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PROGNOSTIC TABLES AND THEIR ROLE IN DETERMINING THE RISK OF ANEMIA IN CHILDREN

RIZAEV JASUR ALIMJANOVICH[1] & KULIEV OZOD ABDURAXMONOVICH[2]

[1]Professor, Rector of Tashkent State Dental Institute, Uzbekistan

[2]Teacher of the Department of Public Health, Management and Physical Education of Tashkent State Dental Institute, Uzbekistan

ABSTRACT

The article presents data on the development and implementation in practice of prognostic tables, as well as their application for early detection of anemia in children. Anemia is one of the most common not only medical but also socio-economic problems of modern medicine and public health on a global scale. Anemia is one of the most common not only medical but also socio-economic problems of modern medicine and public health on a global scale. In this regard, the prognostic tables developed taking into account the risk factors of anemia can prevent the expected outcome, detect the disease at an early stage, develop primary, secondary individually differentiated preventive measures, taking into account the risk groups of children and their dispensary observation and monitoring.

KEYWORDS: Prognostic Tables, Anemia, Risk Factors & Children

INTRODUCTION

Anemia is one of the most common not only medical but also a socio-economic problem of modern medicine and public health on a global scale. [1,2,3,4,6]. According to the World Health Organization (WHO), the prevalence of anemia in the world is 22.9-26.7%. [11,12,13]. Risk factors - a group of factors that threaten human health, have a biological, genetic, ecological, medical-social character, which results in the origin, development, and adverse effects of the disease, and depends on home, production and living conditions. Identification of anemia's risk factors is of great importance on its prevention [5, 7].

OBJECTS

Study the risk factors of anemia in children and to compose a prognostic table.

MATERIALS AND METHODS

We used a case-control research method to study the effects of anemia on children (B. Mamatkulov, 2013).

A case-control research method is one of the analytical methods, used to investigate the relationship between the cause and the outcome, and therefore is a retrospective method.

Of the 1388 children involved in the study (851 cases of anemia and 537 healthy children without anemia), for the study of the frequency of factors which influence to the development of anemia in children, via method of control-case, we divided 1276 children into the group of cases - 765 and controls group - 511 children, and developed a questionnaire called "The study of socio-biological factors, housing conditions and lifestyle, influencing to the development of anemia in children".

In this case, we analyzed 19 factors, that probability of leading to children's anemia is high (Table 1). It is important for a physician – scientific researcher to determine whether there is a link between disease development and the risk factors.

In order to answer, whether has a relationship between the cause and outcome, the researcher should calculate the relative risk (cohort research method) or the odds ratio (case-control research method). Odds ratio (OR) indicates the degree of relationship between the risk factor and the outcome of the disease or the significance of the factor influencing the result of the study.

Odds ratio - Represents the probability of disease progression in the implementation of preventive measures against the disease under study or in case of non-implementation of these measures and is individually assessed for each factor's gradation.

In the first stage (Table 1), firstly, all children in the case and control group are classified by the grading of each factor (columns 1.2).

In the second stage, for the gradation of each factor: the absolute risk is calculated by determining the ratio of a case and control group (column 6).

In the third stage, the odds ratio is calculated in order to determine the effect of each factor on the studying outcome: The highest absolute risk indicator, determined by the gradation of each factor, is divided by the lowest risk indicator in the gradation of this factor (Table 1).

FINDINGS AND THEIR DISCUSSIONS

The 19 factors we have studied (Table 1) in some ways, affect the developing of anemia in children. In that, if the influential power of the factor on the outcome is higher than 1, then it is significant, if it is lower than 1, then this influence is not proved by the statistical method. The more influential power of a factor shows the stronger its influence on the outcome being studied.

Table 1:Socio-Biological Factors, Factors Depending on the Living Conditions and Lifestyle of the Family, Influencing to the Developing of Anemia in Children

No	Factor	Factors gradation	The case group (anemia) n = 765 (%)	Control group (healthy) n = 511 (%)	Absolute risk	Oddsratio (relative risk)
1	Mother's age	Up to 20 years	3.8	2.7	1.4	1.6
		20-24 years	9.8	11.2	0.9	
		25-29 years	25.2	24.3	1.0	
		30-34 years	26.9	27.4	1.0	
		35-39 years	30.1	29.5	1.0	
		40 years and	4.2	4.9	0.9	
2	Mother's education	High	5.1	3.7	1.4	1.4
		medium special	90.3	92.0	1.0	
		Middle	4.6	4.3	1.0	
3	Mother's social status	Worker	22.7	17.6	1.3	2.2
		Employee	8.8	14.1	0.6	
		Housewife	68.5	68.3	1.0	
4	Child's living conditions	Good	61.0	79.4	0.8	3.0
		Satisfactory	26.4	15.3	1.7	
		unsatisfactory	12.5	5.3	2.4	
5	The child's diet	Follows	71.9	87.6	0.8	2.8
		does not follow	28.1	12.4	2.3	
6	Hot meals a day	1 time	8.4	7.7	1.1	1.1
		2 times	79.6	81.2	1.0	

		3 times and more	12.0	11.1	1.1	
7	**The character of eating**	Different	86.2	88.0	1.0	1.8
		Boiled	2.9	3.7	0.8	
		Fatty	6.2	4.3	1.5	
		Roasted	4.7	4.0	1.2	
8	**Evaluate the flour products, used in family**	Enough	78.0	84.3	0.9	1.6
		more than necessary	22.0	15.7	1.4	
9	**Croup**	Enough	94.0	96.5	1.0	1.1
		Not enough	6.0	5.5	1.1	
10	**Meat dishes**	Enough	82.3	61.2	1.4	2.8
		Not enough	17.7	38.8	0.5	
11	**Dairy**	Enough	89.0	89.4	1.0	1.0
		Not enough	11.0	10.6	1.0	
12	**Fruits and Vegetables**	Enough	26.9	29.9	0.9	1.2
		Not enough	73.1	70.1	1.0	
13	**Fishes**	Enough	85.6	87.7	1.0	1.2
		Not enough	1 4.4	12.3	1.2	
14	**Does he consume fortified flour products or bread?**	Enough	57.3	64.0	0.9	1.3
		more than necessary	42.7	36.0	1.2	
15	**Was the child born prematurely?**	No	97.4	97.2	1.0	1.1
		Yes	2.6	2.8	0.9	
16	**Has iron deficiency anemia been observed in the mother during pregnancy**?	No	34.4	65.8	0.5	3.8
		Yes	65.6	34.2	1.9	
17	**Was the baby breastfed?**	No	22.5	12.1	1.9	2.1
		Yes	77.5	87.9	0.9	
		Yes	73.0	73.2	1.0	
18	**Does the child has helminth infections**	No	8 1.6	93.9	0.8	3.9
		Yes	18, 4	6.1	3.0	
19	**Did he use antibiotics irregularly**	No	91.8	95.9	0.9	2.2
		Yes	8.2	4.1	2.0	

However, it should be taken into account the reliability of the influence of these factors on the studying result. And for this, using the criterion of statistical compatibility – X^2, we determined the significance of the influence of the factor under study on the development of anemia in children, that is, the degree of risk.

When we calculated the compatibility criterion – X^2 of the influence of mother's age on the development of anemia in children: we got $X^2 = 1.51$; $P > 0.05$ indices. When studying the influence of mother's education on the development of anemia in these children, we got $X^2 = 1.52$; $P > 0.05$. When studying the influence of mother's social status, the child's living conditions on the development of anemia in children, we respectively had $X^2 = 44{,}77$; $P<0{,}001$; $X^2 = 48.57$; $P<0{,}001$ values. As can be seen from the above, the ratio of odds of anemia in studying of mother's age is 1.6; Although the odds ratio in mother education was 1.4, we determined that this influence is not statistically significant. The odds ratio of the mother's social status was 2.2, the child's living conditions — 3.0, and statistically proved their significance. So, to take into account each factor, it is needed to assess the confidence level.

For the early detection of children with a high probability of anemia and children with anemia, carrying out diagnostic and therapeutic work, to develop measures of integrated, individual, differentiated primary, secondary prevention, to keep children under regular check-up and monitoring them, it is needed to get general data.

Table 2: Factors Linked with Social – Biological, Living Conditions and Lifestyle, that Influence the Developing of Anemia in Children

No	Factor	Factors gradation	Case group (anemia) n = 765 (%)	Control group (healthy) n = 511 (%)	Absolute risk	Odds ratio (factor loading)
1	2	3	4	5	6	7
1	**Mother's social status**	worker	22.7	17.6	1.3	2.2
		employee	8.8	14.1	0.6	
		housewife	68.5	68.3	1.0	
2	**Child's living conditions**	good	61.0	79.4	0.8	3.0
		satisfactory	26.4	15.3	1.7	
		unsatisfactory	12.5	5.3	2.4	
3	**The child's diet**	Follows	71.9	87.6	0.8	2.8
		does not follow	28.1	12.4	2.3	
4	**Taking of meat products**	Not enough	82.3	61.2	1.4	2.8
		enough	17.7	38.8	0.5	
5	**Has iron deficiency anemia been observed in the mother during pregnancy**?	No	34.4	65.8	0.5	3.8
		Yes	65.6	34.2	1.9	
6	**Was the baby breastfed?**	No	2 2.5	12.1	1.9	2.1
		Yes	7 7.5	8 7, 9	0.9	
7	**Does the child has helminth infections**	No	8 1.6	93.9	0.8	3.9
		Yes	18, 4	6.1	3.0	
8	**Did he use antibiotics irregularly**	No	91.8	95.9	0.9	2.2
		Yes	8.2	4.1	2.0	
Min (∑ R)					6.1	Risk range 10.1
Max (∑ R)					16.2	

Our studies have shown that important factors that influence to the development of anemia in children are: the social status of the mother, the living conditions of the child, diet, eating meat dishes, breastfeeding, the presence of iron deficiency anemia in the mother, the presence of helminthiases in the child, inappropriate use of antibiotics for the purpose of treating a child. And for this, we recommend predicting only the odds ratio of factors with risk ratio at least 2 of the studied risk factors for the compilation of a prognostic table. The table should be simple, reliable, easy to use. To do this, it suffices to select 8-10 factors (table 6). For an integrated assessment of risk factors and the compilation of prognostic tables (table 6), the summary or indicator of the lowest risk (Rmin) is determined by adding the smallest indicators of absolute risks from the gradation of each risk factor, and the summary or indicator of the highest risk (Rmin) is determined by adding the largest indicators absolute risks from the gradation of each risk factor.

The lowest risk ($\sum$Rmin) = $R_1^{min} + R_2^{min} + R_3^{min} + ... R_n^{min} = 6.1$

The largest risk is ($\sum$Rmax) = $R_1^{max} + R_2^{max} + R_3^{max} + ... R_n^{max} = 16.2$

Based on the values obtained, the total risk range is determined:

$R_{max} - R_{min}$ = In our example, this was 10.1.

Then, depending on their level, during the formation of risk groups, three groups are classified: groups of the low, medium, high risk.

For each group, a range of risk values is calculated

- Low-risk group: the sum of the lowest risk indicators (∑Rmin) + (∑ Rmax-∑ Rmin) × 30: 100 = 6.1 + 3.03 = 9.13, thus the range of low-risk groups was 6.1 - 9.13
- Group of moderate risk: the sum of the lowest risk indicators (∑Rmin) + (∑ Rmax-∑ Rmin) × 60: 100 = 12.2 the range of the moderate -risk group was 9.14–12.16.
- High-risk group: from the highest indicator of moderate risk group to ∑ Rmax, that is 12.17 - 16.2.

Thus, the range of small risk groups is (10.1) 30% of the total risk, the moderate risk group is also 30%, the high risk group is 40%.

On prognosing the outcome, it is recommended to name 3 risk groups:

- Low-risk group - favorable forecast
- Group of moderate-risk - the forecast requiring attention
- The high-risk group - an unfavorable prognosis.

To study the complex effects of the above-mentioned risk factors and to prevent anemia in children, attendingin an outpatient clinic, it is needed to divide them into the above-mentioned groups.

Thus, according to the results of our study, we divided the total risk ranges into three smaller ranges. The lowest risk group was (6.1 - 9.13); moderate (9.14 - 12.16) and the highest risk groups (12.17 - 16.2).

Table 3:Risk Groups for Small Ranges and the Development of Anemia in Children

Small Risk Ranges	Small ranges values indicator	Risk groups
Minimum risk	6.1 - 9.13	Favorable prognosis
Medium Risks	9,14 - 12,16	Attention
Maximum risk	12,17 - 16,2	Unfavorable prognosis
Total range	6.1 - 16.2	

Depending on the level of the risk range for anemia, children can be divided into favorable, requiring attention, unfavorable groups of prognosis (Table 3). Consequently, the higher the risk of the disease in a child,it will be a reason for adding him to the group of unfavorable prognosis.

When conducting a survey-control in each individual case, in order to determine the risk of the disease and establish medical, social and preventive measures, after identifying the risk factors of the child and indicating the relevant indicators from the 6th table, according to the 3rd table it is determined which group risk enters the child and appropriate scientific decisions are made.

For example Akhmedov. A., 2 years old, mother is an employee, the child's living conditions are satisfactory, follows the diet, does not consume meat dishes in sufficient amount, during pregnancy the mother had iron deficiency anemia, the mother fed the baby with breast milk, the child did not have helminth infections, did not take antibiotics irregularly.

Risk group = 1.3 + 1.7 + 1.4 + 1.9 + 0.9 + 0.8 + 0.9 = 8.9

Thus, Akhmedov A, included into the low risk group, the prognosis is favorable.

CONCLUSIONS

The prognostic table developed by us allows a comprehensive assessment of risk factors, which plays a large role in the development of anemia in children. And it helps general practitioners, working in primary health care, for the prevention of anemia, early diagnosis and for the development of individual, differentiated, scientifically based measures.

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