups with Nano silymarin (48.20 ±5.24) was increased when compared with diabetic rats groups (208.40 ±12.52, 205.07±12.95), while when compared diabetic rats groups with extract silymarin, the mean was mild decrease (44.20 ±4.14) than groups with Nano silymarin. In addition to that, the mean of low density lipoprotein (LDL) and very low density lipoprotein (VLDL) in diabetic rats groups with Nano silymarin (114.46 ±13.788; 37.04 ± 2.53) was decreased when compared with diabetic rats groups (127.21±17.397; 41.08 ± 2.52), while when compared diabetic rats groups with extract silymarin, the mean was mild decreased (119.22 ±4.48; 38.82 ± 2.20) than groups with Nano silymarin. These results were agreement with results obtained by (Pavan Kumar, 2012) who found that, The rats fed on high cholesterol diet showed significant increase in serum total cholesterol, Triglycerides, LDL-C and VLDL-C, when treatment with Nano silymarin, significantly decreased serum total cholesterol, Triglycerides, LDL, in addition to that, rats treated with Nano silymarin showed significant increase in hepatic HDL and decrease in other lipid profiles.Silymarin was effected on lipid profile in diabetic rats by decrease cholesterol and LDL, while in normal condition the cholesterol was reduced absorption of cholesterol from intestine, increase HDL and decrease liver content by inhibit the enzyme, which is important in synthesis of cholesterol (Ubaid, 2017).

### Table 1 : Mean differences of parameters according to study groups

<table>
<thead>
<tr>
<th>Marker</th>
<th>Study groups</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control (15)</td>
<td>DR (15)</td>
</tr>
<tr>
<td>Sugar</td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
</tr>
<tr>
<td>insulin</td>
<td>95.27 ± 9.66</td>
<td>269.7 ± 29.7</td>
</tr>
<tr>
<td>IGF</td>
<td>225.1 ± 45.7</td>
<td>170.1 ± 30.5</td>
</tr>
<tr>
<td>HOMA I.R</td>
<td>1.96 ± 0.48</td>
<td>4.91 ± 1.47</td>
</tr>
<tr>
<td>Protein</td>
<td>7.35 ± 0.82</td>
<td>7.66 ± 0.66</td>
</tr>
<tr>
<td>Albumin</td>
<td>4.34 ± 0.24</td>
<td>4.00 ± 0.36</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>180.33±10.04</td>
<td>208.40±12.52</td>
</tr>
<tr>
<td>Triglyceride</td>
<td>130.20±11.63</td>
<td>205.07±12.95</td>
</tr>
<tr>
<td>HDL</td>
<td>53.80 ± 6.73</td>
<td>39.07 ± 6.53</td>
</tr>
<tr>
<td>LDL</td>
<td>101.17±10.47</td>
<td>127.21±17.397</td>
</tr>
<tr>
<td>VLDL</td>
<td>26.04±2.32</td>
<td>41.08±2.52</td>
</tr>
</tbody>
</table>

### References


Brother’s Medical Publisher; p. 325–90.

Endocrinology & Metabolism, 32(4): 575-591.


