# Frequency of Iron Deficiency Anemia in Young Females with Migraine

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## ABSTRACT

***Objective:*** To determine the frequency of iron deficiency anaemia among young female migraine patients and look for the factors related to the presence of anaemia.

***Study Design:*** Cross-sectional study.

***Place and Duration of Study***: Department of Medicine, Pak Emirates Military Hospital, Rawalpindi Pakistan, from Sep 2018 to Feb 2019.

***Methodology*:** One hundred and thirty young female patients with migraine presenting at our hospital were enrolled in this study. Diagnosis of Migraine was established by the consultant neuro physician based on the International Classification of Headache Disorders diagnostic criteria for migraine. Iron deficiency anaemia was diagnosed based on haemoglobin and ferritin levels. Various social and demographic factors were studied in this study, along with iron deficiency anaemia among the young females suffering from migraine.

***Results:*** Out of 130 young female patients with migraine, 69 (53.1%) showed the presence of iron deficiency anaemia, while 61 (46.9%) had no anaemia. Upon statistical analysis, it was revealed that menstrual abnormalities had a statistically significant association with the presence of iron deficiency anaemia among the young female patients with migraine.

***Conclusion*:** Iron deficiency anaemia was the common finding among young female patients with migraine in Pakistan. Menstrual abnormalities among these young female migraine patients were related to the presence of iron deficiency anaemia. A detailed history of menstrual abnormalities and anaemia screening among migraine patients may be helpful for early diagnosis and intervention.

**Keywords:** Iron-deficiency anaemia, Migraine, Young females

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## INTRODUCTION

Headaches are one of the most common symptoms that health physicians encounter in their daily practice.[1] Primary headache, including migraine, has been observed to be the most common presenting problem at out patient clinics all around the world.[1,2] A lot of other medical problems have also been associated with migraine, which may include epilepsy, menstrual, IBS and haematological problems.[3,4]

Iron deficiency anaemia is a common problem, especially among females in developing countries.[5,7] There may be gynaecological or other medical illnesses that can affect the individual's blood indices. Hepatic problems, endocrine diseases, kidney diseases and migraine are a few of the illnesses associated with iron-deficiency anaemia among various world populations.[7,8]

The presence of iron deficiency anaemia among patients suffering from migraine and other headaches has been explored in detail in various parts of the world. Keivani *et al*, concluded that iron deficiency anaemia was more prevalent in young females with migraine than in the controls.[3] Majority of the patients with iron deficiency anaemia had migraine in a study done in Turkey.[9,10]

The presence of iron deficiency anaemia among the patients suffering from migraine may be affected by many parameters that demand a holistic approach from the treating clinician. Depression, anxiety, and family history of migraine or iron deficiency anaemia are some of the parameters which must be kept in mind while managing the patient of migraine suffering from anaemia as well.[9,10]

Haematological involvement among the patients suffering from primary headaches, especially migraine, has not been reported much from our part of the world. Data regarding iron deficiency anaemia among the young female sufferers of migraine has been deficient in our part of the world. We planned this study to assess the frequency of iron deficiency anaemia among young female patients with migraine and analyze the associated sociodemographic factors linked with iron deficiency anaemia among these patients.

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## METHODOLOGY

This cross-sectional study was conducted at the Department of Medicine, Pak Emirates Military Hospital Rawalpindi Paklistan between September 2018 to February 2019. The sample size was calculated using the WHO sample size calculator with using population prevalence proportion of 9%.[11] Non-probability consecutive sampling technique was used to gather the sample. The Hospital Committee granted ethical approval before the start of this study via IREB letter number A/28.

**Inclusion Criteria:** Young female patients with the migraine presenting at the hospital were included in this study.

**Exclusion Criteria:** Patients of >45 years of age, or those with a past or current history of any chronic physical or psychiatric illness or current history of substance use, patients who were pregnant or breast-feeding, had B-12 or folate deficiency, had recent surgery, had NSAIDs abuse or any autoimmune or could not read or perform the questionnaire were excluded from the study.

The screening was performed on all the young female patients with migraine diagnosed by a consultant neurologist on the International Classification of Headache Disorders diagnostic criteria for migraine.[12,13] International Classification of Headache Disorders diagnostic criteria for migraine, a comprehensive and the most widely used criteria for diagnosis of migraine, was used by the neuro physisicans in our study to diagnose the migraine.[14,15]

Iron deficiency anaemia was described as blood haemoglobin values of <12 g/dl in women with serum ferritin levels of 15 ng/mL.[16]

All the patients with migraine included in the study were provided with all study details prior to the consent. They were only included if they gave consent after the complete information. Venous blood was taken from the participants between 9 and 11 a.m. after 12 hours of fasting. Complete blood count (CBC), serum ferritin, vitamin B12, and folic acid were measured. CBC was measured using a flow cytometer and an automated analyzer. Serum ferritin was measured using a radio immunoassay method. Age, marital status, education, menstrual abnormalities, and BMI were the collected variables, as only young females were included, so ages <45 were included. WHO classification of body mass index was used to group the patients according to their weight and height ratio. Specially structured and designed proforma in corporating all the required variables were designed and used in the study.

All statistical analysis was performed using Statistics Package for Social Sciences version 23.0 (SPSS-23.0). Percentage and frequency were calculated for qualitative variables like the presence or absence of iron deficiency anaemia. Pearson chi-square was applied to ascertain the association. The *p*-value of less than or equal to 0.05 were considered significant.

## RESULTS

One hundred and forty-six female patients with migraine were reported in the department during the given study period. However, only 130 were left behind to be enrolled in the study when the inclusion /exclusion criteria were applied. The mean age of the patients was 37.5 ± 2.345 years. Out of 130, 69 (53.1%) showed the presence of iron deficiency anaemia, while 61 (46.9%) had no anaemia. The presence and absence of iron deficiency anaemia and other factors have been summarized in Table.

**Table: Characteristics of the study group and their Hemoglobin levels.**

| Socio Demographic Factors Total | No Iron Deficiency Anemia n (%) 61 (46.9) | Iron Deficiency Anemia n (%) 69 (53.1) | *p*-value |
|---|---|---|---|
| **Age** | | | |
| 30 year or less | 49 (80.3) | 55 (79.7) | 0.930 |
| 30-45 | 12 (19.7) | 14 (20.3) | |
| **Marital status** | | | |
| Married | 31 (50.8) | 36 (52.1) | 0.877 |
| Unmar/Widowed | 30 (49.2) | 33 (47.9) | |
| **Education** | | | |
| < 10 years | 21 (34.4) | 27 (39.1) | 0.579 |
| 10 years or more | 40 (65.6) | 42 (60.9) | |
| **Menstrual Abnormalities** | | | |
| No | 40 (65.6) | 22 (31.8) | <0.00 |
| Yes | 21 (34.4) | 47 (68.2) | 1 |
| **Body Mass Index** | | | |
| Normal | 46 (75.4) | 55 (79.7) | 0.557 |
| Overweight or obese | 15 (24.6) | 14 (20.3) | |

Menstrual abnormalities had a significant association with iron deficiency anaemia when chi-square was applied. Our results showed that menstrual abnormalities among these young females with migraine were strongly associated with the presence of iron deficiency anaemia. At the same time, age, education, marital status and BMI had no statistically significant association.

## DISCUSSION

It was interesting to look for the dropping of haematological indices among the patients with migraine who had a chronic neurological illness which they think is limited to the attacks of headache and is not affecting their body in any other way. Using simple laboratory investigations, approximately 53% of study participants showed the presence of iron deficiency anaemia. Western studies have similar findings in this regard.[3,10,11] Our sample population comprised of young ladies of a developing country who have many confounding variables pre-disposing them to anaemia.

A case-control study done in the recent past showed the high prevalence of iron deficiency anaemia among females suffering from menstrual migraine.[11] Systemic Manifestations of migraine are widely discussed now-adays, not related to the aura. If related, anaemia and migraine can aggravate each other, impair the individual's quality of life, and cause trouble in multiple domains.[12]

The complex and multi-dimensional mechanism by which migraine and iron deficiency anaemia may be inter-linked. The neuro-transmitter model is most often used to explain this relationship. Dopamine levels of the patient suffering from iron deficiency anaemia may be altered. Altered levels of dopamine have been mentioned as one of the causative factors of migraine and other headaches.[13,14]

Social and demographic factors linked to haematological profile among the migraine patients may be depression, anxiety, family history of migraine or iron deficiency anaemia.[10,15,16] These factors may affect the blood counts and ferritin levels either by direct genetic or physiological cause or indirectly poor nutrition or self-neglect. The bimodal relationship between anaemia and migraine is also an interesting emerging phenomenon.[17]

Physical, nutritional and physiological reasons may predispose the patient towards the development of anaemia. Migraine or its treatment can be related to these factors and precipitate iron deficiency anaemia. Usually, the clinician picks anaemia as a sign in the patient presenting with generalized or specific symptoms. Adequate physician knowledge regarding the link between migraine and anaemia may be beneficial for early diagnosis and treatment. Normal blood counts and iron indices may be necessary for overall adequate functioning of the body, as demonstrated by Lozoff *et al*, in 2011.[13] If treating physician suspects this aspect in young females and perform minor steps in the examination routine investigations. It can be beneficial from the point of view of the overall management of the patient.[17,18]

In most studies, increasing age has not been linked much with iron deficiency anaemia among female patients with migraine. Studies by Keivani *et al,* and Pamuk *et al,* had the findings where the *p*-value for age was more than 0.05, thus not demonstrating any significant relationship between anaemia and age.[3,10] Results in our study were similar, and age was not related to the presence of iron deficiency anaemia. The reason might be the narrow age range of our study population as we only included young females below the age of forty-five.

The presence of menstrual abnormalities was strongly related to iron deficiency anaemia in our chi-square and binary logistic regression study. Past studies have also supported this association. A study published in 2016 revolved around menstrual migraine, and factors linked to that came up with very interesting findings. Menstrual abnormalities include oligomenorrhea, menorrhagia, dysmenorrhea, abnormal uterine bleeding, premenstrual syndrome, premenstrual dysphoric disorder etc.[11] One reason can be blood loss due to menstrual problems among these young females could account for this association. However, these abnormalities can also bimodal relationship with iron deficiency anaemia and migraine. Sometimes, a positive feed-back cycle can also develop among these conditions, worsening with time. Therefore, timely screening and a multi-disciplinary approach involving gynaecologists and haematologists may benefit the patient.

Recent research by Shikaris *et al*, and Zou *et al*, published in 2017 and 2016, have highlighted the inverse relationship of body mass index with iron deficiency anaemia.[19,20] Our results were unable to establish any association. Less sample size and strict inclusion criteria maybe because of our findings. Studies with large sample size and a wide range of age groups may support this association.

## LIMITATIONS OF STUDY

The design of the study and its short duration may hinder us from generalizing the results. Nutritional and socio economic status sometimes have a substantial impact on the presence of anaemia. This aspect was not catered for in our study. However, many comorbid illnesses were part of the exclusion criteria, this aspect should still be controlled more strictly due to the complex aetiology of iron deficiency

anaemia and the effect of various factors and medications on blood indices. Moreover, the cross-sectional study design does not demonstrate the cause/effect relationship. Case/control or cohort studies may be planned by the researchers in the future using the present study results as a baseline.

## CONCLUSION

Iron deficiency anaemia was the common finding among young female migraine patients in Pakistan. Menstrual abnormalities among these young female migraine patients were related to the presence of iron deficiency anaemia. The detailed history of menstrual abnormalities and anaemia screening among migraine patients may be useful for early diagnosis and intervention.

**Conflict of Interest:** None.

**Author's Contribution**

SR: Crosspondence author, KHN: Supervision of manuscript, MHA:, AF: Data collectoin, FH: Data analysis, NM: Data analysis, discussion.

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