

Association of Atopic dermatitis and Anemia in school –Aged group

By

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Abstract:

Background: Anemia is a captain public health problem in the global with occurrence of 43% in developing countries and 9% in developed nations and iron deficiency anemia (IDA) is still the most common kind of micronutrient deficiency in the developing countries. Atopic diseases are associated with long-lasting inflammation. In patients with inflammation-related illnesses, immune activation and iron deficiency can lead to anemia due to disturbance of iron homeostasis. This study was aimed to Identify the association between anemia and atopic dermatitis , as well as identify the association between iron deficiency anemia and atopic dermatitis. The study was conducted in Al-Alam general hospital as cross-sectional study , a group of 530 persons was taken in random way from the patients , relatives of patients and other visitors of hospital . School-aged group (the age restricted from 6 year to 18 year) was the population target of this study. The timing of data collection was start at 1 January 2022 and finished at 30 April 2022 . Our study show by comparing the existence of atopic dermatitis with different anemic groups (anemic including IDA vs not anemic , IDA vs not anemic + anemic but not IDA , IDA vs anemia but not IDA) the result show significant correlation . The most strongest correlation was between the existence of atopic dermatitis and anemic rather than IDA (other causes of anemia rather than IDA), while IDA was more common in non-atopic dermatitis population , IDA was much higher in individuals who not have atopic dermatitis (30.36%) while anemia of other causes occupy about 21.62% of atopic dermatitis population , this mean that IDA is more common in non-atopic dermatitis population while the anemia of other causes was more common in atopic dermatitis population .

Keywords: Atopic dermatitis; Anemia ; school –Aged group

Introduction:

Anemia is a captain public health problem in the global with occurrence of 43% in developing countries and 9% in developed nations ^[1]. It is widespread in people at any stage of life, although pregnant-reproductive females and young children are most liable, which may increase the risk of diminished cognitive and physical growth and increased mortality and morbidity rate ^[2]. In spite of its multifactorial etiology, anemia might be nutritional, inherited, environmental, infectious, socioeconomic (low maternal level of education and low household income), demographic factors (age and gender), autoimmune, malabsorption (achlorhydria), and chronic (cancer) ^[3].

Rendering to WHO report in 2001, about two billion persons in the worldwide have been assessed to suffer from anemia with 50% of all anemia was recognized to IDA ^[4]. Until today, IDA is still the most common kind of micronutrient deficiency in the developing countries ^[5], which consequences from long-term negative iron imbalance. Usually, insufficiency of iron develops gradually and does not have clinically obvious symptoms until anemia becomes severe ^[6]. Poor activity and poor mental performances among children have a strong relations with IDA, may also continue into adulthood with causing low work efficiency which has effects as low economic productivity ^[3].

Atopic dermatitis is a common, relapsing, chronic, inflammatory skin disease that mainly affects young kids. *Atopy* is defined as a hereditary tendency to produce immunoglobulin E (IgE) antibodies in response to minute amounts of common environmental proteins such as pollen, house dust mites, and food allergens. Dermatitis originates from the Greek "derma," which means *skin*, and "itis," which means *inflammation*. Dermatitis and *eczema* are often used synonymously, although the term *eczema* is occasionally reserved for the acute sign of the disease (from Greek, *ekzema*, *to boil over*); here, no distinction is made. Allergic sensitization and elevated immunoglobulin E (IgE) are present in only around half of all patients with the disease, and consequently *atopic dermatitis* is not a definitive term. Atopic dermatitis affects around one-fifth of all persons during their lifetime, but the occurrence of the disease varies greatly throughout the world ^[7].

In several so-called industrial countries, the occurrence increased noticeably between 1950 and 2000 so much that several refer to as the "allergic epidemic." However, current indications point to eczema symptoms having flattened off or even having decreased in some countries with a previously very high occurrence, such as the United Kingdom and New Zealand. This shows that the allergic disease epidemic is not growing continually worldwide. But, atopic dermatitis remains a serious health concern, particularly in the developing world, the disease is still very much on the rise. The danger of developing atopic dermatitis is much upper in those whose family members are affected. For example, the

concordance rate of atopic dermatitis in monozygotic twins is around 75%, meaning that the risk of the disease in the twin sibling is 75% if the cotwin is affected [8].

In contrast, the possibility in dizygotic twins is only 30%. This shows that genetic factors show a role in the liability to atopic dermatitis. However, as there is not complete concordance between monozygotic twins, who share all their genes, environmental and developmental factors must play a role too. As such, atopic dermatitis is a complex genetic disease arising from several gene-gene and gene-environment interactions.

Atopic diseases are associated with long-lasting inflammation. In patients with inflammation-related illnesses, immune activation and iron deficiency can lead to anemia due to disturbance of iron homeostasis [9]. Although the etiology of anemia of inflammation (AI) varies from that of iron deficiency anemia (IDA), distinguishing these conditions in the typical clinical setting is problematic, as both types of anemia exhibit low hemoglobin as well as low iron status in blood tests [10].

Aim of current study:

1. Identify the association between anemia and atopic dermatitis.
2. Identify the association between iron deficiency anemia and atopic dermatitis.

Subject and methods: This study was conducted in Al-Alam general hospital as cross-sectional study, a group of 530 persons was taken in random way from the patients, relatives of patients and other visitors of hospital. School-aged group (the age restricted from 6 year to 18 year) was the population target of this study. The timing of data collection was start at 1 January 2022 and finished at 30 April 2022

we took history from each person taken in this study to know the demographical factors of each person, family history, as well as to know if there is any symptoms of anemia or atopic dermatitis. Examination was done for cases with history that refer to presence of anemia or atopic dermatitis.

All individuals in this study send for Hb investigation, then we only send a specific individuals for S.ferritin (those with low Hb according to W.H.O. definition and category of anemia). Diagnostic criteria used to diagnose atopic dermatitis include those of Hannifin and Rajka, the UK working party, and the American Academy of Dermatology's Consensus Conference on Pediatric Atopic dermatitis, these criteria have specificity at or above 90%. but have much lower sensitivities (40-100%). Therefore, its useful for enrolling patients in studies and insuring that they have atopic dermatitis, but are not so useful in diagnosing a specific patient with atopic dermatitis.

A questionnaire form was used to collect data, which was include name, age, gender, location of living, study status of individual, father education level, mother education level

, presence of atopic dermatitis (according to history and examination) and presence of anemia according to investigations.

The data was summarized firstly in single master table manually , then according to the aims of this study the data categorized into small tables which is used to help us to calculate the association between atopic dermatitis and anemias by using Chi-square test , finally the small tables converting to statistical figures to represent the data in more simple and obvious way.

Results:

Figure No. 1: Our study shows that the prevalence of anemia in general (including iron deficiency anemia) in population study was 33.60% while the majority of study population was not anemic (66.40%).

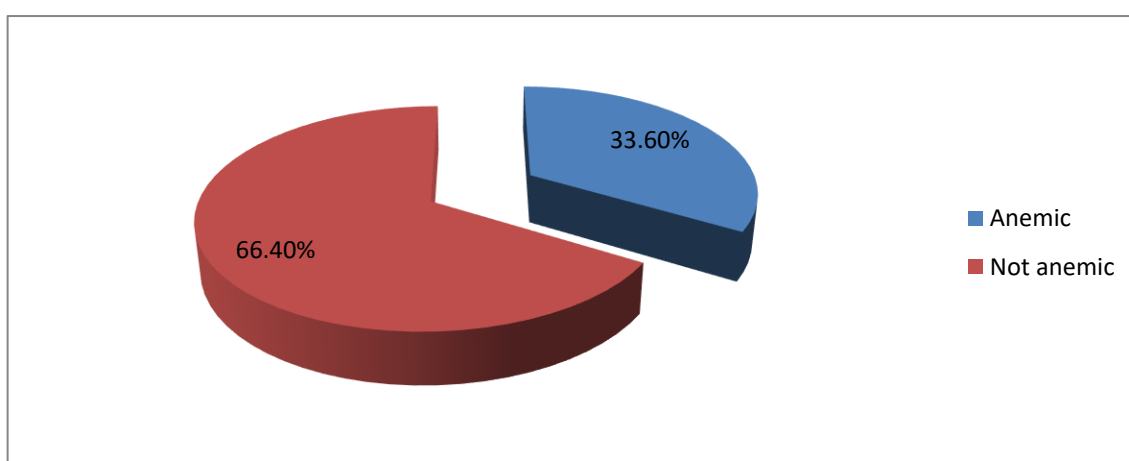


Figure (1) : The prevalence of anemia in school-aged students.

Figure No. 2 : we found that iron deficiency anemia by it's self occupied 23.96% of total study population while further study population occupied 76.04%.

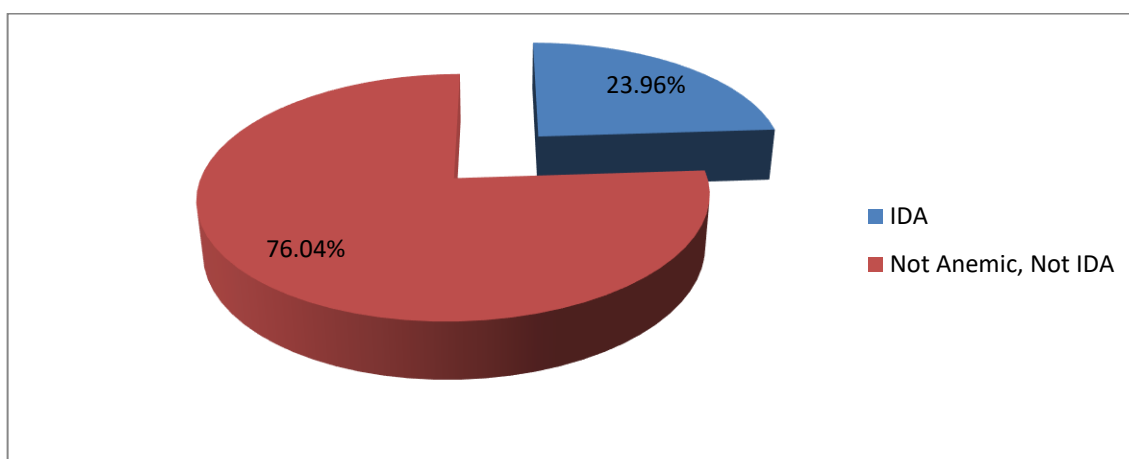


Figure (2) : The prevalence of iron deficiency anemia in school-aged students.

Figure No. 3 : We found that IDA was the dominant type of anemia in total population study, the occurrence of IDA in compare to other types of anemias was 64.80% while other anemias occurrence was only 35.20%.

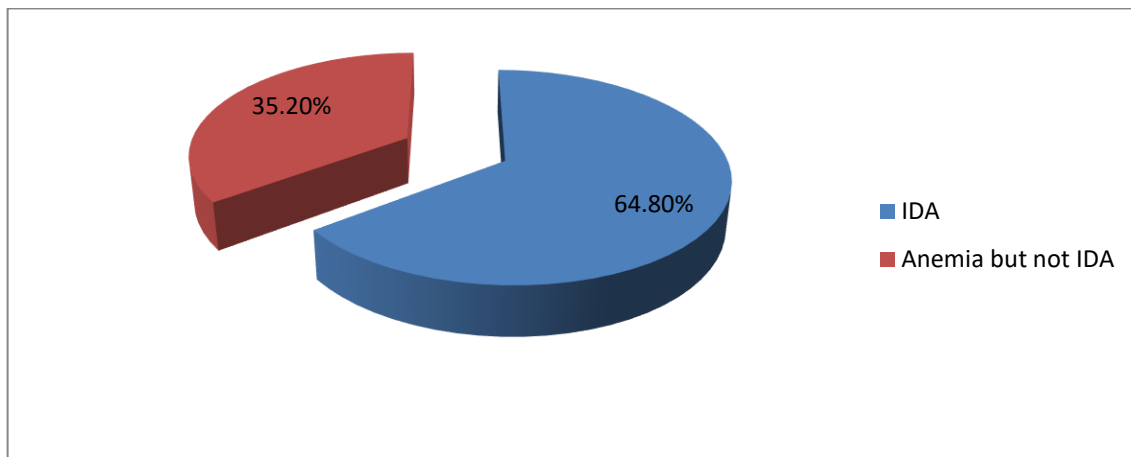


Figure (3) : The percentage of IDA and furthers anemias according to the total of anemia in school-aged student.

Figure No. 4 : This study show that the prevalence of atopic dermatitis at study's population was 27.92% while the majority of study population was (66.40%).

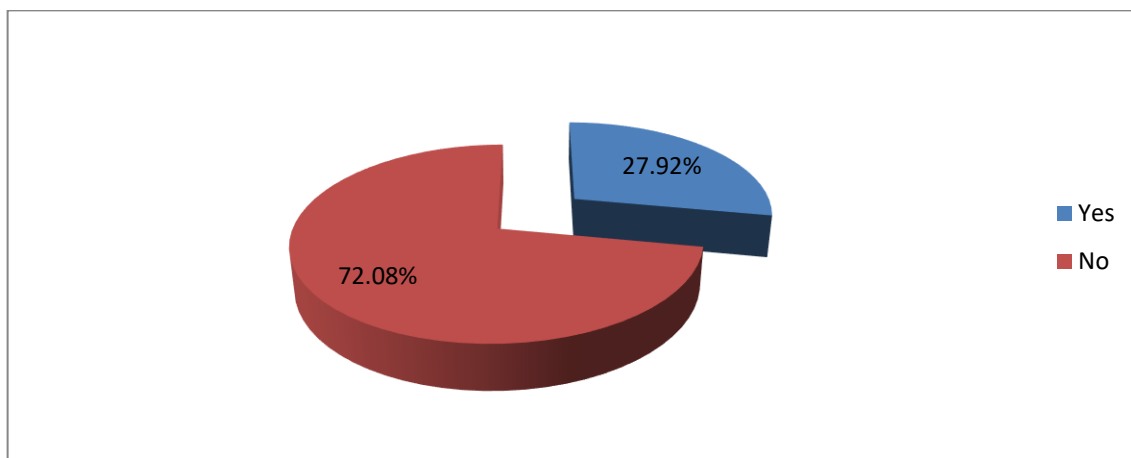


Figure (4) : The prevalence of atopic dermatitis in school-aged students.

Figure No. 5 : The study show that the existence of atopic dermatitis was higher in not anemic individuals in compare to anemic patients , 31.43% and 18.87% respectively . The chi-square statistic is 8.7739 , this is more than 3.48 (confidence 95% , level of significance 0.05) which mean that there is a difference. Result : significant correlation .

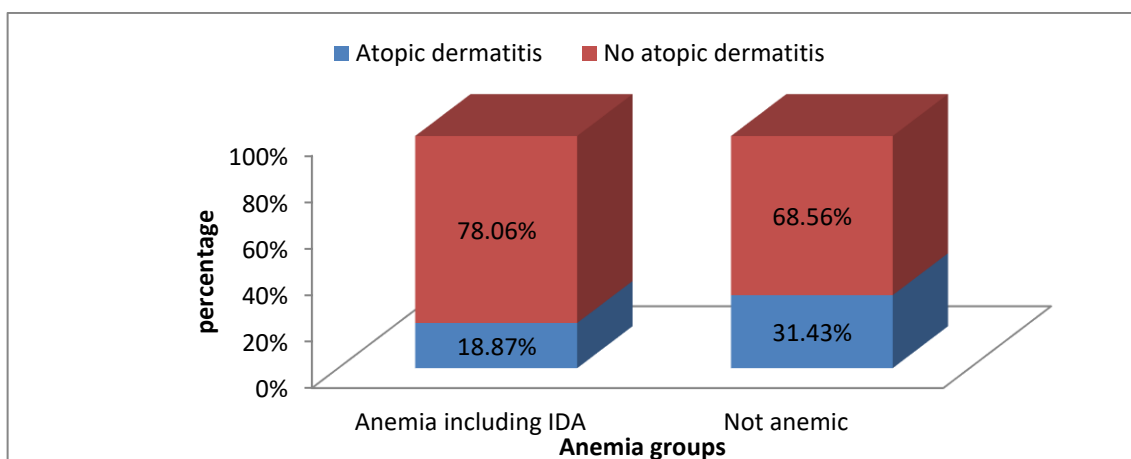


Figure (5): compare the existence of atopic dermatitis among anemic and not anemic individuals.

Figure No. 6 : By comparing the existence of atopic dermatitis between IDA and other population study, we found that atopic dermatitis was much lower in IDA in comparing with other population study, 88.66% and 33.99% respectively. The chi-square statistic is 30.7931 , this is more than 3.48 (confidence 95% , level of significance 0.05) which mean that there is a difference. Result : significant correlation.

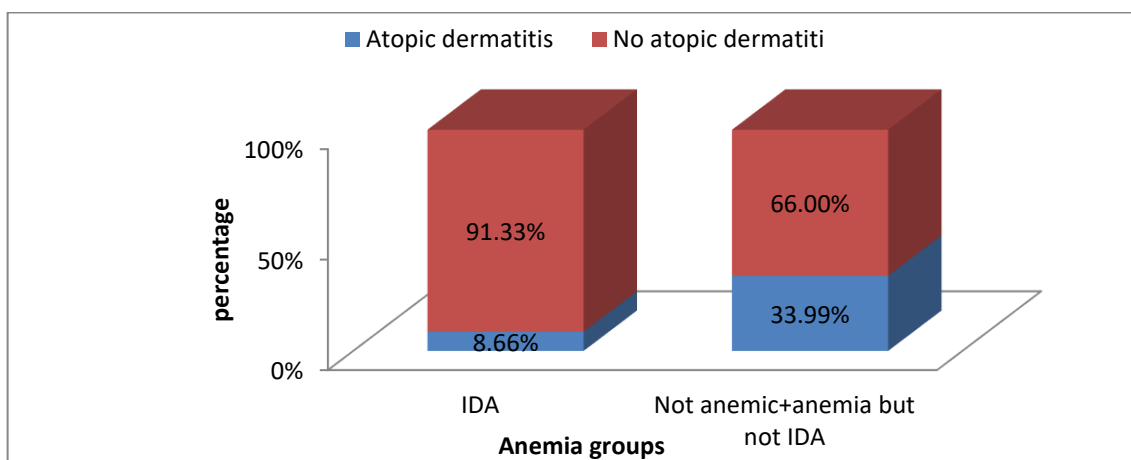


Figure (6) : compare the existence of atopic dermatitis between IDA and further study population.

Figure No. 7 : we found the existence of atopic dermatitis was much lower in IDA in comparing with other anemic population , 8.66% and 46.37% respectively. The chi-square statistic is 37.1352 , this is more than 3.48 (confidence 95% , level of significance 0.05) which mean that there is a difference. Result : significant correlation.

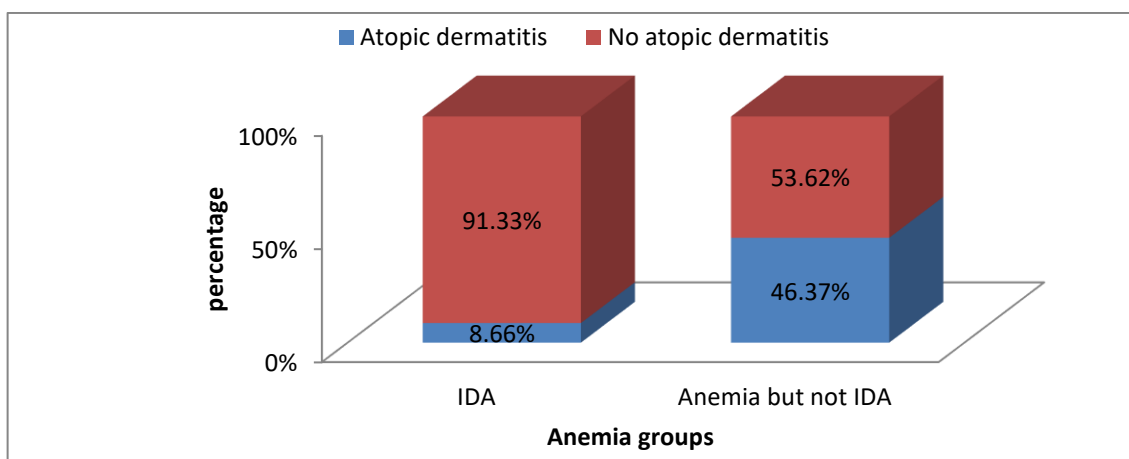


Figure (7) : compare the existence of atopic dermatitis between IDA and further study population.

Figure No. 8 : the study show that the IDA was much higher in individuals who not have atopic dermatitis (30.36%) while other anemia of other causes occupy about 21.62% of atopic dermatitis population , this mean that IDA is more common in non-atopic dermatitis population while the anemia of other causes was more common in atopic dermatitis population. The chi-square statistic is 37.134 , this is more than 5.99 (confidence 95% , level of significance 0.05) which mean that there is a difference.

Result : significant correlation .

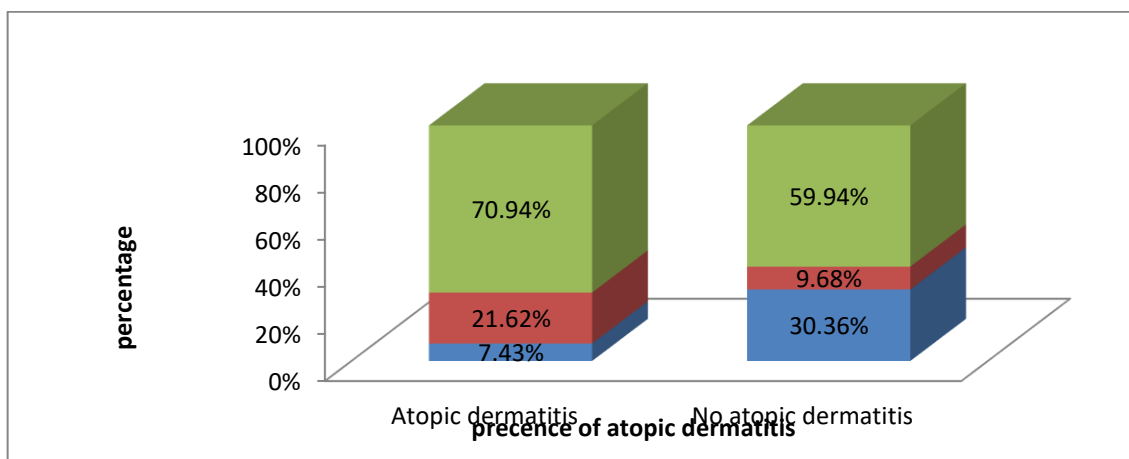


Figure (8): The existence of different anemic groups in atopic dermatitis.

Discussion:

Results of current study found that about 33.60% of school-aged group were anemic . This prevalence is higher than the national report in Indonesia that found an overall prevalence of anemia of 26.4% in children aged 5–14 years old and 18.4% in young adults aged 15–24 years old [11]. Our study also not corroborated the findings of Verma *et al.*, that the prevalence of anemia in the 5-15 years age group of urban school children in Punjab was

51.5% [12]. Similarly, a study by Gomber *et al.*, stated that the prevalence of anemia in school children from urban slums, aged 5-10.9 years was 41.8% [13]. Studies conducted in Nigeria which showed the overall prevalence of anemia of 47.5% [14].

In 2016 Ethiopian DHS prevalence reported for the Amhara Region (42%) [15], As well as, the result of the present study is less than studies done in South-East Nigeria (49.2%) [16]. Anemia is still a serious problem in some countries, affecting 27% of the world in 2013, Developing countries represent for more than 89% of the burden [17].

This study found an overall prevalence of IDA of 23.96% of total study population and the occurrence of IDA in compare to other types of anemias was 64.80%. Other studies found that IDA is the most common cause of anemia (60% of overall causes) [18]. In Al-Mekhlafi *et al.* research on 241 aboriginal institute children directed in Pos Betau, Pahang, the prevalence of IDA was 34.0%. [19], In a similar study on children aged 7 to 12 years old by Ngui *et al.* [20], prevalence of IDA was 16.9%, in contrast, a recent study showed prevalence of IDA on primary school children in Kelantan was low (7.7%) compared to the present study [21]. The difference in the occurrence might be due to difference in the study design, sampling techniques, and size of study population. The difference might also be due to variation in the geographical location or variation in socio-demographic features or socioeconomic status of parents in the areas.

Also results of study showed that the prevalence of atopic dermatitis in school aged population was 27.92%. The international society for augmentative and alternative communication (ISAAC) published prevalence of atopic dermatitis as 11.0% (6-7 years old), 9.3% (13-14 years old) [22],[23].

The prevalence of atopic dermatitis in children and young adults has recently decreased in several studies [22][25], and the cause of the divergent trends could not explain about the hygiene hypothesis and/or allergic epidemic (outdoor allergen levels, diet change, vaccination, smoking, and pet exposure) [22][24][25]. Our study show by comparing the existence of atopic dermatitis with different anemic groups (anemic including IDA vs not anemic, IDA vs not anemic + anemic but not IDA, IDA vs anemia but not IDA) the result show significant correlation. The most strongest correlation was between the existence of atopic dermatitis and anemic but not IDA (other causes of anemia rather than IDA), while IDA was more common in non-atopic dermatitis population. Drury *et al.* investigated the association between atopic diseases and anemia using a survey of pediatric and adolescent patient caregivers, The study found no association between hay fever and anemia [26].

Atopic diseases in general have been revealed to be associated with numerous different comorbid disorders, most of them are known to increase the risk for anemia. For example, chronic inflammation of atopic disease, use of immunosuppressant medications, use of

alternative medicines ^[27], and amplified incidence of malnutrition ^[28], are samples of such comorbidities.

The constricting diets followed by numerous patients with a suspected food allergy or apparent increase of skin or respiratory disease brought on by definite food has been assumed to play a role in anemia and malnutrition seen in individuals with atopic diseases. It also recognized that diet devoid of milk and/or milk products, as well as other crucial food can lead to malnutrition ^[28]. Iron deficiency anemia could occur secondary to food averting and malnutrition. Iron can affect the works of the immune system including the amounts and functions of lymphocytes, as well as granulocytes ^[29]. It determines the balance between with the intensity of Th1 and/or Th2 of the immune response and leads to a deviation toward Th2 response ^[30]. The Th2-twist of immune response favors the development of allergic diseases. As well as, the association between the atopic diseases and IDA anemia may be due to anemia of chronic diseases.

Atopic disease has been shown to be associated with several different comorbid conditions, many of which are known to increase the risk for anemia. The chronic inflammation present in atopic disease, use of systemic immunosuppressant medications, increased incidence of malnutrition^[31], ^[32], ^[33]. Our study has some limitations, firstly it is a cross-sectional study, and thus we cannot determine a causative association between atopic dermatitis and anemia. However, the reverse connection "that anemia causes atopic dermatitis" is unlikely given the pathophysiology of anemia and atopic dermatitis. Secondly because we have not directly assessed all causes of anemia. In addition, unlike other serious health condition or medication use, anemia testing is not common in children with atopic disease, so the impact on outcomes would be limited.

Conclusion: prevalence of anemia in general as well as iron deficiency anemia was higher in students with atopic dermatitis and there was a significant association between atopic dermatitis and anemia in general, as well as same significant association was noticed atopic dermatitis and iron deficiency anemia in school-aged student. As well as IDA was more common in non-atopic dermatitis population while the anemia of other causes was more common in atopic dermatitis population. Further study is needed to understand the etiology of anemia in patients with atopic dermatitis. We recommended to study further atopic diseases and find the correlation with anemia.

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