

Obesity as a Risk Factor for Biliary Lithiasis - Clinical Study

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Abstract: The purpose of this study is to bring new data regarding the prevalence of biliary lithiasis in our region (Cluj district) and regarding the role of obesity as a risk factor for this pathology. We performed a clinical study which included a significant number of participants - 2348 subjects. For each subject an ultrasonographical screening was performed in order to detect biliary lithiasis and to collect anthropometric data (height, weight, and body mass index). We determined the prevalence of obesity in the groups of lithiasic or non-lithiasic subjects. The study included adult subjects with age between 18 and 90. The results show an increased prevalence of obesity in the group of lithiasic subjects (40.15%, 95%CI [34.05 – 46.98]) compared with non-lithiasic group (19.65%). Comparing the results on feminine and masculine groups we observed that obesity was present in 32.16% (95%CI [24.48 – 40.56]) of the lithiasic and only 19.48% of the non-lithiasic females while in the masculine group 53.93% of lithiasic men were obese (95%CI [42.71 – 64.03]) and only 19.84% of the non-lithiasic. The results lead to the conclusion that in studied area obesity is a major risk factor for biliary lithiasis in both sexes, with a plus for the masculine sex where more than 50% of lithiasic men were obese. Obesity is a risk factor which can be controlled. In order to prevent the appearance of gallbladder gallstones it is very important to control obesity by an active way of life and a balanced alimentation.

Keywords: Obesity; Biliary lithiasis; Risk factor.

Introduction

Biliary lithiasis has become an important socio-economical issue because of its continuous increasing prevalence. The connection between obesity and biliary lithiasis was highly debated. There were done many epidemiological studies that confirmed the increased frequency of biliary stones in obese persons [1-4]. The mechanisms are complex. The adipocitary mass leads to an increased syntheses of cholesterol [5] and to a high saturation of cholesterol in bile [6-8]. The activity of HMGCoA-reductase grows in the context of increased alimentation and insulinemy [9,10]. Despite of all the progresses which were made, the complete mechanism of lithogenic discoly in obesity is not known.

In our trial we study the connection between obesity and biliary lithiasis by making a clinical and ultrasonographical screening upon a significant number of subjects.

Material and Method

The target of the study was the adult population of both sexes. The study took place at the Military Hospital, Cluj-Napoca, April 2006 - September 2007. The subjects included in the study were those who came to the Internal Medicine Department for examination. We included in our study 2348 subjects with age between 18 and 90, 1236 women and 1112 men. 75 subjects had surgery for biliary lithiasis. We included subjects from all social categories.

We performed to all the subjects' ultrasonographical screening to detect biliary lithiasis, anthropometrical measures (weight, height, and BMI) and determined the frequency of obesity in subjects with biliary lithiasis comparing with those without biliary lithiasis. The subjects were considered obese if BMI > 30 (BMI = weight(kg)/height(metres)²) [6,10].

Confidence iuntervals for proportions (risk of error equal to 5%) were computed based on a binomial distribution method [11,12].

Results

The frequency of obesity is presented in Table 1 and Figure 1 for lithiasic and non-lithiasic subjects.

Table 1. The frequency of biliary lithiasis in studied groups

Group	Obese	Non obese	Total
Biliary Lithiasis	94	138	232
Without Biliary Lithiasis	416	1700	2116
Total	510	1838	2348

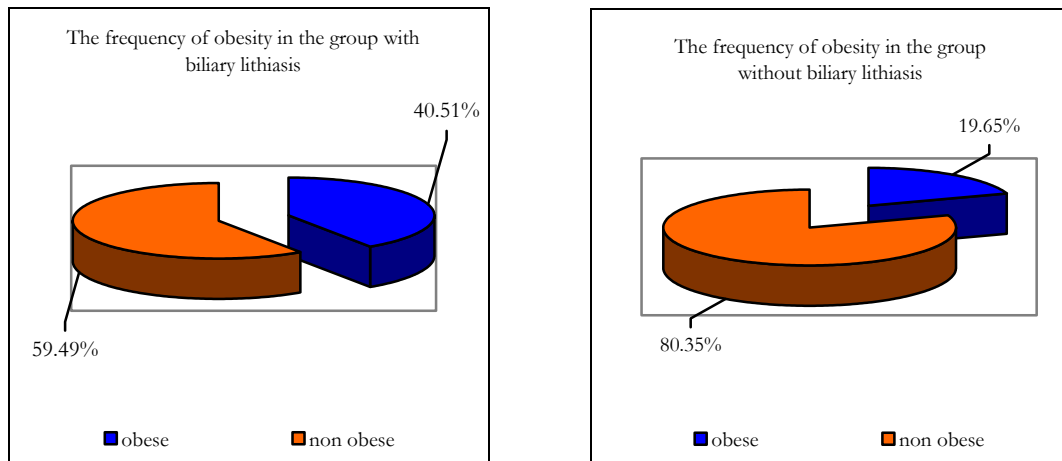


Figure 1. Frequency distribution of obesity on the group with and without biliary lithiasis

The results presented in Figure 1 showed a double frequency of obesity in the lithiasic group. The results obtained for female subjects are presented in Table 2 and Figure 2.

Table 2. Prevalence of obesity in lithiasic an non-lithiasic women

Group	Obese	Non obese	Total
Biliary Lithiasis	46	97	143
Without Biliary Lithiasis	213	880	1093
Total	259	977	1236

It can be observed that female had a significant difference regarding the presence of obesity in the lithiasic and non-lithiasic groups.

The results in masculine sex are showed in Table 3 and Figure 3.

Table 3. Frequency distribution of obesity in lithiasic an non lithiasic men

Group	Obese	Non obese	Total
Biliary Lithiasis	48	41	89
Without Biliary Lithiasis	203	820	1023
Total	251	861	1112

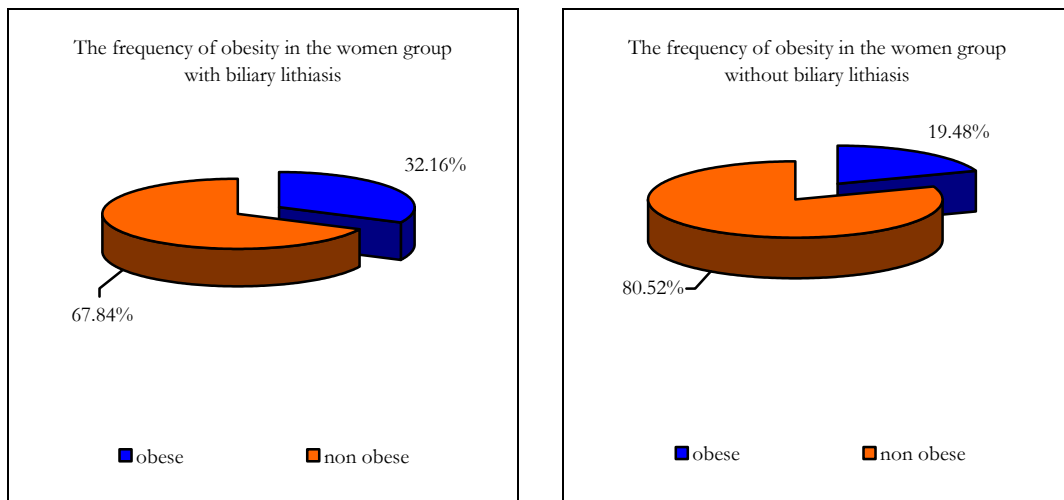


Figure 2. Frequency distribution of obesity on the female subjects with and without biliary lithiasis

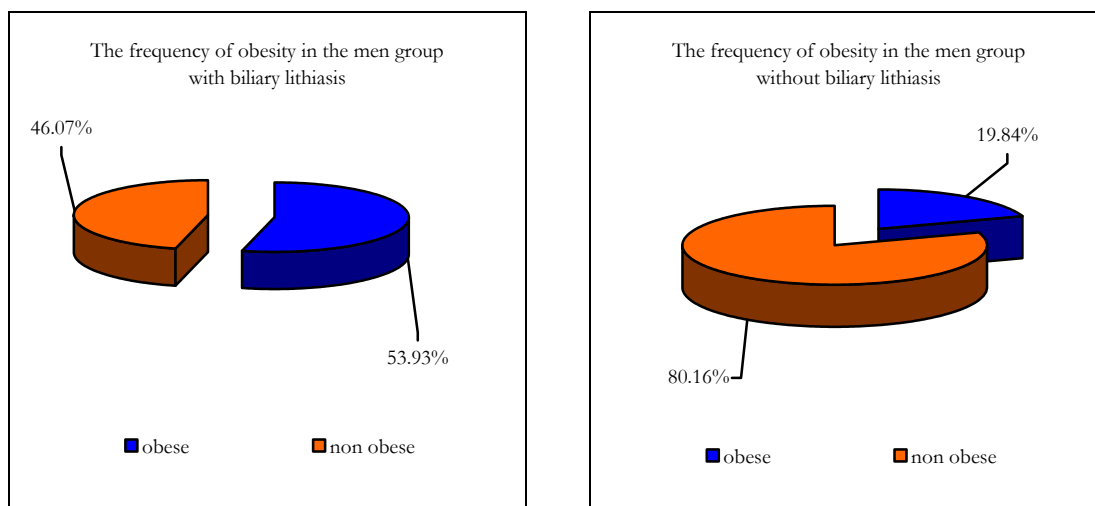


Figure 3. Frequency distribution of obesity on the male subjects with and without biliary lithiasis

We can see at masculine sex that more than half of lithiasic were obese (53.93%; 95%CI [42.71 – 64.03]). In non-lithiasic only 19.84% were obese.

The results obtained on age groups are showed in Tables 4-6.

We notice on each group of age a more important frequency of lithiasis in obese comparing with non obese subjects. We notice an increased frequency of obesity at lithiasic women in decades 5-9 comparing with those without lithiasis.

Beginning with the third decade the obesity frequency is significantly higher in men group with lithiasis comparing with non-lithiasic group.

Table 4. Obesity frequency on decades of age on entire group

Age	Number	Biliary Lithiasis		Without Biliary Lithiasis	
		Obese (% \square)	Non obese	Obese (% \square)	Non obese
< 20	67	1	0	5 (7.57% [3.05-16.64])	61
21-30	215	2 (22.22% [1.23-65.43])	7	21 (10.19% [6.31-15.05])	185
31-40	392	6 (28.57% [9.75-52.15])	15	45 (12.12% [9.17-15.90])	326
41-50	416	21 (41.17% [27.49-54.86])	30	71 (19.45% [15.62-23.83])	294
51-60	522	31 (42.46% [31.53-54.78])	42	111 (24.72% [20.94-28.95])	338
61-70	495	22 (43.13% [29.45-56.82])	29	116 (26.12% [20.07-30.40])	328
71-80	197	9 (45.00% [25.25-67.75])	11	39 (22.03% [16.39-28.81])	138
81-90	44	2 (33.33% [2.78-80.56])	4	8 (21.05% [10.60-36.77])	30

\square = 96% confidence interval

Table 5. Obesity frequency on decades of age in women group

Age	Number	Biliary Lithiasis		Without Biliary Lithiasis	
		Obese (% \square)	Non obese	Obese (% \square)	Non obese
< 20	23	1	0	3 (14.28% [4.99-37.87])	18
21-30	68	1 (16.66% [2.78-63.89])	5	12 (19.35% [9.70-30.62])	50
31-40	185	2 (13.33% [0.44-39.56])	13	19 (11.17% [7.06-17.06])	151
41-50	293	10 (29.41% [14.79-49.97])	24	43 (16.60% [12.36-21.62])	216
51-60	310	16 (37.20% [23.31-53.43])	27	63 (23.59% [18.73-29.21])	204
61-70	252	11 (36.66% [20.11-56.56])	19	53 (23.87% [18.47-30.18])	169
71-80	82	4 (36.36% [9.92-71.90])	7	17 (23.94% [14.10-35.19])	54
81-90	23	1 (33.33% [11.10-88.90])	2	3 (15.00% [5.25-39.75])	17

\square = 95% confidence interval

Table 6. Obesity frequency on decades of age in men group

Age	Number	Biliary Lithiasis		Without Biliary Lithiasis	
		Obese (% \square)	Non obese	Obese (% \square)	Non obese
< 20	44	0	0	3 (6.81% [2.32-18.13])	41
21-30	147	2 (66.66% [11.10-88.90])	1	26 (18.05% [11.81-24.99])	118
31-40	207	3 (50% [19.44-80.56])	3	38 (18.90% [13.93-24.87])	163
41-50	123	9 (52.94% [29.76-76.12])	8	32 (30.18% [21.71-39.61])	74
51-60	212	16 (53.33% [33.44-73.22])	14	47 (25.82% [19.78-32.96])	135
61-70	243	12 (57.14% [33.56-75.96])	9	36 (16.21% [11.71-21.62])	186
71-80	115	5 (55.55% [23.46-87.65])	4	17 (15.88% [9.36-24.29])	90
81-90	21	1 (33.33% [11.10-88.90])	2	4 (22.22% [5.86-49.69])	14

\square = 95% confidence interval

Discussion

A lot of studies place obesity as one of the top risk factors for biliary lithiasis [13-21]. Obesity leads to an increased production of cholesterol and an over saturation of cholesterol in bile [6,7] which creates ideal conditions to develop biliary stones.

The results obtained in our study confirm data from literature which consider obesity an important risk factor for biliary lithiasis. We had in our group a significantly higher frequency of obesity in subjects with biliary lithiasis comparing with non-lithiasic subjects (40.15% - 19.65%-Table 1). On both sexes, he had a positive correlation between obesity and biliary lithiasis. In feminine sex obesity was present at 32.16% from lithiasic women and only 19.48% from non lithiasic (Table 2) while at masculine sex 53.93% of lithiasic subjects are obese and only 19.84% of non lithiasic (Table 3).

Regarding the frequency of obesity at lithiasic subjects on groups of age, we notice that it increases progressively from second to eighth decade (Table 4). In the lithiasic women group the highest frequency of obesity is in 5-8 decades (Table 5) while in the masculine lithiasic group it is increased from second to eight decade (Table 6).

In all groups of age and both sexes, obesity is more frequent in lithiasic comparing with non-lithiasic group.

Conclusion

The results lead us to the conclusion that in our area obesity is a major lithogen factor for both sexes with a plus for masculine sex where more than 50% of lithiasic subjects were obese.

References

1. Maclure KM, Hayes KC, Colditz GA et al. Weight, diet and the risk of symptomatic gallstones in middle-aged women. *N Engl J Med* 1989;321:563.
2. Amaral JF, Thompson WR. Gallbladder disease in the morbidly obese. *Am J Surg* 1985;149:551.
3. Liddle RA, Goldstein RB, Saxton J. Gallstone formation during weight-reduction dieting. *Arch Intern Med* 1989;149:1750.
4. Acalovschi M, Suci A, Florea M, Dumitrascu D, Grigorescu M. Lipides biliaries majeurs et lipides plasmatiques. Etude clans la lithiase biliare a cholesterol. *Acta Gastroenterologica Belgica* 1984;47:381-386.
5. Miettinen TA. Cholesterol production in obesity. *Circulation* 1971;44:842.
6. Bennion LJ, Grundy SM. Risk factors for the development of cholelithiasis in man. *N Engl J Med* 1978;299:1161-1167, 1221-1227.
7. Karel J. van Erpecum. Biliary lipids, water and cholesterol gallstones. *Biol. Cell* 2005;97:815-822.
8. Angelin B, Einarsson K, Ewerth S, Leijd B. Biliary lipid composition in obesity. *Scand J Gastroenterol* 1981;16:1015-1019.
9. Coyne MJ, Bonorris GG, Goldstein LI. Effect of chenodeoxycholic acid and phenobarbital on the rate-limiting enzymes of hepatic cholesterol and acid synthesis in patients with gallstones. *J Lab Clin Med* 1976;87:281.
10. Smith JL, Hardie IR, Pillay SP, de Jersey J. Hepatic Acyl-Coenzyme A:Cholesterol Acyltransferase Activity is Decreased in Patients with Cholesterol Gallstones. *J Lipid Res* 1990;31(11):1993-2000.
11. Drugan T, Bolboacă SD, Jäntschi L, Achimaş Cadariu A. Binomial Distribution Sample Confidence Intervals Estimation 1. Sampling and Medical Key Parameters Calculation. *Leonardo Electronic Journal of Practices and Technologies* 2003;2(3):45-74.
12. Bolboacă SD, Achimaş Cadariu A. Binomial Distribution Sample Confidence Intervals Estimation 2. Proportion-like Medical Key Parameters. *Leonardo Electronic Journal of Practices and Technologies* 2003;2(3):75-110.
13. Dumitrascu D, Acalovschi M, Grigorescu M. *Litiazia biliara*. 1989, Ed Academiei, Bucuresti.
14. Barbara L, Sama L, Labate AMM et al. A population study on the prevalence of gallstone disease: the Sirmione study. *Hepatology* 1987;7:913-917.
15. Kato I, Nomura A, Stemmermann GN, Chyou PH. Prospective study of clinical gallbladder disease and its association with obesity, physical activity and other factors. *Dig Dis Sci* 1992;37(5):784-790.
16. Maclure KM, Hayes KC, Colditz GA et al. Weight, diet and the risk of symptomatic gallstones in middle-aged women. *N Engl J Med* 1989;321:563.
17. Persson GE, Skold SA, Thulin JG. Physical constitution and biochemical characteristics of patients with electively diagnosed gallstone disease. *Eur J Surg* 1991;157(8):473-476.

18. Gonzalez J, Sola R, Sarda P, Joven J, Espax R, Masana L. The relationship between biliary lithiasis and lipoproteins isolated by ultracentrifugation. *Medicina Clinica (Barc)* 1993; 101(2):41-44.
19. Carbajo Ferreira AJ, Urbaz RM, Medina BE, Manyares LJ, Urruzuno TP, Moreno VJM, Gutierrez JC, Espino HM. Biliary lithiasis in childhood. *Anales Espanoles de Pediatria* 1992;36(4):281-284.
20. Ruibal FJ, Aleo LE, Alvarez MA, Pintero ME, Gomez CR. Childhood cholelithiasis. Analysis of 24 patients diagnosed in our department and review of 123 cases published in Spain. *An Esp Pediatr* 2001;55(2):171-172.
21. Giovanni Misciagna, Sandro Centonze, Claudio Leoci, Vito Guerra, Anna Maria Cisternino, Rosa Ceo and Maurizio Trevisan . Diet, physical activity, and gallstones—a population-based, case-control study in southern Italy. *Am J Clin Nutr* 1999;69(1):120-126.

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