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A STUDY ON THE LEVEL OF SERUM FERRITIN IN WOMEN OF CHILDBEARING AGE IN EL-BEYDA CITY

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Abstract:-

Ferritin, a major iron storage protein, is essential to iron homeostasis and is involved in a wide range of physiologic and pathologic processes, and can hold up to 4 000 atoms of iron. The aim of our study was to determine the levels of Ferritin among different age groups in El-Beyda city in women of childbearing age. This study included 217 women in childbearing age (18- 45 years) who were visiting women clinic and in a period of 24 months from the first of January 2016 to December 2017in El-Beyda city. Reliable serum ferritin level was measured by using an enzyme immunoassay ELISA method. This study showed that there is a close relationship between age and level of serum ferritin, where we found that the age groups 25-31 and 32-38 is the lowest in the level of serum ferritin.

Keywords:-*Ferritin, Iron deficiency anemia, age group, female, El-Beyda, Libya.*

INTRODUCTION

Ferritin, a major iron storage protein, is essential to iron homeostasis and is involved in a wide range of physiologic and pathologic processes. The iron storage protein ferritin are consists of a protein shell with a molecular mass of about 500 kDa composed of 24 subunits. The protein shell encloses a core of ferric-hydroxy-phosphate which can hold up to 4 000 atoms of iron [1].A ferritin subunit has five helices and a long inter-helical loop. The loop L and the N-terminal residues are on the outside of the assembled molecule of 24 subunits. The C-terminal residues are within the shell. H and L chains adopt the same conformation within the molecule [2].normal range for serum ferritin is 10-200ng/ml in women, Mean values are lower in women before the menopause than in men, reflecting women's lower iron stores caused by the losses during menstruation and childbirth. The changes in serum ferritin concentration during development from birth to old age reflect changes in the amounts of iron stored in tissues [3].Iron deficiency anaemia is a condition which is extremely common in both developed and undeveloped countries [4]. It has been estimated that 20% of the world's population is iron deficient. Iron deficiency anemia is the most common type of anemia. It occurs at all ages, but is especially common in women of child bearing age, in whom it is an important cause of chronic fatigue and ill health [5]. Serum ferritin, which indirectly reflects total body iron stores, is routinely ordered in the evaluation of anaemia. Low serum ferritin is highly specific for iron deficiency anaemia. Iron deficiency is one of the most prevalent disorders known, with 30% of the world wide population affected [4]. A systematic overview of the diagnostic values used in the evaluation of iron deficiency anaemia showed that serum ferritin was by far the most powerful test for the diagnosis of iron deficiency, outperforming red cell protoporphyrin, transferrin saturation, mean cell volume, or red cell distribution [6]. Nearly negligible amounts of iron are excreted in sweat and urine and Serum ferritin concentration decreases with blood donation [7]. During the reproductive life of the female, menstruation, pregnancy, parturition and lactation significantly increase the physiological requirements of iron [8].With each menstrual cycle, women lose approximately 20- 40 mg of iron. After the menopause the ferritin concentration increases but remains lower than in men [9].Those with a higher than average risk for iron deficiency anemia (IDA) include pregnant women, both young children and adolescents, and women of reproductive age [10]. The World Health Organization (WHO) estimates that around 42.0% of pregnant women and 30.2% of women of childbearing age are anemic. This condition is related to the risk of premature birth, poorer Apgar scores, and low birth weight, low concentrations of ferritin and development of childhood iron deficiency anemia [11]. This study was an effort toevaluate serum ferritin as a marker iron store in women of childbearing age in El-Beyda city.

MATERIALS AND METHODS

A study of the level of serum ferritin in women of childbearing age with level of ferritin was undertaken on217 subjects were diagnosed with symptoms that related to deficiency of ferritin. All subjects between the age group of 18 to 45 years; during their visit to the clinical center in El–Beyda city in Northeast of Libya from January 2016 to December 2017. Five ml of venous blood sample were collected bystandard method of blood collection in serum gel tube from each participant, serum was separated immediately by a fine centrifugation machine and sent for ferritin test. Serum was measured using Immunoassay for the in vitro quantitative determination of ferritin in human serum. The electrochemiluminescence immunoassay "ECLIA" is intended for use on Elecsys and cobas e immunoassay analyzers.This kit was supplied by Roche Diagnostics GmbH (Mannheim, Germany). The Elecsys ferritin assay employed a sandwich principle with two steps, 1st incubation: 10 μL of sample, a biotinylated monoclonal ferritin-specific antibody, and a monoclonal ferritin-specific antibody labeled with a ruthenium complexa) form a sandwich complex. Then 2nd incubation: After addition of streptavidin-coated microparticles, the complex becomes bound to the solid phase via interaction of biotin and Streptavidin. Thereaction mixture is aspirated into the measuring cell where the microparticles are magnetically captured onto the surface of the electrode. Results are determined via a calibration curve which is instrument specifically generated by 2-point calibration and a master curve provided via the reagent barcode. The analyzer automatically calculates the analytic concentration of each sample (either in μg/L or ng/mL). Measuring range 0.500 (ng/mL) to 2000 (ng/mL).

RESULTS AND DISCUSSION

A total of 217 female were included in the study in El-Beyda city.Age group ranges between 18-45 years. The samples analyzed to investigate iron deficiency as assessed by biochemical and hematological parameters and determined among pregnant women. The most attending group in this study is adult female with age group 25-31 years old (29%), and small attendance was recorded among 18-24 (24%) and 39-45 (21%) years. while, in the 32-38 years of age group were (26%) table 1 Prevalence of Cases was increased among a years of study from 69 in 2016 to 148 in 2017 Of the female who tested the level of ferritin in the serum. During our study, the number of females who suffer from a decrease in the level of ferritin in the blood in the age group 25-31 is 16 in 2016, while the number of females in the age group 32-38 is 26 in 2017.While the number of female has a low in the level of the ferritin in the age group 39-45 is 10 during the year 2016, while the number is 16 in 2017 was lower than the other age groups. It was observed that the percentage of females with a high level of serum ferritin was very small (2%) compared to the total number of females during the study, May be due to the analysis after taking drugs to raise the level of iron in the blood or because of some dietary habits table2.There is a close relationship between age and serum ferritin. Where we found that the rate of ferritin is within the normal range in women as we approached menopause. While the rate is low in the younger age and is mostly due to pregnancy and childbirth or because of the menstrual cycle. Different studies also found a higher average risk for iron deficiency anemia include women of childbearing age [10]. In table3 notable that the number of women with moderate anemia (58) is more than the number of women who have severe anemia (47). When comparing the number of women with moderate anemia during the two years it was noted that the number increased in 2017 (34) compared with the number of women in 2016 (24), possibly due to the poor economic conditions experienced by the country. Similarly, for women with severe anemia,

the number was (33) in 2017 While number was (14) in 2016.When comparing age groups, we found that women who had moderate anemia in the age group (25-31) were more numerous (21) during the two years compared to other age groups. Conversely, women with severe anemia in the age group (18-24) were more numerous (14) during the two years compared to other age groups. [12] Anemia in pregnancy is common, this is related to increased demands of iron during pregnancy, pre-existing negative iron balance due to frequent pregnancies, menstrual blood losses, dietary inadequacies, helminthiasis and amoebiasis are important contributory factors. [8] concluded that under taken among females of reproductive age group to detect prevalence of anaemia brings out the fact, that iron deficiency anaemia among this group is still prevalent and dietary intakes needs to be further augmented to address the problem. Health education, improved dietary intake, supplementation at adolescent age, particularly among female would help in addressing the important preventable disorder, which has a bearing on mother and child health.

Table1: Number of samples measuring the level of ferritin in the serum amongst different age groups in women of childbearing age During 2 years

Years Age	2016	2017	Total	%
18-24	19	34	53	**24%**
25-31	24	38	62	**29%**
32-38	10	46	56	**26%**
39-45	16	30	46	**21%**

Table2: Distribution of age groups with normal, low and high serum ferritin levels

Years Age	2016			2017			Total normal%	Total low%	Total high%
	Normal	Low	High	Normal	Low	High			
18-24	8	11	0	14	19	1	10%	14%	0.4%
25-31	6	16	2	17	21	0	11%	17%	0.8%
32-38	3	7	0	19	26	1	10%	15%	0.4%
39-45	5	10	1	14	16	0	9%	12%	0.4%
Total	22	44	3	64	82	2	40%	58%	2%

Table3: Age Distribution in Moderate and Severe Anemia

Age in years	Moderate Anemia 6-12 ng/ml		Total	Severe Anemia <6ng/ml		Total
	2016	2017		2016	2017	
18-24	7	6	13	2	12	14
25-31	11	10	21	4	6	10
32-38	1	13	14	4	9	13
39-45	5	5	10	4	6	10
Total	24	34	58	14	33	47

Conclusion

Therefore, it is recommended to give pregnant women the element of iron during pregnancy either in the form of tablets of oral or intravenous injection if the shortage is large until the loss is compensated. This also applies to single women of childbearing age

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