

III. PROPHYLACTICAL PROBLEMS

COMPARATIVE STUDY OF SOME HAEMATOLOGICAL AND BIOCHEMICAL PARAMETERS OF PUPILS FROM TECHNICAL GRAMMAR SCHOOL OF WOODWORKING

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The education in the technical grammar schools is different and rather complex than that in the rest grammar schools. There are special programmes, new disciplines, definite regimen of labour and rest contributing to the loss of the ordinary "school" stereotype; there are extraordinary first contacts with the professional and production factors (Sukhareva L. M., 1981). In the organisms of pupils from such schools develop complex dynamic changes based on the functional adaptation to the multiple factors of the production environment (Bessedina A. A. et al., 1977; Sergev D. et al., 1977; Lebedeva I. V. et al., 1982) which are able to perform certain negative influences upon the young organisms (Haustova N. D., 1969; Serdyukovskaya G. N., 1975).

In the process of the production education in the school of woodworking the organism of the pupils for the first time gets acquainted with specific production factors: organic solvents, wood powder, noise. The expressiveness of initial reactions and degree of involving of the defensive and adaptive mechanisms towards the action of the chemical agent depend most of all on the age (Kaganomitch D. I., 1969). In the technical grammar schools pupils begin their study at the age of 15—16 years; for this age it is known that there is an increased sensitivity towards the unfavourable factors of the production environment (Doskin V. A., 1971; Kramarenko I. B., L. M. Sukhareva, 1975; Serdyukovskaya G. N., 1975).

In connection with the actual question about the action of chemical factors at low intensity level upon the immature organism (Roels H., U. P. Buchet, 1975; Rutenburg E. S., T. Moreinis, 1976; Serdyukovskaya G. N., 1978) we had planned to study and compare some haematological and biochemical parameters of pupils from the three classes of the technical grammar school of woodworking.

Material and methods

The study was performed during the school 1981/82 year. Based on the standards of the local Hygiene-Epidemiology Institute we considered the concentrations of the chemical factors (excluding toluole) under the limited quantities.

Our study covered 30 pupils from the three classes; they were investigated by using the routine methods for the following parameters: haemoglobin, erythrocytes, lipids and cholesterol, activity of enzymes GOT, GPT, LAP in serum, also acetone, hippuric acid, phenylglyoxalic acid and almond acid in urine. The controls were 15 pupils from the mechanical grammar school.

The results were analysed after the method of variations; the criterion of Student-Fisher "T" was used for comparison.

Results and discussion

Haemoglobin varied about quite similar average values without any definite statistical differences between the three groups of studied pupils and the controls (table 1).

The comparison with the age normal values did not show statistical amplitudes too. Erythrocytes were also in the normal values concerning age. However, their number for the pupils in the first year of education (4.5×10^{12}) was reliably higher to compare it with the control one and the rest groups ($p < 0.02$; table 1). Due to the stability of those parameters we considered that they could not be influenced by any of the production factors.

The results of the study of total lipids and cholesterol in serum shew certain amplitudes concerning the amount of cholesterol. As for the control groups there was an average level about 222 mg. However, cholesterol in serum of pupils from the first year of education was considerably lower ($p > 0.05$), but in serum of pupils from second and third year it was still lower ($p < 0.05$; $p < 0.01$; table 1).

The activity of the studied enzymes GOT, GPT and LAP was changed in a various degree. Table 1 shows that certain dynamics was registered with GPT.

Table 1

Indexes studied concerning serum and blood

Index	controls	1 st Group course	2 nd course	3 rd course
Hb g/l	138,30±4,60	137,25±4,60	144,20±31,3	138,90±3,30
Er $10^{12}/l$	4,03±0,11	4,50±0,44**	3,79±0,13	4,80±0,10
Total cholesterol mg %	222,21±23,70	166,60±17,56*	153,18±6,25*	156,91±5,75**
Total lipids mg %	539,00±37,79	510,90±62,68	577,00±24,71	571,39±25,64
GOT U/dm ³	12,32±1,80	8,91±1,10	12,65±1,19	8,50±1,64
GPT U/dm ³	6,17±0,90	3,00±0,63*	2,98±0,56**	2,37±0,37***
LAP U/dm ³	14,71±1,68	18,83±2,18	9,90±0,95*	12,77±1,17
	* <0,05	** p <0,01	*** p <0,001	

The control average values were 6.17 U/dm³ and the decrease of the enzyme activity was with 61.6 % for the pupils from third year of education ($p < 0.001$; table 1).

The activity of the serum GOT was not dynamically changed but still there was a decreased level for the third-year pupils when compared to the controls (table 1).

The values of the LAP activity for the control group were 14.71 U/dm³. As for the first-year pupils they were higher (with 21 %) and in the serum of pupils from second year these values were with 32.6 % decreased ($p < 0.05$; table 1); lower was the level (in comparison with the controls) of LAP activity for the group of pupils from third year.

The parameters in urine, specially the hippuric acid, shew also some dynamic changes of concentration. For the control group its average values were 0.42 g/dm³ whereas for the second-year pupils they were higher (0.76 g/dm³; $p < 0.05$). The acid concentration was relatively (but unreliably) high for the third-year pupils too.

The acetone concentration in urine of pupils from the control group varied about an average value of 4.35 mg/dm³. The pupils from the woodworking grammar school had a tendency of higher concentration, relatively more expressed for the group of second-year pupils (table 2).

The concentrations of phenylglyoxalic and almond acids in urine of pupils from the three groups varied about very similar and close average values without statistical differences even in comparison with the control group. However, when comparing the dynamics of all parameters from urine of the studied pupils we suggested certain tendency (excluding acetone) of changing the level of activity or concentrations with approximately 30 % of all pupils from the three groups. This fact we considered as an unfavourable one, showing the influence of the applied organic dissolvents upon the organism of the pupils under investigation.

The analysis of our data allowed to determine certain initial level of dynamics of proteins, lipids, carbohydrates. It was very important that most of all the changes in serum and urine contributed to the second-year pupils. Probably it was due to the massive initial contact between the organism of the pupils and the che-

Table 2

Urine concentrations of some acids

Group	Phenylglyoxalic acid mcg/cm ³	Indexes Mandal acid mcg/cm ³	Hippuric acid g/dm ³	Aceton mg/dm ³
Controls	37,36±5,34	273,06±18,92	0,424±0,120	4,35±0,97
1 st course	42,57±3,76	302,84±20,34	0,470±0,120	5,25±0,61
2 nd course	36,96±5,49	270,61±15,10	0,767±0,120*	5,96±0,67
3 rd course	43,99±5,40	301,68±29,07	0,670±0,250	5,40±0,31

* $p < 0,05$

mical factors. According to Sukharev L. M. et al. (1981) the character of the changes could be a result of the additional production factors accumulating considerably in the second year when the education became harder and more intensive. The less expressed dynamics of those changes in the organisms of pupils from third year could be contributed to the adaptation to the production factors when the intensity was still not at the level of the factory production (Ljublina E. I. et al., 1971; Sukhareva L. M., 1981).

The established changes of the studied parameters inform about certain unfavourable influence of the factors with low intensity (school education in wood-working conditions) upon the immature organism; therefore, it is necessary to suggest definite prophylactic and creative programmes.

Conclusion

1) Different changes concerning character and degree of the level of cholesterol, activity of GPT and LAP in serum, hippuric acid in urine, were registered in the pupils under study.

2) The changes were most manifested in serum and urine of pupils from second year of education.

3) Excluding acetone there was certain tendency in the dynamics of the parameters from urine of about 30 % pupils from each group.

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СРАВНИТЕЛЬНОЕ ИССЛЕДОВАНИЕ НЕКОТОРЫХ ГЕМАТОЛОГИЧЕСКИХ И БИОХИМИЧЕСКИХ ПОКАЗАТЕЛЕЙ У УЧЕНИКОВ ТЕХНИКУМОВ ПО ОБРАБОТКЕ ДЕРЕВА

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РЕЗЮМЕ

Во время производственной практики у трех групп учеников I, II и III курса и у контрольной группы юношей того же возраста были исследованы: гемоглобин, эритроциты, жиры, холестерин, активность энзимов ГПТ, ГОТ и ЛАП в сыворотке, и также концентрации ацетона, гипуровой, фенилглиоксальной и миндалевой кислот в моче.

Установлено, что наиболее быстро меняется активность ГПТ, которая в сыворотке трехкурсников уменьшается на 61 % по сравнению с контрольной группой. Активность ЛАП понижается у учеников второго курса. Она задерживается на сравнительно низком уровне и у трехкурсников. Уровень холестерина у исследуемых учеников ниже по сравнению с контрольной группой. Его уровень ниже всего у учеников третьего курса.

Из всех показателей мочи наиболее значительным изменениям подвергается концентрация гипуровой кислоты, которая повышается чувствительно у второкурсников. Наиболее высокие стоимости в моче учеников второго курса показывает ацетон.