



TO STUDY THE ASSOCIATION BETWEEN SERUM IRON AND FERRITIN LEVEL WITH GALLSTONE DISEASE

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ABSTRACT

INTRODUCTION: Gallstone disease is a common clinical condition affecting the adult population of both sexes. Iron deficiency was found to be a new parameter in aetiology of gallstones [5, 6, 7]. Iron deficiency has been shown to alter the activity of several hepatic enzymes, leading to increased gallbladder cholesterol saturation and promotion of cholesterol crystal formation [8, 9]. Iron acts as a coenzyme for nitric oxide synthetase (NOS), which synthesizes nitric oxide (NO) important for the maintenance of gallbladder tone and normal relaxation [10, 11]. **METHOD:** Prospective case control study was conducted In Dr.B.R.A.M. Hospital, Raipur On January 2020 to December 2020. sample size was for case is 60 and for control 60 taken On the basis of inclusion and exclusion criteria . patient sonological confirmed and estimate the serum iron and ferritin level . Data are analyzed with descriptive statistical principals **RESULT:** 31.67% patient of cholelithiasis have serum iron level below normal value .In control group 21.67% participants have normal serum iron level (P value = 0.21) 33.33% cases have serum ferritin level below normal range and 18.33% of control group have serum ferritin level below normal range (P value = 0.06) **CONCLUSION:** gallstone are more prevalent in female population than males . low serum iron was not significantly found in both case and control group with relation to cholelithiasis. low serum ferritin level not significantly found both in case and control group

KEYWORDS :

INTRODUCTION

Gallstone is a common clinical condition in adults. The earliest known gallstones date back to the 21st Egyptian dynasty discovered in the mummy of a priestess of Amenemhat (1085-945 BC)^[1] . About 10-12% of adults develop gallstones^[2] .

In India it is estimated to be around 4%, whereas in western world it is 10%^[3]. Cholesterol and calcium bilirubinate are the two main substances involved in gallstone formation. Gallstones derived from bile consist of mixture of cholesterol, bilirubin with, or without calcium. Based on their chemical composition, gallstones found in the gallbladder are classified as cholesterol, pigmented, or mixed stones^[4]. Four factors which explain gallstones are supersaturation of secreted bile, concentration of bile in gallbladder, crystal nucleation, and gallbladder dysmotility. Recent studies have identified the role of trace elements (iron, calcium, zinc, and copper) and defective pH in formation of gallstones^[5]. Iron deficiency was found to be a new parameter in etiology of gallstones^[5, 6, 7]. Iron deficiency has been shown to alter the activity of several hepatic enzymes, leading to increased gallbladder cholesterol saturation and promotion of cholesterol crystal formation^[8, 9]. Iron acts as a coenzyme for nitric oxide synthetase (NOS), which synthesizes nitric oxide (NO) important for the maintenance of gallbladder tone and normal relaxation^[10, 11]. Alteration of motility of the gallbladder and sphincter of Oddi leading to biliary stasis results in cholesterol crystal formation, which has been reported with iron deficiency.^[12]

If the prevalence of iron deficiency in a population must be described with a single parameter, serum ferritin should be used; which can be complemented with hemoglobin in all programme evaluations.

Since, iron could have a significant role in gallstone pathogenesis, its regulation through ferritin requires to be studied; as ferritin is the most specific marker for iron levels in the body.

If we can predict which factors contribute to the development of cholelithiasis then their prevention could be affected by modifying these factors, which can have large scale implications to reduce the burden, both economic and health status, in the given population.

MATERIALS AND METHODS

Prospective case control study was conducted In Dr.B.R.A.M. Hospital, Raipur On January 2020 to December 2020. sample size was for case is 60 and for control 60 taken

Study Population

Case- Patient who is coming to department of Surgery with gallstone disease and fulfil the inclusion criteria both IPD and OPD basis.

Control- Healthy patient who is coming to department of surgery without gallstone disease, confirmed by ultrasonography.

METHODOLOGY

Patients with sonological evidence of gallbladder stones formed case for the study. Patients with sonological not suffering from gallstones formed control for study. Patients fulfilling the inclusion criteria are included in the study. Serum ferritin, serum cholesterol, serum iron along with other routine investigations are estimated in all patients. Patients with gallstone disease are diagnosed with iron deficiency anemia based on hemoglobin levels, serum iron, serum ferritin levels. Adults' male with hemoglobin level <13 gm/dl and adult female with <12 gm/dl are diagnosed as anemia. Normal

serum ferritin levels in adult male average are 100 µg/L (15-200 µg/L) and in female average is 30 µg/L (12-150 µg/L). Normal serum iron levels in adult male is 50-150 µg/dL, and in female 35-145 µg/dL. Data are analysed with descriptive statistical principals

Inclusion Criteria

I. Case- Age More Than 18 Year and disease confirmed by ultrasonography. Patients satisfying the above conditions and willing to give consent and participate in the study

2.CONTROL- Age More Than 18 Year. Patients not suffering from gallstone disease confirmed by ultrasonography. Patients satisfying the above condition and willing to give consent and participate in the study

GENDER	NUMBER OF CASES
Male	20 (33.33%)
Female	40 (66.67%)

Exclusion Criteria

Patients with age less than 18 years. Who opt out the study and not giving consent for study. Patient with gallstone diseases due to haemolytic anaemias. Patient taking iron for anaemia. Patient with previous case of biliary tract surgery

RESULT :

Table 1: Distribution of Cases According to Gender (n=60)

GENDER NUMBER OF CASES Male 20 (33.33%) Female 40 (66.67%) Table 1: In this study out of 60 cases 20 are male (33.33%) and 40 are female (66.67%) have gallstone disease.

Table 2: Distribution of case and control group according to serum ferritin level

Ferritin	Case	Control	Total
Below Normal	20 (a)	11 (b)	31
Normal	40 (c)	49 (d)	89

Chi square value is 3.52 and P value is 0.06

Table 2:

- 33.33% cases have serum ferritin level below normal range and 18.33% of control group have serum ferritin level below normal range
- As P value is above 0.05, the result of this study is not significant

Table 3: Distribution of case and control group according to serum iron level

Iron	Case	Control	Total
Below Normal	19 (a)	13 (b)	34
Normal	41 (c)	47 (d)	86

Chi square value is 1.53 and P value is 0.21

Table 3: In the case-control study

- 31.67% patient of cholelithiasis have serum iron level below normal value .In control group 21.67% participants have normal serum iron level
- As P value is above 0.05, the result of this study is not significant

DISCUSSION

Gender distribution of subjects with gallstone disease:

In this study, of all the cases being studied, 20 (33%) patients were male and 40 (66.66%) patients were female, suggesting that gallstone disease is much more common among females which is in accordance with the studies conducted by many researchers like Unisas et al⁽¹⁸⁾ in 2011 who assessed the geographical prevalence of gallstone disease in India by using ultrasound and inferred that about 5.6% females and 2% of males suffered from gallstone disease. Similar conclusions have been made by Sanjeev et al⁽¹⁵⁾ (2018) who

conducted a study on 100 patients wherein 79% females and only 21% of males were suffering from cholelithiasis, and Rajashekara G Babu et al⁽⁹⁾ in 2019, who conducted a study on 60 cases concluding that 78.8% patients were females and 21.7% patients were males.

Distribution of cases and control groups according to their serum iron level:

Among the cases, 19 (31.67%) patients of cholelithiasis had serum iron levels below the normal value and 13 (21.67%) participants in the control group had serum iron levels below the normal value suggesting that low serum iron level is more common in patients with gallstone disease (odd Ratio = 1.6, P value 0.21) but the results were not statistically significant. This is in accordance with the findings of many researchers as well.

In 2014, P.K. Mishra et al⁽¹³⁾, conducted a prospective study on 100 patients who were divided into 2 groups A (cases) and B (controls) based on the serum iron levels. 88 patients fell in group A and 12 patients into group B. The serum iron content in group B was significantly lower than group A (P value is less than 0.005, making it statistically significant).

Prasad et al⁽⁵⁾ in his study conducted in 2015, identified that 62% females among the cases and 38% females in the control group had low serum iron levels; and only 12% female patients with cholelithiasis and 38% females in the control group had normal serum iron levels.

B.K. Arora et al, 2018⁽¹⁴⁾ in his study found out that 49.93% cases and 20.8% of control group have low serum iron levels but the P value is 0.95, which makes it statistically non-significant.

Sanjeev Kumar et al, 2018⁽¹⁵⁾ in his study found out that among the male patients, 38.1% cases, 20.8% of control group have low serum iron level with a P value of 0.28, which was non-significant; and among females, 39.2% of cases and 30.8% of control group have low serum iron levels but the P value is 0.077 making this finding statistically non-significant.

Distribution of cases and control groups according to their serum ferritin level:

Among the cases, 20 (33.33%) patients of cholelithiasis have serum ferritin levels below the normal value and in the control group, 11 (18.33%) participants have serum ferritin levels below the normal value. In this study, odds ratio = 2.2, signifying a positive association between low serum ferritin levels and cholelithiasis but the P value is 0.06 making this finding statistically non-significant, which can also be inferred from the following studies done by many researchers correspondingly.

In 2014 P.K. Mishra et al⁽¹³⁾, conducted a prospective study on 100 patients who were divided into groups A and B based on serum ferritin levels. 88 patients fell in group A and 12 patients in group B. The serum ferritin content in group B was significantly lower than group A (P value is less than 0.005, making this finding statistically significant).

B.K. Arora et al, 2018 in this study in males serum ferritin was low in 64.5% cases and 16.66% controls. Serum ferritin level was normal in 35.50% of cases and 66.66% of controls, the P value was <0.001 which was statistically significant. In females serum ferritin was low 35.5% of cases and 15.38% of controls, the P value was <0.001 so the result was statistically significant

Sanjiv Kumar et al, 2018 In this study in males the serum ferritin was low in 42.9% cases and 25% of controls. Serum ferritin level was normal in 57.1% of cases and 58.3% of controls. In females serum ferritin was low 38% of cases and

23.1% of controls, serum ferritin level was normal in 62% of cases and 61.5% of controls. the P value was <0.005 so the result was significant.

Prasad et al, 2015 In this study incase group 6% of male, 4% of female patients have less than normal serum ferritin level. This is 10% and 20% respectively in control group. In this case group 20% of male and 64% of female patient have normal serum ferritin level. This is 40% and 54% respectively in the control group.

CONCLUSION

This study was concluded that gallstone are more prevalent in female population than males in ratio of 2:1.

In this study 31.67% case have low serum iron level as compared to control in which 21.67% participants have low serum iron level as per odd ratio, there is 1.6 times more risk of cholelithiasis in patients who have low serum iron level then who have normal serum iron level. As sample size was less as compared to other study and iron deficiency anaemia was more prevalent in Indian population, so low serum iron was not significantly found in both case and control group with relation to chololithiasis so as per p value, which is 0.21, this study is not significant.

In this study 33.33% cases have low serum ferritin level as compared to control in which 18.33% participants have low serum ferritin as per order ratio, there is 2.2 times more risk of cholelithiasis in patient who have low serum ferritin then who have normal serum ferritin level. As sample size is less as compared to other study and iron deficiency anaemia is more prevalent in Indian population, so low serum ferritin level not significantly found both in case and control group. So as per P value which is 0.06, study is not significant.

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