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ORIGINAL ARTICLE

Anemia and its Effect on the Scholastic Performance of Fifth Grade School Children

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ABSTRACT

Aim: To study the effect of anemia on the academic performance of fifth grade students,
Study design: Cross-sectional comparative study.
Place and duration of study: Local schools in Abbottabad from January to June 2018.
Methods: Study subjects were fifth grade students who were randomly divided into two groups based on their hemoglobin (Hb) levels. First group, which was control group, had 40 students with Hb levels ≥ 10.0 gm/dL while second group, which was anemic group, consisted of 40 anemic students who had Hb levels < 10.0 gm/dL. Hemoglobin levels were estimated using 03 cc of blood in EDTA containing vials using aseptic technique and using standard method. Academic performance was assessed based on the scores obtained using tests (both objective and subjective) in the subjects of English, Math and Urdu.
Results: Mean Hb levels were 14.5gm/dL in control group while it was 9.45gm/dL in case of anemic group. There was a significant association between anemia and the academic performance of the students. Average test score of control subjects was 96.23 while mean score for anemic subjects was 76.35. This showed that the students in control group had performed significantly well as compared to that in anemic group (p value 0.001).
Conclusion: There is a significant relationship between anemia and scholastic performance of the students wherein anemia affects their educational performance. Therefore, nutritional supplementation programs should be initiated particularly at primary school levels so as to avoid the detrimental effects of micronutrient deficiency particularly iron on cognition and education and which in turn will lead to better educational performance and achievement.
Keywords: Anemia, school, performance, scholastic

INTRODUCTION

Nutritional status plays an important role in academic performance of students.[1] On the other hand, malnutrition is a significant public health issue especially in developing counties. It not only effects health status, education and productivity of an individual but also hinders the growth and development of any country.[2] It is believed that cognitive development in preschool children portends their subsequent achievement in schools.[3, 4] Nutrition is one of the chief factors which influence cognitive development. There is an established correlation among better nutrition and optimum brain function. Micronutrients act as building blocks which in turn play a crucial role in cell proliferation, metabolism of hormones and neurotransmitters, DNA formation and as a key component of brain enzyme systems[5-9]. Rapid development of brain in early years of life makes it more vulnerable to nutritional deficiencies in this period of life[10].

Anemia, especially iron deficiency anemia, is found to be a major cause of poor scholastic performance and accomplishment in students. According to World Health Organization, 1.62 billion people are anemic globally and out of these, 25.4% are students and 47.4% are children of school going age.[11] Nutritional deficiency can be caused by lack of essential micronutrients in food or ineffective usage of these micronutrients due to certain infectious diseases like parasitic infestations and this, in turn, leads to different types of anemia i.e. iron, folate, vitamin B 12 deficiency anemia.[12-15] These deficiencies not only have profound effect on health and well-being of an individual but also contribute to poor educational performance and academic drop out among students.[11] Therefore, we have conducted this study to investigate the effect of anemia in school going children on their academic performance and compared it with that of normal students.

MATERIALS AND METHODS

It was a cross-sectional comparative study with purposive sampling and conducted from January to June 2018 after permission from IRB. Study participants, who were 8-10 years of age and were studying in 5th grade, were randomly selected from schools after taking informed written consent from parents or guardians and they were divided into two groups based on their hemoglobin (Hb) levels. First group, which was control group, had 40 students with Hb levels ≥10.0 gm/dL while second group, which was anemic group, consisted of 40 anemic students who had Hb levels <10.0gm/dL. Students with other hematological disorders i.e. thalassemia were excluded from the study. Hb was estimated using 03 cc of blood in EDTA containing vials using aseptic technique and standard method. Academic performance was assessed based on the scores obtained using tests (both objective and subjective) in the subjects of English, Math and Urdu. Items were selected from the syllabus which was already taught to the children. The test was approved and marked by three expert teachers of the respective field. The scores were graded on a scale from 0-100 and mean of three scores was taken and represented as percentages. SPSS version 22 was used to manage and analyze data. Student's t-test was used to compare the results of two groups with significance level set at <0.05.

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RESULTS

There were 80 students in this study with 40 students in control group and 40 in anemic group. Mean Hb levels were 14.5gm/dL in control group while it was 9.45gm/dL in case of anemic group (Table 1).

Average test score of control subjects was 96.23 while mean score for anemic subjects was 76.35, Table 2. This shows that the students in control group have performed significantly well as compared to that in anemic group (p value, 0.001) and their scholastic performance was better than anemic subjects, as shown in Figure 1. Hence, anemia does influence the scholastic performance of the individuals.

Table 1: Hemoglobin levels in study subjects, (n=80)

Variable	Group	n	Mean±SD	Range
Hemoglobin (gm/dL)	Control	40	14.5±.38	14 – 15.4
	Anemic	40	9.45±.70	7 - 10

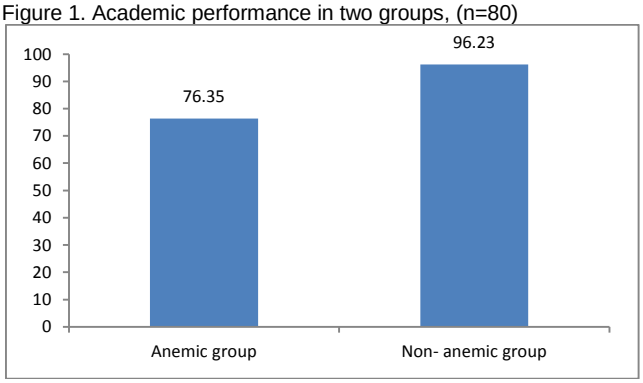
P value 0.001*

Table 2. Test scores in study subjects, (n=80)

Variable	Group	n	Mean±SD
Non- anemic group	Control	40	96.23±15.80
Anemic group	Anemic	40	76.35±18.81

P value < 0.001*

Figure 1. Academic performance in two groups, (n=80)



DISCUSSION

Optimum health and well-being of an individual is pivotal for effective learning and academic success.[1] In turn, this academic performance will affect their future educational accomplishments. Income and social status of an individual increases as their education level increases which in turn leads to better access to housing and health care facilities, better nutrition and life style. Education also raises a person's sense of self control and self-esteem.[16-18] On the other hand, malnutrition is believed to affect the child's attention at school and thereafter, school attendance and academic performance and also contributes to health issues as compared to healthy children[17,19].

Educational performance of anemic subjects was poorer than the control subjects in our study and their mean score were 76.35. Similar to our study, Soleimani and Abbaszadeh reported that the average score of their anemic patients was quite low and they had poor academic performance as compared to non-anemic subjects. The score of their anemic subjects was 52.58%.[11] Halterman et al have also described that the results of all administered standardized tests were significantly low among iron deficient patients. This effect was especially pronounced on math scores which were lower in both iron-deficient and iron-deficient and anemic subjects. Their logistic regression analysis also revealed that the children who were iron-depleted had significantly higher risk of scoring low especially in math subject and these children had twice as much risk of scoring low in math when compared with normal children. Conversely, iron-replete students are more likely to perform well in these standardized tests.[20] This might be due to the fact that cognitive and higher mental functions were affected more and earlier by iron depletion. Thus, anemia does impact the scholastic performance of the individuals. Other researchers have also indicated that the anemic subjects suffer from lack of concentration, perform poorly in their academics and had higher dropout rates from schools.[21] This finding is further strengthened by the fact that scholastic performance of such students improved significantly after iron supplementation.[11] Moreover, cognitive and behavioral effects improved swiftly than rise in hemoglobin levels.[20, 22] Furthermore, Florence et al proved that there was a strong relationship between quality of diet and educational achievements of students. Students with poor quality diet were more likely to perform inadequately in their examination[17]

We haven't performed the detailed analysis regarding the type and cause of anemia as well as the dietary habits of the anemic subjects in our study which is the limitation of our study. More detailed studies should be performed on this subject to accurately gauge the type and cause of nutritional deficiency in anemic subjects.

CONCLUSION

Nutritional supplementation programs should be initiated particularly at primary school levels so as to avoid the detrimental effects of micronutrient deficiency particularly iron on cognition and education and which in turn will lead to better educational performance and achievement.

Conflict of interest: Nil

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