



Original Research Article

Association Between Iron Deficiency Anemia and Chronic Telogen Effluvium

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Abstract: **Objective:** To determine the association between iron deficiency anemia and chronic telogen effluvium among patients visiting to PNS SHIFA hospital Karachi **Study Design:** Case Control Study **Setting:** This study was conducted at Department of Dermatology, PNS Shifa Hospital, Karachi, Pakistan **Duration:** November 16, 2019 to May 15, 2020 **Materials and Methods:** All patients who fulfilled the inclusion criteria and visited to PNS Shifa Hospital, Karachi were included in the study. Informed consent was taken after explaining the procedure, risks and benefits of the study. Participants were classified in terms of case and control. Cases were identified thorough clinical examination; hair pull test to assess telogen effluvium. Control group was the healthy participant without hair loss and who attended hospital for different reason. Both cases and control were evaluated to confirm the presence of iron deficiency anemia. **Results:** In this study, mean age of the patients was 35.7 ± 9.3 years. Most of the patients were male in both groups. Both groups were similar in terms of baseline data, as p-value was > 0.05 . Rate of iron deficiency was 0.37 times more likely in cases as compare to control with highly significant P value i.e. ($P=0.006$). **Conclusion:** It is to be concluded that significant association was noted between iron deficiency anemia and chronic telogen effluvium. Further research is required to better understand the factors associated with chronic telogen effluvium.

Keywords: Chronic Telogen Effluvium, Ferritin, Alopecia, Hair Loss Iron Deficiency Anemia.

INTRODUCTION

Hair holds enormous importance in social interactions and boosting one's confidence. Therefore hair loss is understandably a very important issue encountered in dermatology clinics. Alopecia is a common concern among men and women and is often a cause of distress.¹ Among the myriad factors contributing to occurrence of alopecia, Telogen Effluvium (TE) has emerged as a common cause. It is a non-scarring form of alopecia, characterized by simultaneous diffuse shedding of a considerable amount of hair in telogen phase.² Alterations in the hair follicle cycle, particularly prolonged or reduced anagen and telogen phases as well as synchronous hair follicle cycling resulting in fallout of hair shafts in telogen, can be attributed to telogen effluvium.³ It

occurs as a response to metabolic or physiological stresses. No racial inclination for this condition has been observed. However, the rate of occurrence among females is greater than males.⁴

Telogen Effluvium (ATE) and Chronic Telogen Effluvium (CTE) are the two subtypes of TE that are distinguished by the duration of the illness. Where majority of cases of ATE resolve within a span of 6 months, in some cases the hair loss continues longer beyond this duration. Under these circumstances the condition is defined as CTE.⁵ CTE typically exhibits an intermittent pattern, characterized by alternative episodes of spontaneous remissions and relapses.⁶ CTE is difficult to manage since the cause is often in apparent. The key lies in evaluating the commonly

implicated causes such as iron deficiency, thyroid disorders, hypoproteinemia, and metabolic disturbances. A Low Iron store which is indicated by low serum ferritin level is one of the causes for chronic telogen effluvium. It is caused by any disruption of hair growth cycle resulting in increased synchronized telogen hair shedding.⁷

Profound iron deficiency anemia is known to cause diffuse telogen hair loss however the association of mild anemia or iron deficiency without anemia with chronic diffuse hair loss is more complex.¹ Iron deficiency without anemia was first suggested as an etiological factor for diffuse hair loss in women in 1963.⁸ Many studies have tried to explore this association since then with varying results.⁷⁻⁹

Several studies have evaluated the relationship between iron deficiency anemia and hair loss (chronic telogen effluvium). Almost all of them focused exclusively on women, So, this the need of hour to investigate the status of it in either gender.^{9,10}

Screening all patients with CTE for iron deficiency anemia, even if there is no clinically detectable pallor or reduced hemoglobin will aid us in identifying a possible cause for CTE and help in its management. Through this study, we aim to explore the association between iron deficiency anemia and chronic telogen effluvium.

METHODOLOGY:

This case control study was carried out in the department of at Department of Dermatology, PNS Shifa Hospital, Karachi, Pakistan from November 16, 2019 to May 15, 2020. After taking written informed consent, a total of 78 patients of either gender had age between 18-50 years; 35 were patients with diffuse hair fall (Telogen effluvium)-cases and 35 were patients without diffuse hair fall (control) were included via non-probability sampling technique. Patients with identifiable causes of hair loss (assess from medical record), patient had long standing chronic disease like ischaemic heart diseases, diabetes

mellitus, chronic renal disease, chronic liver disease, diagnosed case of vitamin D deficiency, hypothyroidism or hyperthyroidism. [All the above-mentioned diseases were assessed through detailed history, clinical examination followed by seeing medical record of treatment which patients had taken, and appropriate investigations if required was done), history of accidental trauma, major surgery during previous 3 months, postpartum patients, patients on drugs that cause Telogen Effluvium e.g. antithyroid agents, anticonvulsants, anticoagulants, betablockers, angiotensin converting enzyme inhibitors, and lithium were excluded. Chronic Telogen Effluvium was assessed with hair pull test. It was labeled positive if; >6 hairs obtained when strand of hair approximately 40-60 hairs was grasped between the thumb and the index and middle fingers and gently pulled. A negative test (≤6 hairs obtained) indicated normal shedding. Both cases and control were evaluated to confirm the presence of iron deficiency anemia. 1 mL venous blood was withdrawn from antecubital vein under complete aseptic condition using disposable plastic syringes, transferred into polypropylene tube and sent to laboratory for the assessment of iron deficiency anemia. Patient was labelled as positive for iron deficiency anemia if Hemoglobin < 12 g/dl (males) & < 11g/dl (females) and serum ferritin level < 20 ug/l.

All the gathered data was analyzed using Statistical Package for Social Sciences (SPSS) version 22.0. Mean and standard deviation were calculated for continuous variables i.e. age (years) and duration of symptoms. Frequency and percentage were calculated for gender, residential status and iron deficiency anemia. Association between iron deficiency anemia and chronic telogen effluvium was assessed by applying Chi square test or Fisher Exact test as appropriate with odd ratio >1 was considered as significant. Confounders i.e. age groups, residence, gender and duration of symptoms were controlled through stratification. Post stratification, Chi square test or Fisher Exact test as appropriate was applied and odd ratio was also calculated. The pvalue ≤ 0.05 was considered as significant.

RESULTS:

In this case control study, the total of 156 patients 78 in each group as case and control were included to assess the association between iron deficiency anemia and chronic telogen effluvium. Mean age in case was 36.3±7.6 with C.I (34.58---38.01) and control group was 35.1±7.3, mean duration of symptoms in case and control group was 7.3±3.8 and 6.8±3.5 months, respectively. In group wise distribution of gender, 45 (57.7%) male and 33 (42.3%) females were enrolled in case group while 48 (61.5%) male and 30 (38.5%) females were included in control group. Furthermore, most of the patients in both groups were Urban resided, as shown in Table#1.

Rate of iron deficiency was 0.37 times more likely in cases as compare to control with highly significant P value i.e. (P=0.006), as shown in Table#2.

Further, Iron deficiency anemia was assessed with respect to age groups, gender, duration of symptoms and residential status, significant association of outcome variable was found with age group (> 30 years), male gender,

Urban resided patients and duration of symptoms 6-9 months, as shown in Table#3.

Table#1: Baseline Data of the Patients

Baseline Data	Cases (n=78)	Control (n=78)	P-value
Age (Years)	36.3 ± 7.6	35.1 ± 7.3	0.316
Duration of symptoms (months)	7.3 ± 3.8	6.8 ± 3.5	0.394
Gender			
• Male	45 (57.7%)	48 (61.5%)	0.624
• Female	33 (42.3%)	30 (38.5%)	
Residential Status:			
1. Urban	48 (61.5%)	50 (64.1%)	0.740
2. Rural	30 (38.5%)	28 (35.9%)	

Table#2: Association of Iron Deficiency Anemia and Chronic Telogen Effluvium

Group	Iron Deficiency Anemia		Odd Ratio	P-value
	Yes	No		
Cases	32 (41.0%)	46 (59.0%)	0.371	0.006
Control	16 (20.5%)	62 (79.5%)		

Table#3: Comparison of Iron Deficiency Anemia with respect to Baseline Data

Baseline Data	Groups	Iron Deficiency Anemia		Odd Ratio	P-Value
		Yes	No		
AGE GROUPS					
18 – 30 Years	Cases	12 (37.5%)	20 (62.5%)	0.476	0.168
	Control	08 (22.2%)	28 (77.8%)		
>30 Years	Cases	20 (43.5%)	26 (56.5%)	0.306	0.014
	Control	08 (19%)	34 (81%)		
GENDER					
Male	Cases	21 (46.7%)	24 (53.3%)	0.340	0.016
	Control	11 (22.9%)	37 (77.1%)		
Female	Cases	11 (33.3%)	22 (66.7%)	0.400	0.109
	Control	05 (16.7%)	28 (83.3%)		
RESIDENTIAL STATUS					
Urban	Cases	26 (54.2%)	22 (45.8%)	0.297	0.004
	Control	13 (26%)	37 (74%)		
Rural	Cases	6 (20%)	24 (80%)	0.480	0.272
	Control	3 (10.7%)	25 (89.3%)		
DURATION OF SYMPTOMS					
6-9	Cases	25 (41%)	36 (59%)	0.346	0.009
	Control	12 (19.4%)	50 (80.6%)		
>9	Cases	7 (41.2%)	10 (58.8%)	0.476	0.270
	Control	4 (25%)	12 (75%)		

DISCUSSION:

Diffuse hair shedding is a common issue faced by both men and women but identification of its exact cause and treatment is still a challenge. CTE is diagnosed when there is diffuse hair shedding without any perceptible cause lasting beyond 6 months.¹¹ The association between profound iron deficiency and hair loss is proven; however, various studies have pointed out that iron deficiency even in the absence of clinical anemia due to lower iron stores as measured by serum ferritin can lead to CTE.^{12,13} This study was designed to association between iron deficiency anemia and chronic telogen effluvium and found that patients

with CTE, the prevalence of iron deficiency anemia was 0.37 times higher than that in the general population with significant association, as p-value was > 0.05. Sarkar P and et al; reported iron deficiency anemia (37.5% v/s 17.5%) in cases versus control.¹⁴

A systematic review and meta-analysis of 20 studies found a significant association between iron deficiency and telogen effluvium, a common hair loss condition. The study revealed that patients with both acute and chronic telogen effluvium had lower serum iron and ferritin levels compared to the general population. Furthermore, there was no significant

difference in these levels between patients with acute and chronic telogen effluvium. The prevalence of ferritin deficiency, a marker of iron deficiency, was higher in patients with chronic telogen effluvium when using ferritin levels of 20 ng/dl and 30 ng/dl as the threshold for diagnosing iron deficiency. This suggests that iron deficiency plays a role in telogen effluvium.¹⁵

In this study, Serum ferritin levels were used to assess the iron stored in whole and it has been found from the studies that Serum ferritin levels are the most specific and effective measure of whole-body iron stores and are commonly used.¹⁶ The prevalence of reduced serum ferritin levels (<30-40 µg/L) appears to be higher in women with telogen effluvium than in the general population.¹⁷ Serum ferritin levels below 30 µg/L were found in 40–50% of women in Cambodia,¹⁸ Portugal,¹⁹ Norway, and Denmark.²⁰ Although values < 12-15 µg/L can confirm iron deficiency, serum ferritin level < 30 µg/L is more widely used due to its higher sensitivity (92%) and similar specificity (98%).^{21,22} This study shows that if serum ferritin ≤ 15 µg/L is used as the cut-off value for the diagnosis of iron deficiency in patients with chronic telogen effluvium, the prevalence of iron deficiency in the telogen effluvium group and the control group was not statistically different. If serum ferritin level was 20 µg/L or 30 µg/L for the diagnosis of iron deficiency, the prevalence of iron deficiency was statistically different compared to that in the non-alopecia population.

Limitation of the study: Small sample size, use of non-probability sampling technique and single centered study may not allow to generalize the results.

CONCLUSION:

It is to be concluded that significant association was noted between iron deficiency anemia and chronic telogen effluvium. Further research is required to better understand the factors associated with chronic telogen effluvium.

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