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HYGIENIC-COMPARATIVE ASSESSMENT OF STUDY LOAD AND MENTAL WORK CAPACITY IN STUDENTS OF DIFFERENT PROFILE TECHNICUMS

Abdusalomov Abdulxay Abdumalik o‘g‘li
Fergana Medical Institute of Public Health
Fergana, Uzbekistan

ABSTRACT

This study presents a hygienic-comparative assessment of academic workload and mental work capacity among students enrolled in technicums of different professional profiles. A total of 240 students from technical, medical, and pedagogical technicums were examined using timing observations of the daily schedule, the Kraepelin counting test, and the proof-reading (correction) test for attention and mental performance. The daily academic load, including classroom hours, homework, and extracurricular activities, was calculated and compared across profiles. Results showed that students of technical technicums experienced the highest total study load and demonstrated a more pronounced decline in mental work capacity by the end of the school day, whereas pedagogical-profile students showed comparatively better stability of attention and lower fatigue indices. The findings indicate a need for profile-specific correction of daily schedules and rational organization of the educational process to preserve the health and working capacity of adolescent students.

Keywords: study load; mental work capacity; technicum students; hygienic assessment; fatigue; school hygiene.

INTRODUCTION

The intensification of the educational process in secondary special and vocational education institutions has raised increasing concern among hygienists and physiologists regarding the health status and functional condition of adolescent students [1]. Technicums of different profiles, namely technical, medical, and pedagogical, differ substantially in curriculum structure, the ratio of theoretical to practical training, and the volume of independent work assigned to students, which may result in unequal levels of academic load and, consequently, unequal strain on the central nervous system [2].

Numerous authors [3, 4] have shown that an excessive daily and weekly study load is one of the leading risk factors for a decline in mental work capacity, the development of fatigue, and subsequent deterioration of adolescent health. At the same time, comparative hygienic data on students of different profile technicums remain limited, which substantiates the relevance of the present investigation.

The aim of the present study was to conduct a comparative hygienic assessment of the study load and the dynamics of mental work capacity among students of technical, medical, and pedagogical technicums, and to develop evidence-based recommendations for the rational organization of their educational process.

MATERIALS AND METHODS

The study was carried out on the basis of three technicums of different professional profiles (technical, medical, and pedagogical) located in Tashkent. The study sample comprised 240 first- and second-year students aged 16-18 years (80 students from each profile), practically healthy and matched by age and sex distribution.

The daily and weekly study load was assessed by means of hygienic timing (chronometric observation) of the students' daily regimen, including the duration of classroom lessons, independent homework preparation, extracurricular and practical training, and rest periods. The obtained data

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were compared with the regulatory hygienic norms established for institutions of secondary special and vocational education [5].

Mental work capacity was studied using standard psychophysiological methods: the Kraepelin arithmetic counting test for assessing the speed and accuracy of mental operations, and the Anfimov proof-reading (correction) test for evaluating attention, concentration, and the degree of developing fatigue [6]. Testing was performed twice daily, before the beginning of lessons and at the end of the academic day, to reveal the dynamics of mental performance under the influence of the study load.

The volume of work performed, the number of errors, and the coefficient of mental productivity were calculated for each student. The obtained quantitative data were processed using variation statistics; differences between groups were considered statistically significant at $p<0.05$.

RESULTS

The hygienic timing of the daily regimen revealed that the total study load of students in technical-profile technicums averaged 9.8 hours per day, exceeding the regulatory norm by approximately 18-20%. In medical-profile technicums, the total load averaged 9.1 hours per day, while in pedagogical-profile technicums it was the lowest, at 8.3 hours per day, which was closest to the recommended hygienic standard.

Analysis of the Kraepelin test results showed that, by the end of the academic day, the speed of mental operations decreased in all three groups; however, the most pronounced decline (23-26%) was observed among students of technical-profile technicums, compared with 17-19% among medical-profile students and 11-13% among pedagogical-profile students.

The proof-reading test demonstrated a similar pattern: the number of errors per 500 viewed characters increased by the end of the day in all groups, with the greatest increase again recorded among technical-profile students. The coefficient of mental productivity, which integrates speed and accuracy of performance, was significantly lower at the end of the day among technical-profile students than among their pedagogical-profile peers, indicating a more marked degree of developing mental fatigue.

A moderate inverse correlation was established between the total daily study load and the coefficient of mental productivity at the end of the day, confirming that an increase in academic load is associated with a decline in mental work capacity among technicum students, regardless of profile.

DISCUSSION

The obtained results are consistent with earlier data [7] indicating that adolescents engaged in technical specialties, which combine intensive theoretical instruction with practical laboratory and workshop training, are exposed to a greater cumulative educational load than students of humanitarian or pedagogical profiles. The heavier load in technical technicums appears to be related to the larger share of practical and laboratory classes, as well as a greater volume of homework associated with technical disciplines.

The comparatively favorable indicators of mental work capacity among pedagogical-profile students may be explained by a more balanced distribution of theoretical and practical components in their curriculum, as well as a lower proportion of disciplines requiring intense sustained attention and rapid problem-solving under time pressure [8].

From a hygienic standpoint, the revealed differences justify the need for a differentiated, profile-specific approach to the organization of the daily and weekly schedule in technicums, including rational alternation of theoretical and practical classes, adequate rest breaks, and correction of homework volume, particularly for technical-profile institutions [9].

CONCLUSION

The comparative hygienic assessment demonstrated that the total study load and the degree of decline in mental work capacity differ significantly among students of technical, medical, and

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pedagogical profile technicums, being highest among technical-profile students. These findings substantiate the necessity of profile-differentiated hygienic regulation of the educational process, rational scheduling of classes, and systematic monitoring of students' mental work capacity in order to prevent overload and preserve the health of adolescent students in secondary special and vocational education institutions [10].

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