

## Effect of Hemoglobinopathies Disease on Adolescent Nutritional States at Hereditary Blood Diseases Centre

Abdul Ameer Amer AbdulAmeer<sup>1</sup>, Asmahan Qasim Mohammed<sup>2</sup>

<sup>1</sup>MSN, Pediatric Nursing Department, College of Nursing, University of Baghdad, Baghdad, Iraq.

<sup>2</sup>Ph.D, Pediatric Nursing Department, College of Nursing, University of Baghdad, Baghdad, Iraq.

### ABSTRACT

**Background:** Understanding the impact of hemoglobinopathy on teenagers' nutritional status is critical since it affects both their physical and mental well-being. Nutritional statistics are crucial at this age, particularly for adolescents with hemoglobinopathies during adolescence.

**Objective(s):** What is the extent of the effect of hemoglobinopathy on nutritional status? Low, moderate, or severe

**Methodology:** Thirty-two adolescents with hemoglobinopathy were found at the Hematology Center, Al-Zahra Teaching Hospital, and Al-Najaf Al-Ashraf Teaching Hospital in the Al-Najaf Al-Ashraf Governorate. A descriptive study design was carried out for them between May 22, 2023, and February 22, 2024. Patients with sickle cell anemia and thalassemia who were adolescents, aged 12 to 18, were chosen. There were two components to the study questionnaire: a scale and demographic information, nutritional status. A panel of twelve experts verified the validity of the questioner and a pilot study with ten patients determined its dependability.

**Results:** There were 200 male and female patients in the trial, which focused on adolescents (12–19 years old). In light of the general Global Nutritional Assessment in Children indicates a moderate level, as shown by a mean score of 2.295 ( $\pm 0.5092$ ).

**Conclusion:** The study showed that the relationship between hemoglobinopathy and nutritional behavior in adolescents was moderate and was affected by demographic factors such as education and blood hemoglobin level.

**Recommendations:** According to the study, patients with hemoglobinopathy should receive special attention. One way to do this is by improving their nutritional status through the dissemination of various programs or protocols, as this is crucial for their age group's mental and physical development.

**KEYWORDS:** Effect, nutritional status, Hemoglobinopathy, Adolescent.

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### INTRODUCTION

The document provides information about hemoglobinopathies, which are severe inherited blood disorders. It mentions that hemoglobinopathies are the most common recessive monogenic disorders worldwide and pose a significant global disease burden. The two most common types of hemoglobinopathies are sickle cell disease (SCD) and thalassemia<sup>(1-6)</sup>. Hemoglobinopathy refers to a group of inherited blood disorders that affect the structure or production of hemoglobin<sup>(14-19)</sup>, the protein responsible for carrying oxygen in red blood cells. These disorders result

from genetic mutations that alter the normal synthesis or function of hemoglobin<sup>(10-5)</sup>. thalassemia are gene defects that result in disorders of hemoglobin synthesis, leading to limited production of hemoglobin<sup>(12)</sup>. Structural hemoglobin variants occur when gene defects cause changes in the structure of hemoglobin<sup>(9-4)</sup>. Sickle cell disease is characterized by a structural alteration in the hemoglobin molecule, causing red blood cells to assume a sickle shape under certain circumstances. Hemoglobin S is an example of structurally abnormal hemoglobin associated with sickling disorders<sup>(3-6)</sup>. Nutritional status refers to the overall condition of an

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individual's health and well-being in relation to their nutrient intake and utilization. It is a measure of the adequacy or inadequacy of an individual's diet and the impact it has on their growth, development, and overall health<sup>(8,2-16)</sup>. It is a measure of the adequacy and balance between the intake of nutrients and the body's requirements for growth, development, maintenance, and optimal functioning<sup>(15)</sup>. Nutritional status is influenced by various factors, including dietary intake, nutrient absorption and utilization, physiological processes, and overall health<sup>(11,13)</sup>.

### METHODOLOGY

A descriptive study design was carried out for thirty-two hundred adolescents with hemoglobinopathy at the Hematology Center, Al-Zahra Teaching Hospital, and Al-Najaf Al-Ashraf Teaching Hospital in the Al-Najaf Al-Ashraf Governorate between May 22, 2023, and February 22, 2024. Patients with sickle cell anemia and thalassemia who were adolescents, aged 12 to 19, were chosen. There were two components to the study questionnaire: a scale and demographic information. eating habits. Twelve experts on a panel assessed the validity of the questioner and its dependability using a pilot trial with ten patients.

#### Sample of the Study:

The demographic chosen for the study sample In blood disease centers in the Governorate of Najaf, there were 200 male and female patients with sickle cell anemia, thalassemia, and hemoglobin disease, who were non-probability teenagers aged 12-19.

### Data Analysis.

#### ANOVA, or analysis of variance,

is a statistical procedure used to test for coincidence in the equality of means for distinct mean parameters. It is intended to identify differences between patients' knowledge and general information.

**B. Alpha correlation coefficient (r):** Calculated to assess the questionnaire's test and retest reliability.

**C. The T-test on paired samples.** The mean of two variables is compared using the Paired Sample T-test technique. It calculates the variations between the two variables' values for every scenario and determines whether the average deviates from zero.

$$t = \frac{\sum d}{\sqrt{\frac{n(\sum d^2) - (\sum d)^2}{n-1}}}$$

Where (d) mean of samples, (n) is the sample size and t is a paired sample t-test with (n-1) degrees of freedom.

**D. The p value .** The degree of strong significance at (P < 0.01), significance at (P ≤ 0.05), and no significance at (P > 0.05) is shown by the (P) Value for each table's results. (Nieswidomy, 2012).

### Results of the Study

The following are included in tables and figures that illustrate the descriptive and inferential statistical method under the goals of the present research findings:

**Table 1. Adolescents Report toward Global Nutritional Assessment in Children**

رد	Adolescents Report	Weighted	Freq.	%	M.s ±SD	Ass.
1	Appropriateness of current high for age	Sever	51	25.5	2.07±0.757	Moderate
		Moderate	85	42.5		
		Normal	64	32.0		
2	Is it appropriate to take into account the average height of the parents?	Sever	38	19.0	2.19±0.733	Moderate
		Moderate	86	43.0		
		Normal	76	38.0		
3	Serial growth:	Sever	36	18.0	2.16±0.705	Moderate
		Moderate	96	48.0		
		Normal	68	34.0		
4	Appropriateness of Current Weight for Height (wasting)	Sever	41	20.5	2.15±0.735	Moderate
		Moderate	88	44.0		
		Normal	71	35.5		
5	Unintentional Changes in Body Weight	Sever	35	17.5	2.20±0.718	Moderate
		Moderate	89	44.5		
		Normal	76	38.0		
6	Weight loss	Sever	34	17.0	2.31±0.745	Moderate
		Moderate	71	35.5		
		Normal	95	47.5		
7	Change in past 2 weeks: no change increased decreased	Sever	34	17.0	2.36±0.757	Normal
		Moderate	60	30.0		
		Normal	106	53.0		

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8	Dietary intake versus usual unchanged increase decrease.	Sever	48	24.0	2.24±0.816	Moderate
		Moderate	56	28.0		
		Normal	96	48.0		
9	The duration of the change is less than two weeks more or equal to two weeks	Sever	33	16.5	2.24±0.719	Moderate
		Moderate	85	42.5		
		Normal	82	41.0		
10	Gastrointestinal Symptoms	Sever	37	18.5	2.23±0.742	Moderate
		Moderate	80	40.0		
		Normal	83	41.5		
11	Duration of symptoms: < 2 weeks 2 weeks	Sever	53	26.5	2.12±0.799	Moderate
		Moderate	70	35.0		
		Normal	77	38.5		
12	no impairment, energetic, able to perform age-appropriate activity	Sever	52	26.0	2.16±0.811	Moderate
		Moderate	64	32.0		
		Normal	84	42.0		
13	Function in past 2 weeks: no change	Sever	63	31.5	2.11±0.855	Moderate
		Moderate	52	26.0		
		Normal	85	42.5		

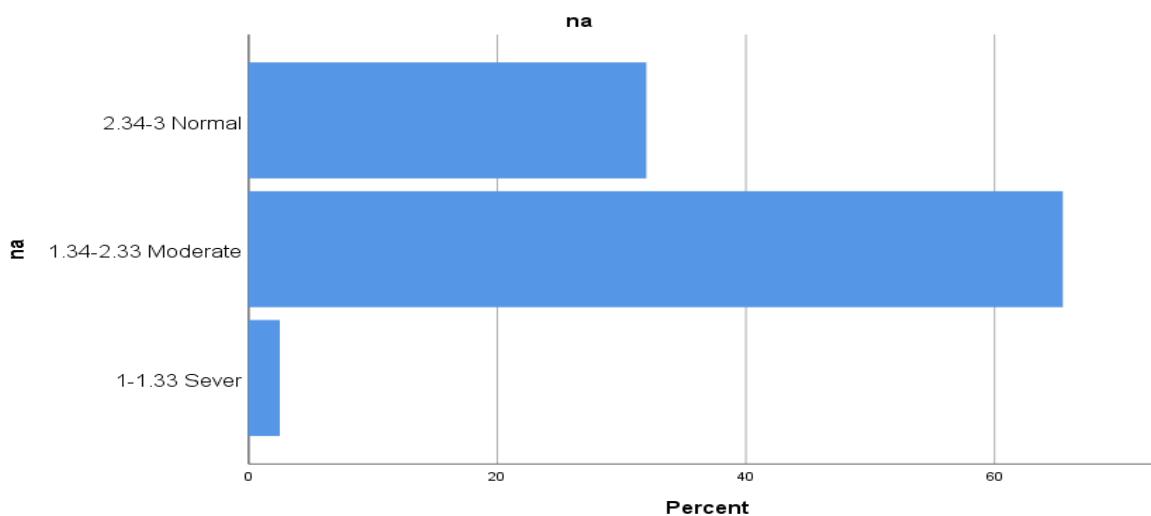
"(MS) Mean of Scores, (SD) Standard deviation, Level of Assessment (Sever=1-1.66, Moderate=1.67-2.33, Normal= 2.34-3)"  
 Table (1) Based on the statistical mean and standard deviation, this table shows that the teenagers had moderate answers in the teenagers Report towards Global Nutritional Assessment in Children for all items, except for item (7) where the assessment level was found to be normal.

**Table 2: Overall Adolescents Report for Global Nutritional Assessment in Children**

Global Nutritional Assessment	Freq.	%	M ± SD	Assessment
Sever	5	2.5	2.295±0.5092	Moderate
Moderate	131	65.5		
Normal	64	32.0		
<b>Total</b>	<b>200</b>	<b>100.0</b>		

"(MS) Mean of Scores, (SD) Standard deviation, Level of Assessment (Sever=1-1.66, Moderate=1.67-2.33, Normal= 2.34-3)"

Table (2) The adolescent's report from the Overall Adolescents Report for Global Nutritional Assessment in Children indicates a moderate level, as shown by a mean score of 2.295 (±0.5092).



**Figure 3-1: Overall Adolescents Report for Global Nutritional Assessment in Children**

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This table show the moderate level of adolescent toward Global Nutritional Assessment.

### 3. Significant Differences in Overall Adolescents Report for Global Nutritional Assessment in Children with regard their Socio-Demographic Variables ( $n=200$ )

Age	Between Groups	59.909	21	2.853	1.056	0.400
	Within Groups	480.886	178	2.702		
	Total	540.795	199			
Sex Type	Between Groups	7.002	21	0.333	1.386	0.130
	Within Groups	42.818	178	0.241		
	Total	49.820	199			
Educational Level	Between Groups	42.206	21	2.010	1.873	0.015
	Within Groups	190.949	178	1.073		
	Total	233.155	199			
Monthly Income	Between Groups	13.769	21	0.656	1.350	0.149
	Within Groups	86.426	178	0.486		
	Total	100.195	199			
Housing	Between Groups	5.312	21	0.253	1.320	0.167
	Within Groups	34.108	178	0.192		
	Total	39.420	199			
your family members suffer from blood diseases?	Between Groups	6.085	21	0.290	1.237	0.226
	Within Groups	41.710	178	0.234		
	Total	47.795	199			
Types of Diseases	Between Groups	5.581	21	0.266	1.345	0.152
	Within Groups	35.174	178	0.198		
	Total	40.755	199			

*d.f.*: Degree of freedom, *F*: F-statistic.

Table (3) The findings indicated that there were no significant variations in the overall adolescents' report for global nutritional assessment in children, except for educational variables ( $p=0.015$ ).

### 4. Significant Differences in Overall Adolescents Report for Global Nutritional Assessment in Children with regard their Hemoglobin Level ( $n=200$ )

Global Assessment	Nutritional	Source of variance	Sum of Squares	<i>d.f.</i>	Mean Square	<i>F</i>	<i>Sig.</i>
Hemoglobin Level		Between Groups	18.419	4	4.605	2.648	0.035
		Within Groups	339.136	195	1.739		
		Total	357.555	199			

*d.f.*: Degree of freedom, *F*: F-statistic.

Table (4) Findings demonstrated that there were significant differences in in Overall Adolescents Report for Global Nutritional Assessment in Children with regard their Hemoglobin Level  $p=0.035$ .

## DISCUSSION

### 1. Table (1). Adolescents Report toward Global Nutritional Assessment in Children

Table 1 This table displays the teens' moderate responses to all items in the Teens Report towards Global Nutritional Assessment in Children, with the exception of the item (weight loss), based on statistical mean and standard deviation. There has been no change in the last two weeks (increased or lowered), and the assessment level was determined to be normal. This result conflicts with a research by (Bhadra and Deb (2020). They noted that there is a connection between anemia and nutritional status during their

investigation. They suggested that starvation is the primary factor contributing to anemia in society.

### 2. Table (2): Overall Adolescents Report for Global Nutritional Assessment in Children.

Table II A mean score of 2.295 ( $\pm 0.5092$ ) on the adolescent's report from the Global Nutritional Assessment in Children's Overall Adolescents Report shows a reasonable level. This outcome is consistent with a research by (Ukoha et al. (2020), which reported that the subjects' Z-scores for weight, stature, and BMI were all lower than those of the controls. Reliability, waste, and overweight/obesity were observed in 10.9%, 24.6%, and 5.1% of participants, respectively, in contrast to

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2.3%, 5.7%, and 9.7% in the control group. While overweight/obesity was entirely correlated with higher social lesson ( $P = 0.001$ ), squandering, hindering, and obesity were all associated to age in SCA.

### 3. Figure (3-1): Overall Adolescents Report for Global Nutritional Assessment in Children.

This figure (3.1) show the moderate level of adolescent toward Global Nutritional Assessment . It is clear in my statement that the relationship and statistical results between hemoglobin and nutritional status in adolescents were moderate.

### 4. Table (4). Significant Differences in Overall Adolescents Report for Global Nutritional Assessment in Children with regard their Socio-Demographic Variables ( $n=200$ )

Table (4) With the exception of educational characteristics ( $p=0.015$ ), the results showed that there were no significant differences in the overall reports from adolescents on the global nutritional assessment of children. Average outcomes. According to a study by (Wiafe atel (2023), one hundred participants finished the questionnaire (50 for the intervention group and 50 for the control group). At the end of the study, there was no statistically significant difference ( $p > 0.05$ ) observed between the research groups for underweight, hemoglobin, ferritin, and dietary press admissions, with the exception of vitamin C admissions.

### 5. Table (5). Significant Differences in Overall Adolescents Report for Global Nutritional Assessment in Children with regard their Hemoglobin Level ( $n=200$ )

Table Five (5) The results showed that there were notable variations in the hemoglobin level ( $p=0.035$ ) between the overall adolescents report and the global nutritional assessment in children. This outcome is consistent with a research by (Kusuma Atel 2019). They concluded from their research that there is a statistically significant correlation between teenage nutritional status and hemoglobin level.

## CONCLUSION

The study generally demonstrated that adolescents' nutritional status was only moderately affected by hemoglobinopathy. The statistical findings were middling. Adolescents with hemoglobinopathy have significantly different nutritional states because of their surroundings, the influence they have on their healthy peers, or demographic reasons. Compared to their contemporaries who were unaffected or in good health, those with hemoglobin disorders were more affected by nutritional defects. According to the study, caregivers will benefit if they get involved in initiatives that promote nutrient-dense eating habits. The study found that the affected adolescents' demographic characteristics, particularly their degree of schooling and blood hemoglobin content, had an effect on them.

## RECOMMENDATIONS

.. In order to improve the nutritional condition of patients with inherited blood disorders, hospitals and particularly hematology centers need to establish health systems with nutritional value. Improving the nutritional status of affected children and their parents, whether or not they are housed in hematological facilities, by educating them about a healthy nutritional status system. Carrying out a number of investigations to improve the surroundings and therapy options for teenagers with hemoglobinopathies in order to raise their nutritional status.

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