

**ORIGINAL ARTICLE - BIOCHEMISTRY**

**Study On Biochemical Analysis Of Factors Involved In The Pathogenesis Of  
Uterine Fibroid Disorder**

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**ABSTRACT**

**Introduction:** Uterine fibroids are the commonest smooth muscle tumours that originate from the uterus. Several factors are involved in the pathogenesis like the reproductive hormones, age, family history, parity and race.

**Aims and objectives:** To analyze the biochemical parameters in fibroid cases and to compare the same with healthy study subjects.

**Materials and methods:** 45 uterine fibroid cases and 45 age matched controls were studied for their biochemical parameters lipid profile, liver function tests, complete blood count and blood grouping & typing.

**Results& Discussion:** Patients with uterine fibroids had earlier age of menarche and first child when compared to normal subjects. They were anemic with low hemoglobin count Hb (gm %)  $8.6 \pm 2.12$  against controls  $10.8 \pm 3.1$ . Their HDL (mg/dl) was low with mean value  $40.4 \pm 5.9$  compared to control values ( $50.9 \pm 6.8$ ). In liver function tests, alkaline phosphatase(IU/L) was significantly elevated  $190.8 \pm 32.8$  IU/L when compared to the controls with mean value of  $110.5 \pm 24.5$  IU/L. Interestingly most of patients were found to have blood group B positive (62.22%).

**Conclusion:** Uterine fibroids are more common in the reproductive age group especially in women between 30-50 years of age. Most of the patients with fibroid are found to have blood group B type with Rh positive.

**Key words:** Uterine fibroids, Lipid profile, Alkaline phosphatase, Blood grouping

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## INTRODUCTION:

Uterine fibroids are the commonest benign tumours that originate from uterine smooth muscle cells. They are monoclonal tumors of the uterine smooth muscle cells that consist of large amounts of extracellular matrix made up of collagen, fibronectin, and proteoglycan. Even though their pathogenesis is not clearly known, studies conducted on uterine fibroid shows that the estrogen and progesterone hormones has the effects to proliferate the tumor growth.<sup>1,2,3,4</sup>

Uterine fibroid is the commonest cause of gynaecological disturbances in women to get admitted in hospital and undergo Hysterectomy. Prevalence is 20 - 50 % in reproductive age group or 1 in 20 women will have fibroids in their reproductive age.<sup>2,5</sup>

Depending upon the location, they are classified as subserous, submucous and intramural fibroids. They can occur as a single or multiple fibroids. Usually, it is common in the age group of 30-50 years, which is the reproductive age group for women. Rarely appear before menarche and regress after menopause. About 1/1000 uterine fibroid may turn into malignant at their later age. Fibroids may remain simply as asymptomatic or may cause several range

of symptoms like fatigue, dysmenorrhoea, abnormal and irregular bleeding leading to anaemia, non cyclic pain, abdominal distension, pelvic pressure, bladder and bowel disturbances.<sup>6,7,8,9</sup> Uterine fibroids may also be associated with reproductive problems, including impaired fertility, pregnancy complications and loss, and adverse obstetric outcomes.<sup>10-17</sup>

## MATERIALS AND METHODS:

Study was conducted in the department of Biochemistry, Vinayaka Mission's Medical College & Hospital, Karaikal in association with department of Obstetrics and Gynaecology from October 2018 to August 2019. Ethical committee approval was obtained before conducting the study. A total of ninety (90) study subjects which includes forty five (45) uterine fibroid cases with the age group of 30 - 45 years and forty five (45) age matched controls were studied for their fasting blood glucose, urea, creatinine, lipid profile, liver function tests, complete blood count, blood grouping and typing. All the study subjects answered a questionnaire containing details of age, gender, smoking, symptoms, history of medications and duration of the disease. Height, Weight, Blood pressure was noted

for all the subjects and Body Mass Index (BMI) calculated.

Diabetic, hypertensive, post menopausal women, patients on hormonal treatment for other diseases, jaundiced patients were excluded from the study. Parameters like fasting glucose, urea, creatinine, total cholesterol, triglycerides, High Density Lipoprotein Cholesterol (HDL-C), liver function tests which includes serum total and direct bilirubin, Serum Glutamate Oxaloacetate Transaminase (SGOT), Serum Glutamate Pyruvate Transaminase (SGPT), Alkaline Phosphatase (ALP), total protein and albumin was done for all the study subjects. Blood glucose was done by the glucose oxidase peroxidase method. Serum total cholesterol was estimated by Cholesterol oxidase - peroxidase and triglycerides by glycerol 3 phosphate oxidase - peroxidase enzymatic method. HDL-C was measured by direct method. Urea and creatinine were estimated by enzymatic UV- kinetic Glutamate dehydrogenase and by modified Jaffe's two point kinetic method respectively. Serum bilirubin was analysed by modified Jendrassik & Grof's method.

SGOT, SGPT and ALP were estimated by enzymatic kinetic methods. Total protein was estimated by Biuret and albumin by Bromocresol green end point methods respectively.

Calculated parameter includes BMI, VLDL and LDL. LDL calculated by Friedwald's formula. Complete blood count was done by automated analyzer Horiba ES 60 and blood grouping & typing by tulip kit slide agglutination method.

**Statistical analysis:** Statistical analysis was carried out by SPSS software. The results are presented as Mean  $\pm$  Standard deviation. A p value of less than 0.05 was set as significant.

#### **RESULTS :**

The demographic and biochemical characteristics of the study subjects are depicted in Table 1 and Table 2 respectively. Figure 1 concludes B positive blood group is more common among the study groups. Figure 2,3 and 4 are the scatter diagrams of TGL vs ALP, Total cholesterol vs TGL and ALP vs Total proteins respectively in fibroid cases.

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**Table 1: Demographic characteristics of study subjects .**

GENERAL PARAMETERS	CASES	CONTROLS
Age of menarche(yrs)	13 ± 0.8	14.6 ± 1.2
Age at first child birth(yrs)	19.2 ± 4.8	22 ± 3.9
Height (cm)	156.2 ± 5.5	160.7 ± 7.8
Weight(kg)	62.8 ± 10.2	60.8 ± 9.5
BMI (kg/m <sup>2</sup> )	26.9 ± 4.7	24.6 ± 3.8
Mean age (yrs)	40.8 ± 6.3	38.7 ± 5.7

**Table 2: Biochemical characteristics of study subjects**

PARAMETERS	CASES	CONTROLS
Hemoglobin (gm/dl)	8.6 ± 2.12	10.8 ± 3.1
Glucose(mg/dl)	81.5 ± 8.8	78.8 ± 6.9
Urea(mg/dl)	22.5 ± 5.8	21.6 ± 6.8
Creatinine(mg/dl)	0.75 ± 0.12	0.8 ± 0.2
T.Cholesterol(mg/dl)	160.8 ± 24.6	145.7 ± 22.8
Triglycerides(mg/dl)	165.2 ± 34.8	140.7 ± 28.6
HDL-C(mg/dl)	40.4 ± 5.9	50.9 ± 6.8
LDL-C(mg/dl)	100.8 ± 22.8	84.6 ± 23.6
VLDL-C(mg/dl)	30.5 ± 12.1	18.8 ± 8.9
SGOT(IU/L)	20.6 ± 7.8	18.8 ± 6.9
SGPT(IU/L)	23.6 ± 5.7	20.7 ± 4.8
ALP(IU/L)	190.8 ± 32.8	110.5 ± 24.5
T.Protein(gm/dl)	6.25 ± 0.4	6.8 ± 1.2
Albumin(gm/dl)	3.7 ± 0.32	4.2 ± 0.5
T.Bilirubin(mg/dl)	0.62 ± 0.35	0.53 ± 0.21
Direct(mg/dl)	0.26 ± 0.02	0.21 ± 0.01

**DISCUSSION:**

The commonest presenting complaints from the patients with uterine fibroid disorder is irregular and heavy menstrual bleeding with dysmenorrhea, while other symptoms includes abdominal pain, painful intercourse, urinary frequency and fertility complications<sup>3,4</sup>.

The mean age in years of attaining menarche among patients with fibroid was 13± 0.8 while it was 14.6 ± 1.2 among the control group as early menarche and late menopause are considered as one of the etiology for developing fibroid uterus due to

longer period of exposure to estrogen level in blood.<sup>18</sup> The mean age in years at which the patients had their first delivery was 19.2 ± 4.8 and in controls it was 22 ± 3.9. Nulliparous women are at risk of having fibroid uterus than parous women and multiparous females have still lesser chance to develop fibroid in their later ages due to altered estrogen and progesterone exposure during and after pregnancy<sup>4</sup>. The average duration of illness in fibroid cases was six months.

Most of the patients were found to be anaemic due to continuous blood loss with mean hemoglobin (gm/dl) level being 8.6 ± 2.12 in fibroid patients and in controls 10.8 ± 3.1. Serum blood glucose, urea and creatinine were found to be within normal limit. Lipid profile though normal or low normal in most of the patients, some patients showed increased level of total cholesterol and triglycerides. HDL (mg/dl) was found to be in the normal range in controls whereas it is decreased in fibroid cases with values

50.9 ± 6.8 and 40.4 ± 5.9 respectively. BMI (kg/m<sup>2</sup>) was slightly elevated among cases and also in control group with mean value of 26.9 ± 4.7 and 24.6 ± 3.8 respectively. Liver function tests were normal except for low serum total protein (gm/dl) 6.25 ± 0.4 and hence albumin (gm/dl) level 3.7 ± 0.32. Serum Alkaline phosphatase enzyme (IU/L) was elevated in most of the cases of uterine fibroids with mean values of 190.8 ± 32.8 and 110.5 ± 24.5 in controls. The reason behind this being expression of Catechol O methyl transferase enzyme genotypes that have been proved in cases of uterine fibroids which are associated with elevated enzyme activity in blood. Therefore interruption in receptor signaling mechanism for both estrogen and progesterone hormones and their receptors had been considered for many treatment modalities.<sup>19,20</sup> Whereas, studies are there showing decreased alkaline phosphatase and increased acid phosphatase enzymes in uterine fibroid cases.<sup>21</sup>

Patients with uterine fibroids were found to be mostly of blood group B and Rh factor positive type which accounts for 62.22% (28/45 patients). The next common blood group being O positive with 19.44% (9/45 patients) and the rest being A positive

with 4.44% (2/45), A<sub>1</sub>B positive with 4.44% (2/45 patients), A<sub>2</sub>B negative with 4.44%

(2/45 patients), A negative with 2.22% (1/45 patients) and B negative with 2.22% (1/45 patients). The exact reason behind this remains unclear and on contradiction with previous study by Fathia M. Ben Ashour et.al, which showed higher prevalence in patients with O positive blood group with A and B positive as the next common groups<sup>22</sup>.

Fig 1: Bar diagram showing prevalence of blood group among total patients

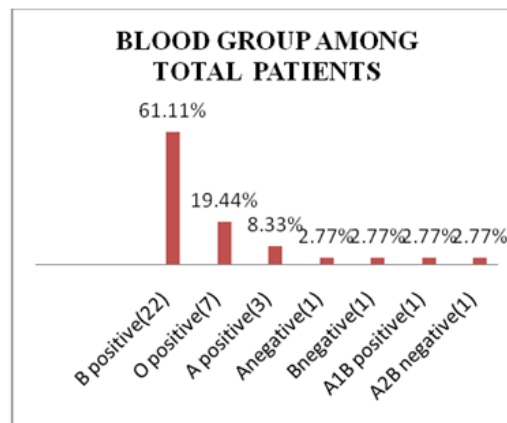


Fig 2: Scatter diagram showing TGL (mg/dl) vs ALP (IU/L) in fibroid patients

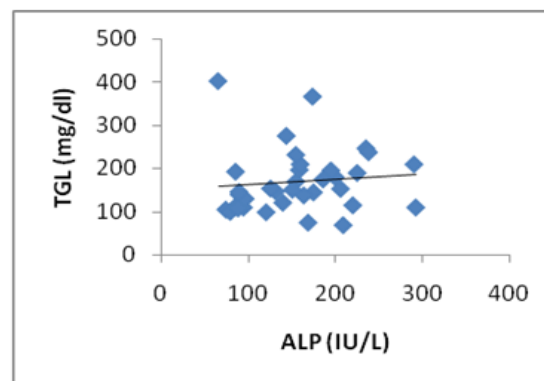


Fig 3: Scatter diagram showing TC(mg/dl) vs TGL(mg/dl) in fibroid patients

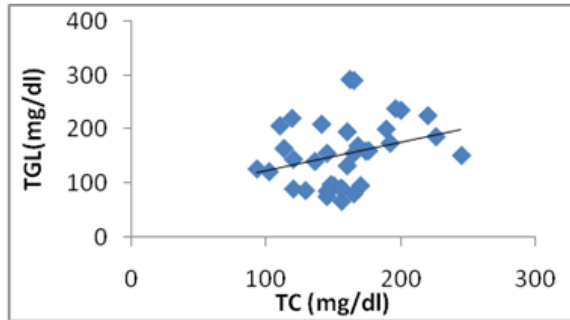
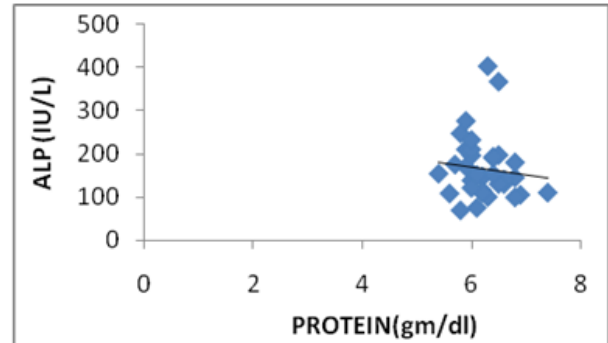


Fig 4: Scatter diagram showing serum ALP (IU/L) vs total protein(gm/dl) in fibroid cases.



### LIMITATIONS:

This study has to be conducted in a larger group as the sample size is small. The effects of steroid hormones on fibroid are needs to be studied in detail. As, it runs in families first degree relatives of patients need to be evaluated further for the incidence of uterine fibroids.

### CONCLUSION:

Uterine fibroids are more common in women with reproductive age group especially between 30-50 years of age. Liver enzyme, alkaline phosphatase were found to be elevated in patients with fibroid disease. B type blood group with Rh factor positive was found to be more common among uterine fibroid cases.

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