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Research Article

**FREQUENCY OF IRON DEFICIENCY ANEMIA IN CHILDREN  
WITH BREATH HOLDING SPELLS**<sup>1</sup>Muhammad Arslan Anwar, <sup>2</sup>Hafiza Hiba Anis, <sup>3</sup>Bakhtawar Asghar<sup>1</sup>Medical Officer, Regional Health Center, Faisalabad, Pakistan, Email:[arslananwar93@gmail.com](mailto:arslananwar93@gmail.com), <sup>2</sup>Women Medical Officer, Allied Hospital, Faisalabad, Pakistan,Email: [dochiba35@gmail.com](mailto:dochiba35@gmail.com), <sup>3</sup>House Officer, Allied Hospital, Faisalabad, Pakistan, Email:  
[agrometuaf@gmail.com](mailto:agrometuaf@gmail.com)**Abstract:**

**Background: Objective:** Breath-holding spells occur in childhood up to 4 years of age more common among 6 - 18 months children. Some reports suggest that these episodes can occur even later. Almost 5% of the pediatric population might demonstrate such episodes. Breath holding spells have also been associated with iron deficiency anemia.

**Study Design:** Cross sectional study

**Objective:** To determine the frequency of iron deficiency anemia in children with breath holding spells.

**Place and duration of study:** Pediatric Department, Allied Hospital Faisalabad (December 2016 to May 2017)

**Patient & Methods:** After taking approval of ethical review committee, 95 cases of age 6 to 60 months attending the pediatric outdoor with breath holding spells fulfilling the inclusion criteria were included in the study, with informed written consent from parents/guardians. Exclusion criteria were strictly followed. Patients included in the study were thoroughly evaluated by taking detailed history and examination. About 3cc blood was drawn for complete blood count and serum ferritin level and sent to the hospital laboratory. Iron deficiency anemia was assessed as per my operational definition.

**Results:** In this study, 61% (n=58) were between 6-36 months of age whereas 39%(n=37) were between 37-60 months of age, mean  $\pm$  SD was calculated as 38.74 $\pm$ 11.98 months; 59%(n=56) were male and 41%(n=39) were females, frequency of iron deficiency anemia in children with breath holding spells was recorded as 51.6%(n=49) and was absent in 48.4%(n=46).

**Conclusion:** The frequency of iron deficiency anemia is higher in children with breath holding spells and effective treatment of these children is also easily available and cheap through iron supplements, thus reducing the anxiety of the parents.

**Keywords:** Infants, Children, Breath hold spells, iron deficiency anemia, Serum ferritin

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**INTRODUCTION:**

Breath holding spells are age specific expressions of frustration and anger.[1] These attacks are very frightening for the parents or care givers.[2] They are triggered by mild trauma or emotional upset.[3] During the spell child cries excessively and at the end he becomes apenic for several seconds and either becomes blue or pale or both, even he can go into tonic or clonic movements.[4] The more common cyanotic form is considered to be due to inhibition of respiratory effort due to autonomic instability, or intra-pulmonary shunting. Pallid spells are caused by an exaggerated vagal response to noxious stimuli leading to bradycardia or a brief asystole.[5] Although breath holding spells are mostly self-limited and spontaneous resolution occur without sequelae, they may be an initial symptom of prolonged QT syndrome and paroxysmal cardiac rhythm abnormalities.[6] One other rare complication is prolonged syncope or even status epilepticus.[7]

The pathophysiology of breath holding spells is multifactorial. Among various causes iron deficiency anemia is the most important one.[3] It causes spells by decreasing oxygenation of brain.[6] A delay in brain stem myelination measured through brain stem evoked potentials is also a contributing factor.[8] Other risk factors include zinc deficiency, positive family history, birth sequence, parents education status and father's age.[9]

According to WHO statistics 43% children worldwide and 29% in Pakistan are iron deficient. Iron deficiency is the commonest one among three micronutrient deficiencies (Iron, Vit-A and iodine) in the developing world.[10] So Treatment with iron is recommended in children with iron deficiency anemia and a trial can be considered even without its presence.<sup>11</sup> Besides iron, refractory cases of breath holding spells have been treated successfully with piracetam, and cardiac pacemaker implantation[7,12] Studies from all over the world showed that breath holding spells are frequently associated with iron deficiency anemia.[1,3,13] One such study conducted in Rawalpindi showed association of breath holding spells with iron deficiency anemia as 56.67%.[14] And treatment with iron supplements greatly reduced its frequency.[13]

There is no study conducted so far in our local hospital, as per my knowledge, so rationale of my study is to find frequency of iron deficiency anemia in children with breath holding spells who present to our local hospital and treat these children with easily available and cheap iron supplements so that parents anxiety could be reduced and there will be decreased

number of unnecessary investigations and less no of visits to the hospital.

**PATIENTS & METHOD:**

After taking approval of ethical review committee, 95 children of age 6 to 60 months attending the pediatric outdoor with breath holding spells fulfilling the inclusion criteria were included in the study through non-probability purposive sampling, with informed written consent from parents/guardians. Patients were thoroughly evaluated by taking detailed history and examination. About 3cc blood was drawn for complete blood count and serum ferritin level and sent to the hospital laboratory. Iron deficiency anemia was assessed as per my operational definition. Sample size was calculated by 95% confidence level, 10% absolute precision and taking expected percentage of iron deficiency anemia in children with breath holding spells as 56.6%. Patients having congenital heart disease diagnosed on echocardiography, febrile or non-febrile seizures, severe malnutrition and those on anticonvulsant therapy or having mental disability were excluded. Age, gender, height, weight, relevant history and physical exam, all the findings were documented. Outcome of the study included the presence or absence of iron deficiency anemia in patients with breath holding spells. Data was entered and analyzed through SPSS-20. Mean and standard deviation was calculated for all quantitative variables like age, hemoglobin level, and serum ferritin level. Frequency and percentage was calculated for all qualitative variables like gender and iron deficiency anemia. Effect modifier like age and gender was controlled by stratification. Post stratification chi square test was applied. P value <0.05 was taken as significant.

**RESULTS:**

A total of 95 cases fulfilling the inclusion/exclusion criteria were enrolled to determine the frequency of iron deficiency anemia in children with breath holding spells.

Age distribution of the patients was done, it shows that 61.05% (n=58) were between 6-36 months of age whereas 38.95% (n=37) were between 37-60 months of age, mean±sd was calculated as 38.74±11.98 months. (Table No. 1)

Gender distribution of the patients was done, it shows that 58.95% (n=56) were male and 41.05% (n=39) were females. (Table No. 2)

Mean Hb level was recorded as 9.74±4.21(g/dl). (Table No. 3)

Mean ferritin level was recorded as 10.47±5.87(mg/l). (Table No. 4)

Frequency of iron deficiency anemia in children with breath holding spells was recorded as 51.58%(n=49) whereas this morbidity was absent in 48.42%(n=46). (Table No. 5)

Stratification for frequency of iron deficiency anemia in children with breath holding spells with regards to age shows that out of 49 cases of iron deficiency anemia, 30 were between 6-36 months of age

whereas 19 were between 37-60 months of age, p value was 1.06. (Table No. 6)

Stratification for frequency of iron deficiency anemia in children with breath holding spells with regards to gender shows that out of 49 cases of iron deficiency anemia, 25 were male whereas 24 were females, p value was 1.06. (Table No. 7)

**TABLE No. 1: AGE DISTRIBUTION (n=95)**

Age(in months)	No. of patients	%
6-36	58	61.05
37-60	37	38.95
Total	95	100
Mean+SD	38.74+11.98	

**TABLE No. 2: GENDER DISTRIBUTION (n=95)**

Gender	No. of patients	%
Male	56	58.95
Female	39	41.05
Total	95	100

**TABLE No. 3: MEAN Hb LEVEL OF THE PATIENTS (n=95)**

Hb level(g/dl)	Mean	Sd
	9.74	4.21

**TABLE No. 4: MEAN SERUM FERRITIN LEVEL OF THE PATIENTS (n=95)**

Serum ferritin levels(mg/l)	Mean	Sd
	10.47	5.87

**TABLE No. 5: FREQUENCY OF IRON DEFICIENCY ANEMIA IN CHILDREN WITH BREATH HOLDING SPELLS (n=95)**

Iron deficiency anemia	No. of patients	%
Yes	49	51.58
No	46	48.42
Total	95	100

**TABLE No. 6: STRATIFICATION FOR FREQUENCY OF IRON DEFICIENCY ANEMIA IN CHILDREN WITH BREATH HOLDING SPELLS WITH REGARDS TO AGE**

Age months)	(in	Iron Deficiency Anemia		P value
		Yes	No	
6-36		30	28	1.06
37-60		19	18	

**TABLE No. 7: STRATIFICATION FOR FREQUENCY OF IRON DEFICIENCY ANEMIA IN CHILDREN WITH BREATH HOLDING SPELLS WITH REGARDS TO GENDER**

Gender	Iron Deficiency Anemia		P value
	Yes	No	
Male	25	31	0.10
Female	24	15	

**DISCUSSION:**

Breath-holding spells are a well described phenomenon known to occur mostly among children 6 to 18 months of age. Some reports suggest that these episodes can occur even later in childhood, up to 4 years of age. Almost 5% of the pediatric population might demonstrate such episodes. Breath-holding spells are extremely frightening to parents. Episodes are described as infants crying, for up to a minute, and while crying excessively they will hold their breath to a point at which they might lose consciousness. Breath holding spells have also been associated with iron deficiency anemia. It has been documented that iron deficiency anemia may lead to adverse effects on oxygen uptake in the lungs and reduce available oxygen to the tissues, including central nervous system tissues.[1,2,3,4]

This study was conducted to find the frequency of iron deficiency anemia in children with breath holding spells that presented to our local hospital and treat these children with easily available and cheap iron supplements so that parent's anxiety may be reduced and there will be decreased number of unnecessary investigations and less no of visits to the hospital.

In this study, out of 95 cases, 61.05% (n=58) were between 6-36 months of age whereas 38.95% (n=37) were between 37-60 months of age, mean $\pm$ SD was calculated as 38.74 $\pm$ 11.98 months, 58.95% (n=56) were male and 41.05% (n=39) were females, frequency of iron deficiency anemia in children with breath holding spells was recorded as 51.58% (n=49) whereas this morbidity was absent in 48.42% (n=46). Studies from all over the world showed that breath holding spells are frequently associated with iron deficiency anemia.[1,3,13] One such study conducted in Rawalpindi showed association of breath holding spells with iron deficiency anemia as 56.67%.[14] And treatment with iron supplements greatly reduced its frequency.[13] The findings of our study correspond to the study conducted at Rawalpindi.

Handan Gençgönül and others[15] evaluated iron and zinc levels in breath-holding spells and recorded that anemia was observed in 28 children (56%), 22 children (44%) didn't have an anemia.

Another recent study[16] performed a clinical and laboratory analysis through reviewing the data of 64 child having breath holding spells considering the types of BHS and its relation to iron deficiency anemia, with special consideration to neurodevelopmental status and EEG finding and recorded that 62.5% of children with BHS has anemia, the frequency of BHS has improved markedly with 12 weeks of elemental iron therapy.

Rahul Jan and others [17] analyzed the effect of iron supplementation in children with breath holding spells, irrespective of their iron status and study the factors associated with the response and concluded that iron supplementation is effective in the management of breath holding spells. Non-anaemic and iron-replete children with breath holding spells also respond well to iron supplementation.

However, the findings of our study reveal that iron deficiency anemia is commonly found in children presenting with breath holding spells, and the treatment of these children with easily available and cheap iron supplements is effective which may reduce the anxiety of the parents consequently it will decrease the number of unnecessary investigations and less no of visits to the hospital.

**CONCLUSION:**

The frequency of iron deficiency anemia is higher in children with breath holding spells. However, the treatment of these children with easily available and cheap iron supplements is effective which may reduce the anxiety of the parents consequently it will also decrease the number of unnecessary investigations and less no of visits to the hospital.

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