Frequency of gallstones in diabetes mellitus

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We performed a prospective and controlled study to determine the frequency of gallstones in 200 diabetic and 200 nondiabetic patients by using gallbladder ultrasonography. The control group was selected similar to the diabetic group of identical age, sex, and nmber of pregnancy. The frequency of gallstones in the control group was 10,5% and 27% in diabetics and the difference between the two group was stastically significant (p<0.01). The rate of asymptomatic gallstones was 81,4 in diabetics and 61,9% in controlb and the difference between the froups was stastically significant (p<0.05). Gallstone complications (acut colesistitis etc) in diabetics are more frequent and an important cause of mortality in emergency surgery diabetic patients. For this reason, gall bladder ultrasonography must be performed in diabetic patients even though asymptomatic for diagnosis and treatment before the complications begin. [Turk J Med Res 1994; 12(2):87-90]

Key Words: Gallstone, Ultrasonography, Diabetes mellitus

Gallstone is one of the most significant problems and has %10 frequency in adult population (1,2). However this percentage increases up to 25% in diabetic patients (3).

Bile is a solution which is formed from; salts, phospholipids and cholesterol. Under normal physiological conditions is in liquid form. The factors that cause changes in the physical form of the bile lead to the formation of gallstones (1). The significant increase in of gallstones in diabetic patients can't be clearly explained, so the discussions on this subject are still going on. Obesity and hyperlipidemia are the two factors which effect cholesterol saturation. It has been reported that; obesity, hyperlipidemia and neuropathy in diabetic patients are important factors that cause gallstones (3). Due to the weakness of the contractions caused by neuropathy are obstacles for the visualization by oral contrast solution in 30% of diabetic patients (4). Therefore the traditional cholecystography used in the diagnosis of gallstones may cause errors (5).

Ultrasonography is thought to be the most powerful technique in the diagnosis of the gallstones (6). It is a simple noninvasive method which can be easily applied and no'hazardous effects as radiation causes to focuse the attention on this method.

This study is devoted for the evaluation of the frequency of gallstones in diabetic patients.

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MATERIALS AND METHODS

In this study 200 diabetic patients and 200 non-diabetic controls were sampled. The physical examina tion was performed to the patients and diabetic grour was classified according to the National Diabetes Dat;: Group (NDDG) (7).

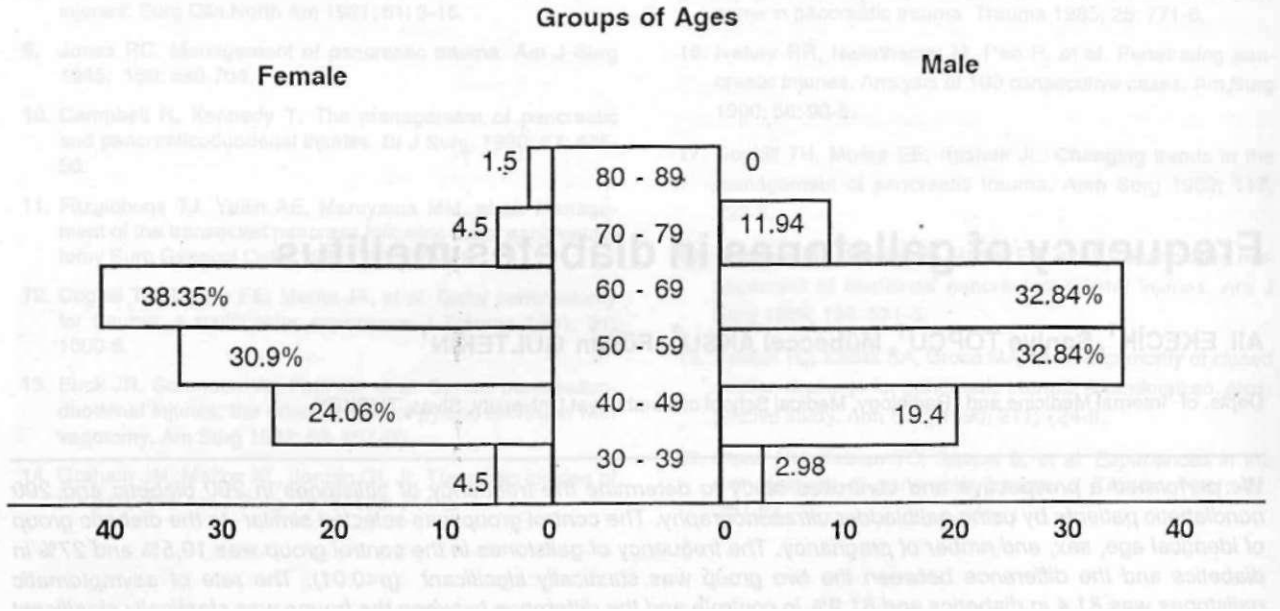
The population of the control group was in the same age, sex and number of pregnancy.

The body mass index (BMI) was calculated. [W/h^2: W=Weight (kg). h= height (m)] (4).

0=BMI	20-24.9	Normal
1=BMI	25-29.9	Over normal range.
2=BMI	30-40	Obese
3=	>40	Highly obese

General Electric Radius-HR ultrasonoraphy with a 3.75 Miltz convet transduced was used for the evaluation of the study population.

All the patients were investigated after a 12 hour of fasting. During ultrasonographic investigation the



wall of gall bladder could be seen obviously with its thin accustic wall, which was filled with bile that indicated homogenous sonolucent structure.

The fallowing parameters were used in diagnosis of gall stones during ultrasonography;

1. Echogenic structures showed acustic shadow in gallbladder.

2. Hyperechogenic images and large acustic shadows in a gallbladder that can be visualized.

3. Multiple small echogenic structures that placed along the wall of gallbladder like small irregularities,

4. Sometimes movement of stones were investigated by changing position of patients (6,8).

The results were evaluated by the significancy test of difference between two percentages (9).

RESULTS

The age distribution of diabetic patients were given in Figure 1.

The frequency of gallstones in diabetic group was 27.0% and 10.5% in the control group. The difference was statistically significant ($p<0.01$) (Table 1).

The 31.11 % of the diabetic women patients had gallstones but 18,46% in males. So the difference between two groups was also statistically significant ($p<0.05$) (Table 2).

When the women were compared on the basis of parity; an insignifant difference was observed between the nullipar and primipar diabetic and control groups ($p>0.05$) (Table 3).

The frequency of gallstones in the multipar diabetic women was 36% and 12,2% in control group. The difference was statistically significant ($p<0.01$) (Table 3).

The effect of obesity in the formation of gallstones were also studied and an insignificant difference in the control and study group of BMI "0-1" group was observed ($p>0.05$). However in BMI "2-3" group 40% of the diabetics had gallstone whereas the percentage of gallstones in the control group for this category was 13%. The difference was significant ($p<0.01$) (Tablo 4).

Table 1. The Gallstone Frequency in Diabetics and Control Group.

	Diabetics		Control	
Male	18.46%	(12/65)	8,8%	(6,68)
Femal	31.11%	(42/135)	11,36%	(15/13)
Total	27,0%	(54/200)	10,5%	(21/200)

Table 2. The relation between the sex and gallstone frequency in diabetics.

	Total	Gallston(t)	%
Diabetic Femal	135	42	31.11
Diabetic Male	65	12	18.46

Table3. The relation Between The Gallstone Frequency and Parity of Diabetic and Control Groups.

	Diabetics		Control	
Nullipar	7 J %	(1/14)	6.6%	(1/15)
Primipar	14.2%	(3/21)	10.5%	(2/19)
Multipar	36%	(36/100)	12.2%	-(12.98)

Table 4. The relation between the gallstone frequencyl and obesity diabetics and control groups.

	Diabetics		Control	
BMI	Total	Gallstone	Total	Gallstone
(M	88(44%)	14(15,9%)	85(42,5%)	8(9,4%)
2-3	112(56%)	40(35,7%)	115(57,5%)	13(11,3%)

Table 5. The asymptomatic gallstone frequency ratio in diabetic and control groups.

Diabetics		Control	
81,4%	(44/54)	61.9%	(13/21)

The diabetic patients with asymptomatic gallstones were in 81.4% and 61.9% in control group, having a statistically significant difference ($p<0.05$) (Table 4).

DISCUSSION

There are several reports stating different frequencies of gallstones in diabetic patients. Tano et al sampled 212 diabetic patients and reported the frequency of gallstones as 13% (3). Bartoli E. reported the frequency of gallstones as 32% in diabetic patients and 20% in the control group (4). Feldman investigated the gallstones frequency in autopsy of diabetics as 25% and %8% in nondiabetics (9). In this study 200 diabetics and 200 nondiabetics were investigated, the frequency of gallstone, for diabetics was 27% and 10.5% for nondiabetics.

We belive that the difference in the frequency of gallstones, caused by predispose factors. There are several factors which directly effect the formation of gallstones as; sex, age, obesity, diet with high calories, diabetes mellitus, hemolytic anemia, estrogen and clafibrate therapy etc (1-3). A study in still going on for the evaluation of the relation with the above mentioned parameters and gallstone formation.

The supersaturation of bile with cholesterol, nucleation of monohydrate crystals and dysfunction of gall bladder are the 3 important factors that cause gallstone formation (10,11).

In diabetics, lipid concentration of plasma and bile increase. The obesity observed in diabetic patients has diverse effects on increased cholesterol synthesis and bile saturation (12,13).

The gall bladder of diabetic patients are generally enlarged and its motility is disturbed. These events are probably due to the dysfunction of the gall bladder wall. The anomalies are rised in the muscle or cholecystokinin receptors (14,15).

In the diagnosis of gallstones;

1. Plain abdominal graphy,
2. Oral cholesislography,
3. Ultrasonography,
4. E R C P (Endoscopic retrograde cholangipancreatography)
5. Duodenal tubage test, are used (2).

By using plain abdominal graphy only %15 of the gallstones can be visualized (16).

E R C P and duodonal tubage are the two diagnostic method used if and only if the other tests are negative (2).

Ultrasonography and oral cholecystography are the widely used methods with 95% specificity and sensitivity (2).

Since, ultrasonoraphy can early be managed, it is coined as the best radiodiagnostic method used in the diagnosis of gallstones (4,6,8,17).

In females obesity and hypercolesterolemia are frequently observed with respect to males, so the frequency of gallstones is high in females (18). In our study group; the frequency of gallstones in females was 31.11% but 18.46 in males. The difference between the two groups was statistifically significant ($p<0.05$). These results were in accordance with the previosly reported results (3,4). Bartoli and his group reported the gallstone frequency as 35.9% in female and 21.2% in male diabetic patients.

When the number of pregnancies and frequency of gallstones were concerned an insignificant difference was observed ($p>0.05$). However Bartoli has reported that diabetic nullipar, principar and multipar patients had high frequency of gallstones.

If we compare the frequency of gallstones and obesite in BMI "0-1" group, the difference would be insignificant ($p>0.05$). However this difference was significant in BMI "2-3" (For diabetics the gallstone frequency was %40, while for control group %13) ($p<0.01$). Similar findings were reported by Bertoli. et al (4).

Asymptomatic gallstones are another important point in discussing gallstone-diabetic relationship. It was reported that 2/3 of the gallstones are asymptomatic (13,18).

In our study; the patients who had gallstones didn't complain about their gall bladder. The frequency of asymptomatic gallstones was 81% in diabetics, and 61.9% in controls.

The gallstones in diabetic induces the inflamation and infectious complications (14,15).

The rate of mortality in patients with acute cholecystitis was 22% (13,15). But the mortality and morbidity was the same among the diabetic patients who exposed to elective surgery and control patients (16,17).

As a result; gall bladder ultrasonography must be performed in diabetic patients even though asymptomac for diagnosis and treatment befonre complications begin.

Diabetes mellitusta safra taşı sıklığı

200 diabetik ve 200 nondiabetik bireyde safre kesesi ultrasonografisi kullanılarak Diabetes Mellitusta safra taşı sıklığını belirlemek amacıyla prospektif kontrollü bir çalışma yaptık. Kontrol grubu, yaş, cins ve kadınların gebelik sayıları bakımından, diabetik gruba tamamen benzer şekilde seçildi. Safra taşı sıklığı kontrollerde, %10,5 ve diabetiklerde %27 olup iki grup arasındaki fark istatistiksel olarak anlamlı idi (p<0.01). Asemptomatik safra taşı oranı diabetiklerde %81,4 kontrollerde %61,9 olup, gruplar arasındaki fark istatistiksel olarak anlamlı idi (p<0.05). Safra taşı komplikasyonları (akut kolesistit vb.) diabetiklerde daha sık olup acil cerrahi diabetik hastalarda önemli bir mortalite nedenidir. Bu nedenle asemptomatik olsa bile diabetiklerde komplikasyonlar gelişmeden önce teşhis ve tedavi için safra kesesi ultrasonografisi yapılmalıdır. [Türk J Med Res 1994; 12(2): 87-90)

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