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## **THE VALUE OF HEMOGLOBIN CONTENT IN CHILDREN WITH COMMUNITY-ACQUIRED PNEUMONIA**

The purpose of this study was to evaluate Hemoglobin level in children with community-acquired pneumonia (CAP). Hemoglobin content was measured in 30 children with CAP in multicenter children hospital of Andijan region (Uzbekistan). The relationships between hemoglobin level and clinical/laboratory characteristics of CAP were studied by multiple linear regression. Diagnosis of CAP was confirmed by X-ray studies. Mean Hb level was 80.6 g/l, minimum 60 and maximum 96 g/l respectively (standard deviation – 9.500, CI - 95%). Age of patients or severity CAP was not predictive for Hb levels, and Hb content was not significant trigger for hospital days.

**Keywords:** Hemoglobin, patient, pneumonia, anemia, hospitalization.

## **РОЛЬ УРОВНЯ ГЕМОГЛОБИНА У ДЕТЕЙ С ВНЕБОЛЬНИЧНОЙ ПНЕВМОНИЕЙ**

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Целью данного исследования была оценка содержание гемоглобина у детей с внебольничной пневмонией (ВП). Уровень гемоглобина определено у 30 детей с внебольничной пневмонией на многопрофильной детской больнице Андижанской области (Узбекистан). Взаимосвязь между уровнем гемоглобина в плазме и клинико-лабораторными характеристиками ВП изучено методом множественной линейной регрессии. Диагноз ВП был подтвержден рентгенологическим исследованием. Средний уровень гемоглобина составил 80.6 г/л, минимальный 60 и максимальный 96 г/л соответственно. Возраст пациентов или тяжесть ВП не были прогностическими факторами для уровня гемоглобина в плазме, а также

содержание гемоглобина не был значительным триггером для продолжительности госпитальных дней.

**Ключевые слова:** гемоглобин, пациент, пневмония, анемия, госпитализация.

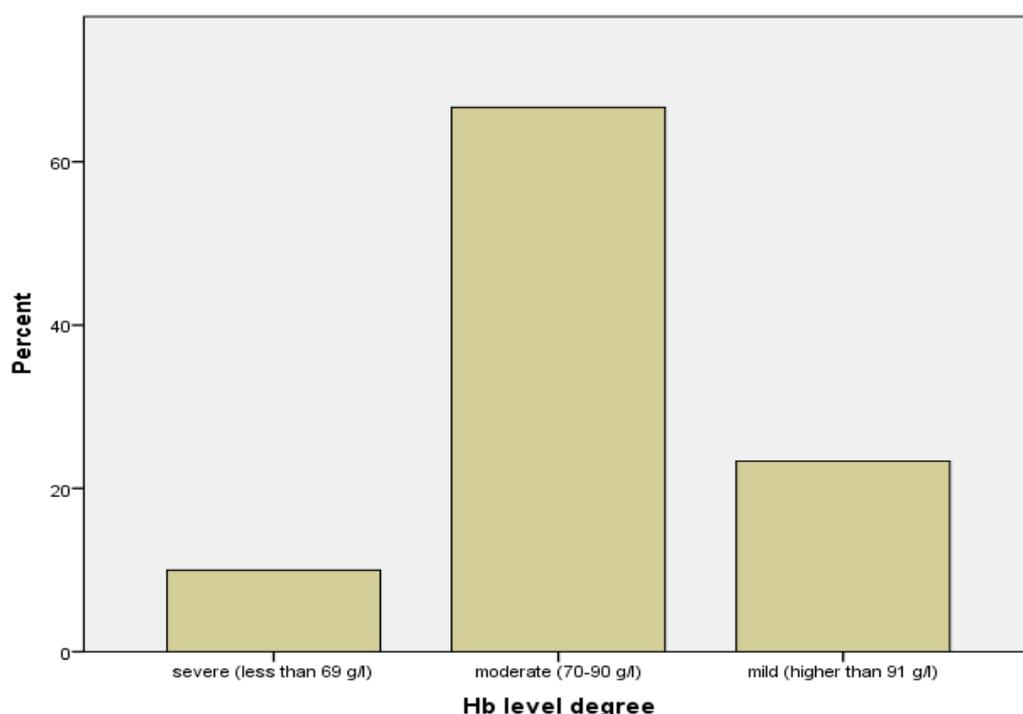
**Introduction.** Community-acquired pneumonia (CAP) is a leading cause of morbidity and mortality (1). In recent decades, many studies have been conducted to determine the predictors of poor outcomes in patients hospitalized for CAP, including comorbidities and laboratory parameters at admission (2). Based on these characteristics, several prognostic measures have been developed, such as the evaluation of the results of a study of patients with pneumonia (3). Although there is a large amount of evidence in this area in the general population, less attention has been paid to younger group of patients, even though several recent studies have shown an increase in the number of hospitalizations for CAP among patients under 5 years of age. We studied several studies conducted in children to analyze the hemoglobin content and its role during acute diseases in recent decades (4). The significance of plasma hemoglobin (anemia) in pneumococcal pneumonia has been documented (5), and insufficient data have been published for children with ongoing pneumonia. The aim of this study was to determine the level of hemoglobin in blood plasma in children with community-acquired pneumonia (CAP), being treated in a hospital, and its role in the course of the disease.

**Methods:** This prospective study was conducted at the Pediatrics Department of the Multidisciplinary Children's Hospital of Andijan Region, Uzbekistan, from January 1, 2022 to March 1, 2022. Pediatric Department, were eligible to participate in the study. Inclusion criteria: All patients with symptoms and signs suggestive of pneumonia on admission, including fever ( $>38.4^{\circ}\text{C}$  axillary), cough, and abnormal breath sounds on auscultation.

*Exclusion Criteria:* We excluded patients with acute bleeding episodes as this would indicate a transient and potentially rapidly reversible cause of anemia. Although the majority of patients excluded for this reason had a bleeding episode within 2 weeks prior to admission, we excluded patients with acute blood loss at any time during the 6 months prior to admission. Statistical analysis was

performed using SPSS software (version 23.0). Normal distribution data were expressed as mean  $\pm$  standard deviation (mean SD). To compare these data, we used the T-test of independent samples. Statistical significance was defined as  $P < 0.05$ .

**Results:** 30 patients were hospitalized, of which 47% (14) were children under 3 years of age. A severe form of pneumonia was observed in 23 patients, the rest were diagnosed with a moderate degree in 23.3% (7 patients). The mean



plasma hemoglobin concentration was 80.6 g/l (Table 1) Graph 1. The ratio of children by degree of anemia

Table 1. The mean difference of patients in several categories.

Descriptive Statistics						
Hb level degree		N	Minimum	Maximum	Mean	Std. Deviation
severe (less than 69 g/l)	hospital days	3	7	15	10.33	4.163
	Glucose level mmol/l	3	4	8	5.37	2.540
moderate (70-90 g/l)	hospital days	20	4	9	6.20	1.576
	Glucose level mmol/l	20	3	8	3.81	1.257
mild (higher than 90 g/l)	hospital days	7	4	11	7.29	2.690
	Glucose level mmol/l	7	2	9	4.18	2.183

There were only 3 (10%) children with severe anemia (<69 g/l); moderately severe (70-90 g/l) was observed in 20 children (66%), and mild anemia (>91 g/l) was detected in 7 children (24%). The mean standard deviation for patient age was 48-49 months, and there were no complications. The mean standard deviation of the hemoglobin level in patients with moderate severity was 77.43 g/l, in patients with severe CAP - 81.57 g/l ( $p = 0.322$ , 95% CI = 4/261-5.567) (Table 2).

Table 2. Mean difference in disease severity

Group Statistics						
	Degree of the disease	N	Mean	Std. Deviation	Std. Error Mean	P value
Hb level g/l	moderate	7	77.43	10.179	3.847	0.322
	severe	23	81.57	9.302	1.940	0.361

Upon further analysis of the effect of age on hemoglobin levels, the patients were divided into two groups; patients aged 3 years and older. Hemoglobin values in the group of patients under 3 years (mean SD = 77.29 g/l, standard deviation = 2.902) were not significantly higher ( $p = 0,073$ , 95% CI= 0.622 – 0.886) in the group older than 3 years (83.5 г/л,  $p = 0,083$ , 95% CI = 0.622 – 0.886).

Table 3. The mean difference by age categories.

Group Statistics						
	age groups	N	Mean	Std. Deviation	Std. Error Mean	P value

Hb level g/l	under 3 years old	14	77.29	10.859	2.902	0.073
	older than 3 years old	16	83.50	7.285	1.821	0.083

As well as the content of hemoglobin for the duration of hospitalization was considered. We subdivided patients into 2 groups: up to 7 days and more than this in a hospital setting. The average hemoglobin content in the first group was 82.59 g/l, and in the second group it was 78 g/l (p value 0.195- 0.204 95% CI 11.665- 11.832).

Table 4. The mean difference in duration of hospitalization

	hospital degree	N	Mean	Std. Deviation	Std. Error Mean	P value
Hb level g/l	less than 7 days	17	82.59	8.882	2.154	0.195
	more than 7 days	13	78.00	10.000	2.774	0.204

**Conclusion.** Hemoglobin content is not a significant trigger for children during community-acquired pneumonia. Neither severity nor age was significantly associated with changes in hemoglobin levels. And also the state of anemia also did not greatly change the course of the disease. Research on this topic should be raised to a higher level with the majority of patient groups in randomized multicenter trials.

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