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COMPARATIVE ANALYSIS OF MEASLES WITH REGARD OF VACCINATION

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Introduction

Duration of Measles is a world and actuality medical and social problem. Measles - an acute viral and antropozoon disease with intoxication, catarrhal lesions of the upper respiratory tract and macula - papular rash. In the prevaccination period of the disease was spread everywhere and was as one of the leading causes of death in the children.

From January 2011 in the 29 countries of the European region recorded more than 30 thousand cases of measles among all age groups - from babies to adults according to the WHO latest data, In the Ukraine were observed in 2001 (16 970 cases), 2006 (42,724 cases) and 2012 (12 746 cases) according to a retrospective analysis of measles [1, 2]. The during of the current epidemic process dictates the need for a whole set of preventive and anti-epidemic measures and requires increased attention of the doctors for early diagnosis and prevention of measles [3, 4].

The aim of the work

Aim of the present study to evaluate the problem of duration of measles in the children from vaccination.

Material and methods

We investigated child's contingent with Measles from the Zakarpattya region (135 children, age $26,68 \pm 1,37$ months) with regard of vaccination

Results

We presented comparative analysis of measles with regard of vaccines. During the analysis of the data concerning vaccinating against measles we recorded no clear bio-chemical regional difference. That's why the analysis concentrates on the very fact of vaccination.

In the table 1 we show the peculiarities of measles in the cases of vaccinated and nonvaccinated children.

Table 1

Measles in the cases of vaccinated and nonvaccinated children

Parameters	Vaccinated (n=66)		Nonvaccinated (n=69)		P
	n	%	n	%	
Decreased appetite	66	100	69	100	p>0,05
Weakness	66	100	69	100	p>0,05
Headache	33	50	42	60,87	p>0,05
Eye redness	66	100	69	100	p>0,05
Light sensitivity	24	36,36	40	57,97	p<0,05
Secretion	38	57,58	46	66,67	p>0,05
Stuffy nose	66	100	69	100	p>0,05
Mucus secretion	66	100	69	100	p>0,05
Cough	66	100	69	100	p>0,05
Dyspnea	12	18,18	35	50,72	p<0,001



Nausea	7	10,61	7	10,14	p>0,05
Vomiting	7	10,61	7	10,14	p>0,05
Stomach ache	17	25,76	18	26,09	p>0,05
Fluid stool	23	34,85	52	75,36	p<0,001
Cattarrh syndrome – less than 5 days	39	59,09	24	34,78	p<0,05
more than 5 days	27	40,91	45	65,22	p<0,01
Temperature: 37-38 C	3	4,55	12	17,39	p<0,05
38-39 C	29	43,94	37	53,62	p>0,05
39-41 C	34	51,52	20	28,99	p<0,01
Complications: Acute unilateral pneumonia	3	4,55	10	14,49	p<0,05
Acute bilateral pneumonia	4	6,06	6	8,70	p>0,05
Acute bronchiolitis	1	1,52	11	15,94	p<0,01
Acute bronchitis	11	16,67	20	28,99	p>0,05
Acute obstructive bronchitis	5	7,58	8	11,59	p>0,05
Acute catarrhal otitis media	-	-	1	1,45	-
Days of curation -1-5 days	41	62,12	2	2,90	p<0,001
-6-10 days	23	34,85	57	82,61	p<0,001
- more than 10 days	2	3,03	10	14,49	p<0,05

Note. P– liability of the data in the case of vaccinated and nonvaccinated children.

While comparing the data of the two groups we can see the difference in the majority of parameters. The illness is harder in the case of nonvaccinated children, for example: light sensitivity – 24 (36,36%) to 40 (57,97 %), p<0,05), dyspnea 12 (18,18 %) to 35 (50,72 %), (p<0,001), fluid stool 23 (34,85 %) to 52 (75,36 %), (p<0,001). In the case of 39 (59,09 %) vaccinated children cattarrh syndrome was longer than in the case of nonvaccinated children – 24 (34,78%), (p<0,05), but there was reversive reaction during 5 days 27 children (40,91%) and 45 children (65,22 % in the groups), (p<0,01). In the case of vaccinated children the temperature (39-41 C) was more typical, while in the case of nonvaccinated the temperature (37-39 C) was more typical. The period of fever was longer in the case of nonvaccinated children 6,16±0,15, than in the case of vaccinated – 5,75±0,41 days. The data concern-

ing the complications was more liable: acute unilateral pneumonia – 3 (4,55 %) to 10 children (14,49 %) in the groups, (p<0,05), acute bilateral pneumonia – 4 (6,06 %) to 6 children (8,70 %), acute bronchiolitis – 1 (1,52 %) to 11 (15,94 %) (p<0,01), acute bronchitis – 11 (16,67 %) to 20 (28,99 %) in the groups and acute obstructive bronchitis – 5 (7,58 %) to 8 children (11,59 %). In the case of 24 vaccinated children (36,38 %) and 55 nonvaccinated (79,71 %) we recorded complications with breathing. Because of the greater amount of complications in the case of nonvaccinated children the period of curation was longer. The children curation – less than 5 days long – is typical for vaccinated children (p<0,001), whereas more than 10 days long – for nonvaccinated children (p<0,05).

We also conducted biochemical serum tests.



Table 2

Biochemical tests of venous blood of the children who have measles

Parameters	Vaccinated (n=32) M±m	Nonvaccinated (n=35) M±m	P
Direct Bilirubin (mkmol /l)	3,20±0,70	1,73±0,26	p>0,05
Bilirubin (mkmol /l)	6,30±0,68	5,69±0,44	p>0,05
Protein total (g/l)	63,77±1,67	61,44±1,56	p>0,05
Albumen (g/l)	40,77±1,16	41,78±1,15	p>0,05
ALAT (IU/l)	30,23±4,78	35,50±2,69	p>0,05
ASAT (IU/L)	64,00±4,87	52,00±8,49	p>0,05
GGT (IU/L)	15,15±1,45	15,00±1,41	p>0,05
Urea (mmol/l)	2,30±0,16	2,67±0,17	p>0,05
Creatinine (mkmol /l)	45,28 ±2,00	55,80±8,67	p>0,05
Alkaline phosphatase (IU/l)	280,77±29,73	281,75±25,23	p>0,05
Thymol test (IU)	4,34±0,60	3,40±0,19	p>0,05
Glucose (mmol/l)	5,22±0,10	5,21±0,10	p>0,05
Amilasa (g/l)	17,97±1,74	19,03±1,77	p>0,05

Note. P- liability of the data in the case of vaccinated and nonvaccinated children. According to our exploration there is no difference between the groups.

We also analyzed mineral balance in the groups.

Table 3

Mineral balance in the case of children with measles

Parameters (mmol/l)	Vaccinated (n=34) M±m	Nonvaccinated (n=41) M±m	P
Potassium	3,87±0,11	4,19±0,16	p>0,05
Natrium	137,84±0,50	137,98±0,41	p>0,05
Chlorine	102,91±0,58	104,46±0,84	p>0,05
Calcium	2,24±0,01	2,23±0,02	p>0,05

Note. P- liability of the data in the case of vaccinated and nonvaccinated children.

We can see minimal growth of Potassium and Chlorine in the case of nonvaccinated children.

Here are the results of immunological status analysis.

Table 4

Immunological status analysis

Parameters	Vaccinated (n=32) M±m	Nonvaccinated (n=35) M±m	P
Il-1 (pg/ml)	0,86±0,09	1,17±0,15	P<0,01
Il -2 (pg/ml)	9,69±0,39	8,95±0,40	P>0,05
Il-6 (pg/ml)	28,04±5,71	44,59±5,21	P<0,01
Il - 10 (pg/ml)	18,73±2,04	18,56±2,63	P>0,05
Interferon - γ (pg/ml)	80,73±13,95	84,16±13,80	P>0,05
Neopterinum (nmol/l)	115,19±7,51	115,78±9,30	P>0,05

Note. P- liability of the data in the case of vaccinated and nonvaccinated children.



We can see high levels of IL-2, IL-6, IL-10, IF- γ and neopterinum. According to our data, we can see clear domination of the levels of IL-1 ($0,86\pm 0,09$ to $1,17\pm 0,15$), ($p<0,01$) in the groups and IL-6 ($28,04\pm 5,71$ to $44,59\pm 5,21$), ($p<0,01$)

which correlates with the period of catarrh syndrome (more than 5 days 27 ($40,91\pm 6,05$) to 45 ($65,22\pm 5,73$) and the period of fever ($5,75\pm 0,41$ to $6,16\pm 0,15$) in the groups. Here is the data of microelement analysis of blood plasma.

Table 5

Microelement analysis of blood plasma in the case of children with measles

Parameters	Vaccinated (n=43) M \pm m	Nonvaccinated (n=48) M \pm m	P
Iron (mmol/l)	36,68 \pm 4,21	33,16 \pm 5,74	p>0,05
Copper (mg/l)	0,41 \pm 0,04	0,64 \pm 0,04	p<0,05
Zinc (mg/l)	0,55 \pm 0,04	0,55 \pm 0,03	p>0,05
Phosphorus (mmol/l)	707,21 \pm 40,05	544,30 \pm 49,03	p<0,01
Iodine (mg/l)	69,9 \pm 0,58	64,7 \pm 0,69	p<0,05

Note. P- liability of the data in the case of vaccinated and nonvaccinated children.

In the group of nonvaccinated children we can record decrease of copper ($0,41\pm 0,04$ to $0,64\pm 0,045$ mg/l), ($p<0,05$), phosphorus ($707,21\pm 40,05$ to $544,30\pm 49,03$, $p<0,01$)

and Iodine ($69,9\pm 0,58$ to $64,7\pm 0,69$ mmol/l, $p<0,05$).

We also conducted multifactorial regressive analysis in the groups.

Table 6

Dates of multifactorial regressive analysis in the groupe of Nonvaccinated children

Parameters	Tests	β	P
Enlargement of the liver	Direct bilirubin	0,38	p<0,05
	ALAT	0,56	p<0,05
	IL-6	-0,42	p<0,05
	Iron of plasma	-0,56	p<0,05
Increased liver echogenicity	Total protein	0,69	p<0,05
	Albumen	0,88	p<0,05
	ALAT	0,47	p<0,05
Enlargement of the pancreas	Direct bilirubin	0,70	p<0,001
	Total protein	0,88	p<0,001
	ALAT	0,46	p<0,01
	IL-2	0,42	p<0,05

According to results in the case of nonvaccinated children we can record dependency of liver size and level of direct bilirubin ($\beta=0,38$), ALAT ($\beta=0,56$), IL-6 ($\beta=-0,42$) and Iron level of blood serum. ($\beta=-0,56$), ($p<0,05$). Increased liver echogenicity interconnected with the levels of total protein ($\beta = 0,69$),

albumin ($\beta = 0,88$), ($p<0,001$), and ALT ($\beta = 0,46$). Enlargement of the pancreas caused by levels of direct bilirubin ($\beta = 0,70$), total protein ($\beta = 0,88$), ($p<0,001$), ALT ($\beta = 0,46$) and IL-2 ($\beta = 0,42$), ($p<0,05$). Mutual dependency of these factors can be recorded in the case of vaccinated children.



Table 7

Dates of multifactorial regressive analysis in the groupe of vaccinated children

Parameters	Tests	β	P
Enlargement liver	bilirubin	0,96	p<0,001
-	total protein	0,56	p<0,01
-	albumin	0,58	p<0,01
-	ASAT	0,35	p<0,05
-	IL-1	0,99	p<0,001
-	IL-2	0,98	p<0,001
-	IL-6	0,32	p<0,05
-	IL-10	0,73	p<0,001
-	Iron	0,37	p<0,05
-	Iodine	0,96	p<0,001
Increased liver echogenicity	bilirubin	0,95	p<0,001
-	total protein	0,56	p<0,01
-	albumin	0,58	p<0,01
-	ASAT	0,35	p<0,05
-	IL-1	0,99	p<0,001
-	IL-10	0,74	p<0,001
-	Iron	0,38	p<0,05
-	Iodine	0,96	p<0,001
Enlargement of the pancreas	bilirubin	0,99	p<0,001
-	total protein	0,55	p<0,01
-	albumin	0,58	p<0,01
-	ASAT	0,35	p<0,05
-	IL-1	0,99	p<0,001
-	IL-2	0,98	p<0,001
-	IL-10	0,73	p<0,001
-	Iron	0,38	p<0,05
-	Iodine	0,98	p<0,001

Increased liver echogenicity interconnected with the levels of total protein ($\beta = 0,69$), albumin ($\beta = 0,88$) and ALT ($\beta = 0,47$). Enlargement of the pancreas caused by direct bilirubin levels ($\beta = 0,70$), total protein ($\beta = 0,88$), ALT ($\beta = 0,46$ and IL-2 ($\beta = 0,42$). We discovered dependency between the progress of measles and the level of Iodine ($\beta=0,96-0,98$), ($p<0,001$) in the case of vaccinated children according to ultrasonography. The statistics also demonstrates high mutual dependency of Cytocines (IL-1, 2, 6, 10) and microelements state of vaccinated children, espe-

cially of Iron and Iodine. It means there is a process of complex activation of the minerals in all systems of child body as a reaction on illness. It is advisable to apply appropriate immunological mineral diet to improve the curation.

Conclusions

During the analysis of the data concerning vaccinating against measles we recorded no clear bio-chemical regional difference. That's why the analysis concentrates on the very fact of vaccination.



Comparative analysis of the vaccinated and nonvaccinated group shows substantial difference in the majority of parameters. As we can see, the progression of illness is more complicated in the case of nonvaccinated children, for example, light sensitivity – 24 (36,36%) to 40 (57,97%), ($p < 0,05$), dyspnea – 12 (18,18%) to 35 (50,72%), ($p < 0,001$), sparse stool – 23 (34,85%) to 52 (75,36%), ($p < 0,001$). In the case of 39 (59,09 %) vaccinated children catarrh syndrome was more extended than in the case of nonvaccinated – 24 (34,78 %), ($p < 0,05$), but more than 5 days situation was reversed 27 children (40,91 %) and 45 (65,22 %) ($p < 0,01$). Vaccinated children had high temperature (39-41C), ($p < 0,01$), whereas for nonvaccinated children the temperature of 37-38 was typical ($p < 0,05$). The period of fever was longer in the case of nonvaccinated children $6,16 \pm 0,15$ days, than in the case of vaccinated – $5,75 \pm 0,41$ days.

Highly liable was indication of complications: acute unilateral pneumonia 3 (4,55%) to 10 (14,49%) children, ($p < 0,05$), acute bilateral pneumonia 4 (6,06%) to 6 (8,70%) children, acute bronchiolitis – 1 (1,52%) to 11 (15,94%) ($p < 0,01$), acute bronchitis – 11 (16,67%) to 20 (28,99%) and acute obstructive bronchitis – 5 (7,58%) to 8 (11,59%) children. To sum up, in the case of 24 vaccinated children (36,38 %) and 55 nonvaccinated (79,71%) we recorded complications with respiratory system.

Because of these complications nonvaccinated children were under curation for longer time. Highly representative is the data concerning curation up to 5 days which is 20 times more typical for vaccinated children ($p < 0,001$), whereas cura-

tion up to 10 days is 5 times more typical for nonvaccinated children ($p < 0,05$).

In the group of nonvaccinated children we recorded the decrease of Copper and Iodine in blood ($p < 0,05$) comparing with vaccinated children. According to our data, there is significant dominance of IL-1 ($p < 0,01$) and IL-6 ($p < 0,01$) in the case of nonvaccinated children, which correlates with catarrh period up to 5 days and up to 5 days of fever. These results can be explained by the fact, that IL-1 is responsible for the local inflammation and reaction of body in the case of infection. IL-6 is one of the most active cytokines which react on inflammation. They are also authentic pyrogenes.

Our dates presented communication hepatomegaly caused by of level of direct bilirubin ($\beta = 0,38$), ALAT ($\beta = 0,56$), IL-6 ($\beta = -0,42$) and level iron of blood plasma ($\beta = -0,56$) in the nonvaccinated children. Increased liver echogenicity interconnected with the levels of total protein ($\beta = 0,69$), albumen ($\beta = 0,88$) and ALT ($\beta = 0,47$). Enlargement of the pancreas caused by direct bilirubin levels ($\beta = 0,70$), total protein ($\beta = 0,88$), ALT ($\beta = 0,46$) and IL-2 ($\beta = 0,42$).

We recorded mutual dependency of the development morphofunctional features of measles and the level of Iodine ($\beta = 0,96-0,98$) in the case of vaccinated children according to ultrasonography. The statistics also shows high mutual dependency of including of Cytocines (IL-1, 2, 6, 10) and microelements state of vaccinated children, especially of Iodine and Iron, i.e. complex activization of all the systems of child body takes place, which proves the necessity of immunological mineral correction for better curation.

Перебіг корі в залежності від вакцинації

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Резюме. В результаті клініко-параклінічного аналізу даних перебігу корі в залежності від проведеної вакцинації були отримані такі дані. У дітей, вакцинованих проти кору, захворювання мало переважно легку форму та неускладнений перебіг (63,8 %) на відміну від нещеплених дітей, де переважали тяжкі та середньотяжкі форми (81,1%). У (79,7%) хворих відзначені ускладнення з боку органів дихання. В обох групах спостерігалися високі рівні IL-2, IL-6, IL-10, ІФН- γ та неоптерину. За нашими даними, було вірогідне переважання рівнів IL-6 у не вакцинованих дітей ($44,59 \pm 5,21$ пг/мл проти $28,04 \pm 5,71$ пг/мл, $p_{1,2} < 0,01$) відповідно по групах, що корелювало з тривалістю катарального синдрому більше 5 днів у 27 вакцинованих дітей (40,91%) проти 45 не вакцинованих дітей (65,22%, $p < 0,01$) та тривалістю лихоманки ($5,75 \pm 0,41$) проти ($6,16 \pm 0,15$) днів відповідно по групах. Спостерігалось зниження рівня міді у вакцинованих та невакцинованих дітей ($0,41 \pm 0,04$ проти $0,64 \pm 0,04$ мг/л відповідно по групах, $p < 0,05$) та йоду ($69,9 \pm 0,58$ проти $64,7 \pm 0,69$ ммоль/л відповідно по групах).

Ключові слова: діти, кір, вакцинація.



LITERATURE

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