



CHANGES OF EDUCATIONAL SYSTEM AND HEALTH STATUS CARE PROBLEMS IN THE REPUBLIC OF ARMENIA

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Abstract

It is known that in health development of pupils and students the educational process and educational environment play a great role (especially in case of pupils) alongside with a number of biosocial factors. That is why today numerous changes of educational system in Armenia intend to review the basic issue of the regulation of the educational factor, as well as its scientific substantiation.

The following research was directed to define the health status in pupils and students from schools and universities with new educational programs and regimen in Armenia in the post-soviet period and to work out hygienic measurements to maintain health. The psycho-physiological investigation and assessment of health status of students was conducted among 638 children at the age of 5.5 to 7 years studying in 14 schools of Yerevan city and 863 schoolchildren of 2 new type schools with intensive educational regimen, as well as among 1266 students of the Yerevan Medical University.

Unfavorable changes were noted in the health status of pupils and students, which were conditioned not only by numerous biosocial factors, but also by psycho-physiological factors and factors of educational environment, providing the educational process. Revealed infringements of hygienic norms concerning the educational regimen have conditioned unfavorable deteriorations of both mental capacity and educational activity and health status.

The efficacy of implementation of scientifically worked out hygienic technologies was supported.

It is recommended to collaborate with special boards to continue many-sided investigations both in schools and Universities to work out complex of preventive measurements directed to maintain the health of pupils and students.

Keywords: Armenia, educational process, pupils, students, health status

Introduction

Nowadays the health care issue of children, adolescents, and young people is one of educational key problems of preventive medicine, because in case of any change in livelihood of population, it is necessary to investigate the health status of its more vulnerable groups (in this case pupils and students). At present, it is required, because in educational institutions the traditional

measures of medical control have been changed, also new approaches to the health care system of children are still at development stages, as well as socioeconomic hard conditions have been added to all this, due to which during the last years a health status deterioration of infant population and the youth has been registered, as well as an increase in morbidity [Berezhkov L., 1995; Dietz W., 1996; Andersen R. et al., 1998; Pozdneeva T. et al., 2000; Cole S. et al., 2001; Ilyin A. et al., 2000; Kuchma V., 2001; Kuchma V., Sukhareva L., 2006; Lotyshevskaya N. et al., 2004; Parveen R., 2004].

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It is well-known that for health formation besides numerous social factors, inter-school factors for children and inter-university factors for students play a great role: in the genesis of diseases in these age groups the specific gravity of educational factor reaches up to 35%, that is because the organism is influenced by this factor at school every day, from 5 to 6 hours a day, 6 days a week and continuously from 10 to 12 years, as well as afterwards in higher educational institutions during 5-6 years of education, that is during the whole period of maturation [Mokeeva M., Setko N., 1995; Plyaskina I., 1998; Kuchma V. et al., 2000; Kuinji N., Stepanova M., 2000; Minnibaev T., Kuznetsova L., 2001; Sidorov A. et al., 2001; Avetisyan L., 2003; Avetisyan L. et al., 2006; Aghajanyan N. et al., 2005; Vardazaryan V., 2005; Simonyan A., 2006; Ksajikyan N., 2006; Markaryan A., 2006]. That is why scientific approaches and their implementation matters of fostering problems of educational factor must be of great importance.

In Armenia up to 1990s, the school education was unified and the educational process was scientifically based. Nowadays many schools of new type have been established in the Republic of Armenia (RA), which are functioning by educational regimes almost optionally chosen neglecting admitted hygienic norms. At the same time during the last years both foreign and national scientific investigations have shown that if pedagogical, medical and psychological combined measures have not been put in basis of changes made in educational sphere, they particularly have influenced the health status of students negatively.

At present, changes made in educational system pose serious problems for preventive medicine requiring solutions, which are directed to issues on organization of education of children at 5.5 to 6 years of age relevant to transmission to 12-year educational system and to health care problems of students studying with new educational programs and regimes at schools of new type such as colleges, gymnasiums, lyceums, as well as high educational institutions. The aim of our research

was to determine the health status of pupils and students. The preliminary data of performed investigations are presented below.

Material and methods

The cohort of investigation were pupils and students. Comparative analysis was done among 638 children at the age of 5.5 to 7 years studying in 14 schools of Yerevan city and 863 schoolchildren of 2 new type schools (a lyceum after A. Shirakatsi and "Kvant" specialized school), studying with intensive educational regimen, as well as among 1266 students of the Yerevan Medical University. The following was conducted:

- 1) Psycho-physiological investigation of students
 - study of complaints by the questionnaire-based survey on daily regimen, biosocial factors and health;
 - determination of mental capacity by correction tables;
 - study of functional status of CNS by chronoreflexometry;
 - determination of educational activity by chronometry;
 - study of academic progress.
- 2) Investigation of the health status and physical development of students by medical examination taken by a team of specialists: therapist, ophthalmologist, dermatovenereologist, surgeon, otorhinolaryngologist, gynecologist, neurologist.

Results and discussion

Analysis of study results has shown that during academic years (both at school and University) there are registered unfavorable changes of students' health status. Such changes are conditioned not only by biosocial, but also psycho-physiological and educational environmental factors, which define the educational process.

As mentioned above, in RA for several years already children go to school at 5.5 to 6 years of age. In the first forms of schools we studied children of 5.5 to 7.5 years of age (having various functional levels of CNS), who generally enter school without being exposed to medicopsychological and pedagogical tests, examinations, which are required for the transmission to regular education.

In 54.3% of investigated schools, the hygienic norms of such educational regimen as duration of classes and breaks, schedules, the beginning and end of classes were violated.

The investigation of mental capacity and educational activity among 638 schoolchildren has showed that by the end of an educational day only in 23% of students (on Fridays in 5% of students) a high level of working capacity remained (moreover, in 87% of cases the high level of working capacity remained in children at the age of 7 to 7.5 years). Comparing with the first 2 days of week, on Friday the educational activity was twice lower.

From the analysis of screening survey results it was found out that 27.5% of students (from which 78.3% were children at the age of 5.5 to 6 years) got tired during the classes and after classes 58.9% of respondents (from which 69.1% were children at the age of 6) marked fatigue. At the end of the year in 21.2% of pupils (from which 71.4% were 5.5-6 years of age) there was reported a decrease of the body resistance, among 3.1% of respondents deterioration of vision was mentioned. Among 7.3% of children, particularly at 5.5 to 6 years of age, changes of musculoskeletal system were reported. Here we particularly encountered a serious problem, because in investigated schools there were no desks of appropriate number for children aged 5.5-6 years. In order to solve this problem we collaborated with the

Design Department of the Yerevan Art Academy. We have mutually worked out and designed the educational "area" and desks appropriate for the arrangement of education for children aged 6 proceeding from hygienic norms and contemporary requirements of Ergonomics, as well as taking into consideration psychological factors. The obtained results have been presented to appropriate institutions for discussions.

We encountered serious problems while analyzing hygienic problems of intensive education. The question is about special schools such as gymnasiums, colleges and seminaries, which function without scientifically based intensive educational programs. Because of academic overload in schools with intensive regime (a lyceum after A. Shirakatsi and "Kvant" specialized school), which was by 13-27% more than in comprehensive secondary schools duration of the students' sleep was shortened by 2-3 hours in comparison with the pupils of secondary schools, as well as duration of being in the fresh air was 2-2.5 hours shorter. The time spent for preparation of lessons was 1.5-2.4 times longer compared with the same value in pupils of secondary schools. Both quantitative and qualitative indices of pupils' mental capacity of studying with intensive educational regime both during academic day and year are statistically significantly deteriorating in comparison with the pupils of secondary schools. Among pupils of these special schools prolonged

Table 1.

Changes of functional status of CNS during the day among pupils of different schools.

Indices	Schools	Before lessons	After lessons	P
Duration of the latent period of visual-motor reaction (m/sec) (M ±m)	lyceum after A. Shirakatsi	349.2±14.8	398.2±13.8	< 0.01
	"Kvant" specialized school	369,2±13.2	429.2±14.8	<0.01
	secondary school (control group)	371.2±12.8	391.1±12.9	>0.05
Number of interruptions of differentiation reaction (%±m)	lyceum after A. Shirakatsi	2.5±0.3	3.8±0.4	<0.01
	"Kvant" specialized school	3.2±0.4	5.1±0.5	<0.01
	secondary school (control group)	3.1±0.3	3.3±0.4	>0.05

duration of latent period of conditional reflexes is conditioned by development of external inhibition of the brain explained by deterioration of CNS function (Table 1).

The analysis of data on health status deviations and prevalence of diseases revealed that among students with intensive education regime in comparison with the control group there were registered lower levels of pathological disturbances in the beginning of intensive study since 8th form. However, in the dynamics of 3 years' intensive study the pathological dysfunction in pupils of these schools was 1.7-2.7 times higher in comparison with the control groups (8th-10th forms), in which pathological dysfunction was 1.2 times higher.

The dynamic analysis of health groups has shown that in a lyceum after A. Shirakatsi the number of students of the 1st health group was decreased 1.8 times dropping from 68.8% to 37.8% ($p < 0.01$) and in a control group it was declined from 39.2% to 28.8%. The number of students of the 3rd and 4th health groups at the lyceum after A. Shirakatsi was increased 5.6 times reaching from 3.1% to 17.8% ($p < 0.01$) and in control groups it changed from 19.6% to 25% ($p > 0.05$).

The analysis on morbidity rate has revealed that among schoolchildren the diseases of respiratory (32.6-40.2%), visual (19-30.1%), musculoskeletal (5.7-13.8%) and digestive (10.-15.2%) systems constitute large proportion. During 3 academic years in intensive educational system the number of students with visual pathology increased 1.8 times constituting 52.8%, neurological diseases have increased 2.7 times and cardio-vascular diseases 1.7 times.

The correlation analysis found out that health status by intensity and character is directly/proportionally correlated with education load ($\rho=0.79$), physical development ($\rho=0.97$), with some components of regimen: duration of sleep ($\rho=0.81$), physical activity ($\rho=0.81$), with accomplishment of home tasks ($\rho=0.88$). Health status is also correlated with social factors such as parents' education ($\rho=0.72$), budget ($\rho=0.7$), as well as

with students' mental ability ($\rho=0.7$) and academic progress ($\rho=0.75$). On the basis of investigation results for schools functioning with intensive educational regime a complex program of health care and correction measure was worked out for the first time (optimal distribution of weekly load, working out of scale on complexity of subjects, medico-psychological screening test for determining risk group, daily and study favorable regime, recommendations directed to correction of visual system function and quantity and quality of food.

Implementation of hygienic technologies reported the following positive changes:

- the growth of qualitative index of mental capacity by 23.7%, significant decline of fatigue 2.9 times, shortening of duration of latent period of visual motor reaction and declining the number of differential interruptions;
- increase of total academic progress by 4.6 %;
- declining loss of health status 2.8 times (stable status of the 3rd and 4th health groups), shortening of pathological dysfunction index by 6.3 %
- declining complaints (headache, infringements of sleep, fatigue) among pupils 1.4-1.6 times (Figure 1; Tables 2, 3).

The results of research concerning students' health were very interesting. The result of research has shown that height index in 77.9% of the first-

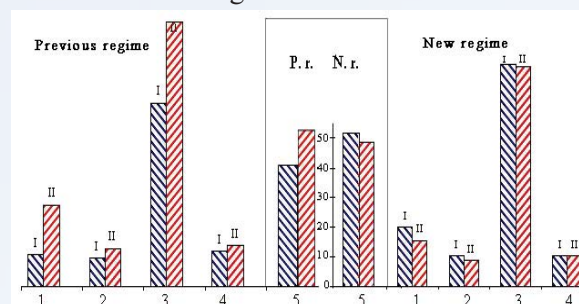


Figure 1. One year dynamics of prevalence of diseases and infringements of health status among pupils studying in lyceum after A. Shirakatsi in conditions of previous and new regime (per 100);

1. Nervous system
 2. Cardio-vascular system
 3. Visual system
 4. Musculoskeletal system
 5. Sum of chronic diseases and functional disorders
- I At the beginning of year
II At the end of year.

Table 2.

Results of screening tests concerning the prevalence of complaints among pupils in conditions of previous and new regime (%)

Complaints	Previous regime	New regime
Headache	61.2	44.3
Tiredness, weakness after classes	70.1	51.4
Infringements of sleep	12.1	8.3
Dizziness	15.4	14.3
Pain in cardial area	18.8	13.4
Increase of blood pressure	16	10.1
Frequent cough	15.4	8.7
Abdominal pain	24.2	17.3
Heartburn, nausea	18.7	15.3
Constipation, diarrhea	23.1	18.4
Allergic rash	12.1	13.8

year boys and in 71.6% of senior students is appropriate to average value of this age group. This index corresponded to average value of this group also among 73.3% of the first-year girls and in 72.2% of the last year girls. Nevertheless, body weight index was appropriate to average value among 56.4% of the first-year boys and in 49.5% of the last-year boys, as well as among 58.9% of the first-year girls and in 62.7% of the last-year girls.

Analysis of indices of physiometry has shown that among 84.4% of the first-year girls value of vital capacity of the lungs was within limits of the average. Low value of vital capacity of the lungs has been revealed among 9.5% of the first-year girls and high value of this index has not been registered in general. About 63.2% of the last-year girls had average value of vital capacity of the lungs. In 4.4% of them low value of this

index was revealed and high value observed among 9.6% of girls. In 72.6% of the first-year boys there was defined an average value of vital capacity of the lungs, which is by 11.8% less of the same index among girls. Of these boys 18.8% had low value of vital capacity of the lungs, and high value has been revealed only in 3.1% of boys. Among 60.3% of seniors average value of vital capacity of the lungs was found, 9.9% of them had high value of this index.

The results of analysis of dynamometry parameters have shown that 69.7% of the first-year boys have average values of dynamometry. In 10.3% of these students low values were registered and high results have been observed among 7.8% of the first-year boys. Only in 48% of senior students values of dynamometry were within the average. Low values were noted in 20.7% of these boys and high values were revealed

Table 3.

Changes of health status in pupils during one year studying by new regime in schools with intensive regime.

Health groups	At the beginning of the year		At the end of year	
	%	Absolute number	%	Absolute number
I	48.6	103	44.5	93
II	38.7	82	42.6	89
III-IV	12.7	27	12.9	27
Total	100	212	100	209

in 7.8% of seniors. Only among 21.7% of the first-year girls had average values of dynamometry. Most of the first-year girls (77%) had low values of dynamometry. The same situation was observed among seniors. Among the last-year girls 74.2% had low values of dynamometry and only in 13.7% average values were found.

If in 1976 the value of physical working capacity (PWC_{170}) among boys was 976 ± 17.3 , in 2003 it decreased to 730.9 ± 15.7 ($P < 0.005$). In case of girls these values were 595 ± 10.8 in 1976 and 435.5 ± 9.1 in 2003 ($P < 0.005$). The results of research, which was done in 2003, showed that oxygen maximal utilization level among boys was equal to 34.3 ± 0.4 (in 1976 it was 39.8 ± 0.5 ; $P < 0.001$), and in girls it made 35.0 ± 0.36 (in 1975 it was 40.8 ± 0.5 ; $P < 0.001$).

It is known that disorders of health status, which are expressed by parameters of physical development, morbidity and total number of functional and chronic diseases during investigations allow us to clearly define the character and type of effects of unfavorable external conditions. So, morbidity and disorders of health status, as well as health status of students by health groups were investigated.

Total number of functional and chronic diseases during academic years increases from 81.2 (first-year students) to 130.5 (senior students) (Figure 2).

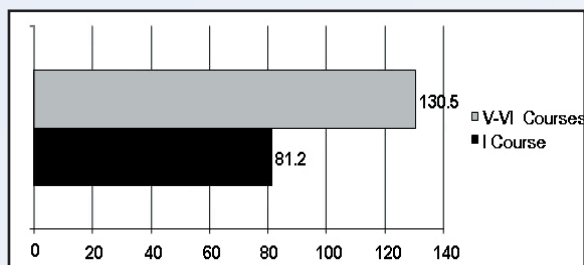


Figure 2. Total number of functional and chronic diseases during years of study.

The comparative analysis of disease prevalence among the first-year and last-year students showed that disorders of all organs and systems, except the disorders of nervous system, increased during academic years. Analysis of disease

prevalence and health status disorders showed that disorders of nervous, respiratory, visual and musculoskeletal systems among the first year students prevailed. Indices of these disorders were higher among girls compared to boys. Disorders of respiratory, gastrointestinal (GIT), visual, and musculoskeletal systems were high among 5-6th year students (Figure 3).

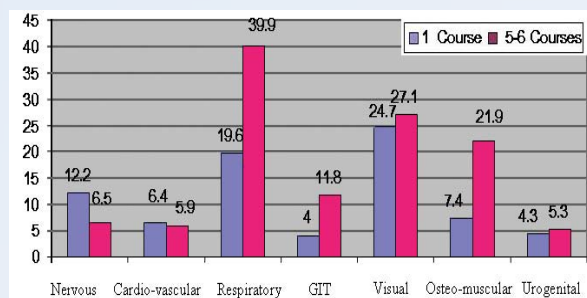


Figure 3. Comparative analysis of diseases prevalence among the first-year and last-year students (%).

In all faculties there were very high disorders of musculoskeletal system, especially disorders of bearing. This regularity was also described in similar research, which was done in Armenia in 1975. We may notice that in today's students the prevalence of musculoskeletal system disorders increases by 4-4.5 times.

Simultaneously the analysis of health status by health groups was done. Medical examination was carried out among 1113 students. Results have shown that in all faculties of YSMU in case of the first year students prevail I and II health groups, but during the last years of study III and IV health groups (chronic sick persons) increased. In other words, number of chronic sick students from 13.3% becomes 25.4% (Figure 4).

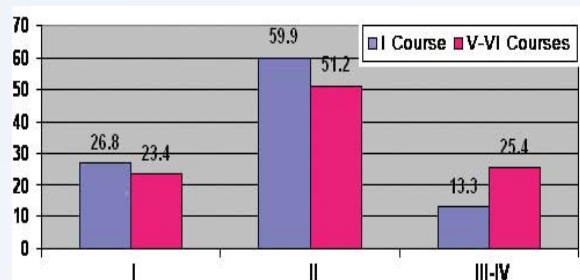


Figure 4. Analysis of health status of students by health groups from I course to V-VI courses (%).

Conclusions

All the mentioned above testifies that correct and timely implementation of scientifically based hygienic technologies gives opportunity to avoid the negative influence of intensive education and improve health status of students and their academic progress.

It is necessary to continue many-sided scientific investigations in order to:

- reveal, assess and prove cause-effect association between health status of students with various loads and educational regime;
- conduct medical-and-psychological joint investigation aimed at working out distin-

guished educational programs;

- review the hygienic norms proceeding from contemporary requirements;
- work out a complex of preventive measures aimed at improvement of health status of students and increasing productivity of educational process.

Nowadays, the department collaborates with appropriate authorities of the Republic of Armenia Ministry of Education and Science system and we plan to conduct comprehensive investigations in schoolchildren aged 5.5-6 and students of State Universities.

References

1. *Aghajanyan N.A., Minnibaev T. Sh., Severin A.E., Ermakova N.V., Kuznetsova L.U., Silaev A.A. et al.* [Study on the life style, health status and progress of students in case of educational process intensification] [published in Russian] *Hygiene and Sanitary* 2005; No. 3, p.48-52
2. *Andersen R.E., Crespo C.J., Bartlett S.J.* Relationship of physical activity and television watching with body weight and level of fatness among children: results from the Third National Health and Nutrition Survey *JAMA*. 1998; 42: 279-289.
3. *Avetisyan L.R.* [Hygienic aspects of intensive study regimen in new type schools] [published in Armenian] *Med. Sci. Doctoral Thesis Author's Abstract*. Yerevan. 2003; 40p.
4. *Avetisyan L.R., Hovhannisyan M.G., Khachikyan N.Z.* [Capacity for work and health status in 6-year old children depending on their functional preparedness to study at school] [published in Russian] In: *Proceedings of the First International Scientific and Practical Conference "Adaptation of biological systems to natural and extreme environmental factors"* Chelyabinsk (Russia) 2006; p.236-237.
5. *Berezhkov L.F.* [Health status in elementary school pupils and the functional peculiarities of their hormonal and immune systems] [published in Russian] In: *Population Health and Habitat* 1995; No.9 (30), p.3-6.
6. *Cole S.M., Teufel-Shone N.L., Ritenbaugh Ch.K., Yesenbaard R.A., Cockerham D.L.* Dietary intake and food patterns of Zuni adolescents. *J. Am. Diet. Assoc.* 2001; 101(7): 802
7. *Dietz W.H.* The role of lifestyle in health: the epidemiology and consequences of inactivity. *Prac. Nutr. Soc.* 1996: 40:52-82.
8. *Ilyin A.G., Zvezdina I.V., Elyanov M.M.* Modern tendencies of health status dynamics in adolescents. [published in Russian] *Hygiene and Sanitary* 2000; No. 1, p.59-62.
9. *Ksajikyan N.N.* [Comparative analysis of certain physiological indices in students of gymnasiums and secondary schools under conditions of educational load and examination related stress] [published in Armenian] *Doctoral Thesis Author's Abstract*. Yerevan; 2006; 22p.
10. *Kuchma V.R.* [The theory and practice of children and adolescents hygiene on the threshold of the Millenniums] [published in Russian] 2001; 375 p.

11. *Kuchma V.R., Serdyukovskaya G.N., Demin A.K.* [Manual on hygiene and health protection of schoolchildren] [published in Russian] Moscow. 2000; p. 34-35.
12. *Kuchma V.R., Sukhareva L.M.*, editors. [Scientific-and-methodical basis for study on children and adolescents adaptation to life conditions] [published in Russian] Moscow, 2006. 237p.
13. *Kuinji N.N., Stepanova M.I.* [Modern school-children teaching technology and its impact to health] [published in Russian] Hygiene and Sanitary 2000; No. 1, p.44-47.
14. *Lotyshevskaya N.I., Klauchek S.V., Moskalenko N.P.* [Gender differences in health status and life quality of students] [published in Russian] Hygiene and Sanitary 2004, No. 1, p.51.
15. *Markaryan A.G.* [Functional adaptation of Medical University students] [published in Russian] In: Proceedings of the First International Scientific and Practical Conference "Adaptation of biological systems to natural and extreme environmental factors" Chelyabinsk (Russia) 2006. p. 314-315.
16. *Minnibaev T. Sh., Kuznetsova L. Yu.* [Intensive education forms and students' health] [published in Russian] Bulletin of the Russian Academy of Medical Sciences 2001, No. 12, p. 42-44.
17. *Mokeyeva M.M., Setko N.P.* [Combined effect of in-school milieu factors on children health] [published in Russian] Hygiene and Sanitary 1995; No. 3, p.29-31.
18. *Parveen R.* Overweight status: body image and weight control beliefs and practices among female college students [serial online] Available from URL: <http://www.kfshrc.edu.sa/annals/194/98-138.htm> as of May 2004.
19. *Plyaskina I.V.* [Characterization of health in pupils of new-type secondary establishments in case of different arrangements for the educational process] [published in Russian] Doctoral Thesis Author's Abstract. 1998. 22 p.
20. *Pozdneeva T.A., Bolshakova O.M., Lyutova O.Yu.* [Urban public health challenges] [published in Russian] Issue 5. 2000. p. 105-108.
21. *Sidorov A.G., Solovjev I.A., Novikova I.A.* [Psychosocial disadaptation of students with chronic somatic diseases] [published in Russian] Hygiene and Sanitary 2001, No. 4, p. 46-49.
22. *Simonyan A.M.* [Hygienic evaluation of actual nutrition in pupils of Yerevan city intensive regimen schools] [published in Armenian] Med. Sci. Doctoral Thesis Author's Abstract. Yerevan. 2006; 21 p.
23. *Vardazaryan V.M.* [Complex investigation on bio-social status, anthropometrical and morpho-functional parameters] [published in Armenian] Doctoral Thesis Author's Abstract. Yerevan 2005; 24 p.