



Association between Ferritin and Vitamin D Levels in Premenopausal Fibroid Uterus Patients with and Without Anemia - A Prospective Observational Study in a Tertiary Care Center

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Introduction and Literature Review

Diets across the world are commonly deficient in several micronutrients, especially iron. In developing countries, severe iron deficiency is considered to contribute directly to cognitive impairment, decreased work productivity, and death. In industrialized countries, iron depletion increases the risk of anemia in certain populations (e.g., pregnant women, female blood donors, and women using intrauterine devices). It is therefore important to understand the factors contributing to maintaining optimal iron status. There is increasing evidence that moderately elevated body iron stores, below levels commonly found in genetic hemochromatosis, may be associated with adverse health outcomes.

Elevated serum ferritin levels independently predicted incident type 2 diabetes in prospective studies in apparently healthy men and women [1,2]. In cross-sectional studies, elevated ferritin levels have been associated with hypertension [3], dyslipidemia [4,5], elevated fasting insulin and blood glucose [6], and central adiposity [7]. The association between elevated iron stores and the metabolic syndrome, however, has been less well explored [8]. Although the mechanisms for the potential effect of iron on the risk of metabolic syndrome are unclear, it has been hypothesized that elevated iron stores may interfere with hepatic insulin extraction leading to peripheral hyperinsulinemia [9,10]. Others have suggested that iron may catalyze the formation of hydroxyl radicals, which contribute to the development of insulin resistance [11]. We hypothesized that the metabolic syndrome would be more common in those with moderately elevated serum ferritin levels.

Ayman et al. [4] and Ciavattini et al. [5] have highlighted vitamin D deficiency as a major risk factor in the development of uterine fibroids, also advocated that vitamin D supplementation could improve the prognosis of patient with fibroid uterus. Supplementing patients with 25-OH-D3 would restore the normal vitamin D serum level in women with small burden fibroid. Observations also suggested vitamin D supplementation seemed to reduce severity of fibroid uterus in view of intervention.

Though factors like race, ethnicity, seasonal variation, exposure to sunlight and nutritional status play a major role in regulating vitamin D levels, the cause of hypovitaminosis D in fibroid is still a topic of active research.

Recently the co-existence of Anemia and hypovitaminosis D has emerged as a new causal association in fibroid uterus patients. Yoon et al. [8] stated that vitamin D was positively associated with serum ferritin levels in women without metabolic syndrome but not in women with metabolic syndrome.

Malczewska et al. [9] have highlighted the fact that vitamin D influences iron metabolism and erythropoiesis whereas iron is essential for vitamin D synthesis as well.

Jung et al. [10] reported that Ferritin level was positively associated with serum vitamin D.

Rationale for the Research Project

1. Results obtained from this study will reveal association between the serum levels of ferritin and vitamin D in anemic and non-anemic uterine fibroid women.

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2. Susceptibility of asymptomatic (non-anemic) uterine fibroids to advance into symptomatic (anemic) stage can be known and prior precautions and medications can be taken by regular evaluation of vitamin D and ferritin levels in serum.

3. If a significant association is found out between serum ferritin and vitamin D levels in uterine fibroid patients, it would add on to our existing knowledge regarding the treatment of fibroid uterus in women and may further warrant clinical trials.

Aim and Objectives

Aim

To evaluate the effect of iron deficiency and vitamin D deficiency in a fibroid uterus patient.

Objectives

1. To estimate the serum ferritin, vitamin D and Hb levels in fibroid uterus cases with and without anemia.
2. To determine the association between ferritin and serum vitamin D levels in anemic and non-anemic fibroid uterus women.

Materials and Method

Study design: Prospective observational study.

Study period: One year.

Inclusion criteria:

1. Clinically diagnosed premenopausal women with uterine fibroid within the age group of 25 to 45 years, irrespective of their parity, attending the OPD of Obstetrics and Gynecology Department.
2. Patient with uterine fibroid of size 2 cm to 7 cm.

Exclusion criteria:

1. Postmenopausal women.
2. Women with inflammatory disorders, acute infections.
3. Insufficient exposure to sunlight and liver diseases.

Methodology

All these participants will be evaluated on the basis of a questionnaire prepared pertaining to the study i.e. parity, age at menarche, last menstrual period, breast feeding, type of delivery, history of intake of oral contraceptive pills, hormone replacement therapy, miscarriage, duration of exposure to sunlight (<1 h/day, 1 h/day, >1 h/day), race, ethnicity, history of chronic diseases like diabetes, hypertension, renal disorders, inflammatory conditions, autoimmune disorders, history of recent blood transfusion, history of intake of multivitamin and iron supplements and the type of nutrition. The blood pressure will be recorded. Height and weight will be measured to calculate body mass index. After obtaining informed written consent, 3 ml of blood sample will be collected from all participants and will be processed to separate out serum. The serum will be stored at -20°C until it is used for biochemical evaluation. Vitamin D status will be analyzed by estimating 25(OH) vitamin D levels (circulating active metabolite) in the serum by Enzyme Linked Immunosorbent Assay (ELISA) method. Peripheral blood smear, Complete Blood Count (CBC) and Hemoglobin concentration will be measured by fully automated analyzer. The serum ferritin levels will be estimated by Chemiluminescence Immunoassay by using system compatible reagents. The clinical findings as well as biochemical reports will be recorded in the case study form of individual patient.

Data obtained from questionnaire as well as biochemical evaluation will be analyzed and the patients will be divided into 2 group's i.e.

Group –A: Fibroid with anemia (treated as cases).

Group –B: Fibroid without anemia (treated as diseased control group).

Subjects in the anemic group (Group-A) will be evaluated as iron deficiency anemia.

(Hb<11 g/dl, ferritin <12 ng/ml) and iron deficiency state (Hb>11 g/dl and ferritin <12 ng/ml).

Subjects in the non-anemic group (Group-B) are those with Hb>11 g/dl and ferritin >12 ng/ml.

Study participants of both the groups will be evaluated as

Vitamin D deficiency: 25(OH)D <20 ng/ml

Vitamin D insufficiency: 25(OH)D of 20 ng/ml to 30 ng/ml

Vitamin D sufficiency: 25(OH)D >30 ng/ml.

The data will be analyzed statistically using SPSS software. Multivariate logistic regression analysis will be done. Odds ratio will be found to see the strength of association between the variables and uterine fibroids.

Sample size

We planned to enroll 150 patients for this study.

Statistical analysis

Statistical analysis will be performed using appropriate statistical tests like Chi square test, Fischer's test or Mann-Whitney test etc. Unpaired student's t-test will be used to determine the significance of the infertility patients. Statistical comparisons will be undertaken only between those patients who received treatment in accordance with the random allocation. Intent to treat analysis will be done. During the study period, the treatment of the patient shall continue as usual and no interference shall be made at any point in the treatment process. Further, the research team will be separate from the clinical care team of the patient.

The data will be analyzed statistically using SPSS software. Multivariate logistic regression analysis will be done. Odds ratio will be found to see the strength of association between the variables and uterine fibroids.

References

1. Juvvadi S, Verabelli M. Prevalence of fibroids: A study in semi urban area in Telangana India. *Int J Reprod Contracept Obstet Gynecol.* 2017;6(12):5247-50.
2. Geum SS, Si Hyn C, Yong MK, Chi- Heum C, Mee-Ran K, Sa Ra L. Current medical treatment of uterine fibroids. *Obstet Gynaecol Sci.* 2018;61(2):192-201.
3. Alistair RWW. Uterine fibroids- what's new? Version -1 F1000 Res. 2017;6:2109-2115.
4. Ayman AH, Marwa B. Can vitamin D reduce the risk of Uterine Fibroids? *Women Health (Lond)* 2014;10(4):353-8.
5. Andrea C, Giovanni C, Matteo S, Arianna V, Jacopo S, Alessandra T, et al. Hypovitaminosis D and small burden uterine fibroids: Opportunity for vitamin D supplementation, *Medicine.* 2016;95(52):e5698-704.
6. Mansour B, Sajadeh S, Ali B, Behzad H. Ability of serum ferritin to

- diagnose iron deficiency anemia in an elderly cohort. *Rev Bras Hematol Hemoter.* 2017;39(3):223-8.
7. Hyun JJ, Jun HL, Moon KK. The prevalence of vitamin D deficiency in iron deficient and normal children under the age of 24 months. *Blood Res.* 2013;48(1):40-5.
 8. Hyun Y, Nan YB, Mi YG. The association between serum ferritin and 25(OH) vitamin D and metabolic syndrome in Korean women. *J Clin Biochem Nutr.* 2017;61(1):60-66.
 9. Malczewska LJ, Sitkowski D, Surała O, Orysiak J, Szczepańska B, Witek K. The association between iron and vitamin D status in female elite athletes. *Nutrients.* 2018;10(2):E167-80.
 10. Jung WY, Sung WK, Eun GY, Moon KK. Prevalence and risk factors for vitamin D deficiency in children with iron deficiency anemia. *Korean J Pediatr.* 2012;55(6):206-11.
 11. Shweta G, Kiran P, Mamta C. Comparative study of serum ferritin and vitamin D in thalassemia patients with healthy controls. *Int J Res Med Sci.* 2018;6(2):693-5.