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Hygienic Assessment of Child Growth and Development in the Context of Preschool Education Reform

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Abstract: *In the Republic of Uzbekistan, the contingent of children and adolescents is the main part of the population. The contingent of children and adolescents, particularly in rural areas, accounts for 34-40 percent of the entire population. The state of Health and physical development indicators of those entering this category of the population cannot be called satisfactory. One of the main reasons for this is inappropriate social hygienic conditions. Today, coverage of children in pre-school educational institutions in our republic is 35%. Along with this, some preschool institutions do not meet hygienic requirements with such conditions as the condition of the building, equipment, Organization of feeding. Along with this, the level and quality of medical services provided to children and adolescents are not in demand. Therefore, the death rate in early childhood to evazi is 33 units per 1000 live births .Inappropriate conditions in some pre-school educational institutions of the Republic ,their low coverage by these institutions ,inadequate communal living conditions in their places of residence, adversely affected their growth and development , led to an increase in some diseases among them .*

It should be separately recognized that the peculiarities of the organism of growing children, their very rapid permeability and sensitivity to harmful effects, necessitate the creation of sufficient conditions for their harmonic growth and development

Keywords: *pre-school education, sanitary-hygienic staying, children's health, occupancy groups.*

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An extremely acute shortage of places in pre-school educational institutions in almost all regions of our country has caused the need to focus on the hygienic standards of the area of group premises in preschool organizations [3,4,7,8]. According to the sanitary rules, the number of children in preschool groups of general educational orientation depends only on the area of the group room: for nursery groups – at least 2.5 m2 per child, in preschool groups – at least 2.0 m2 [13,22].

over-compaction of groups, reduced motor activity, general resistance, depletion of regulatory systems, increased morbidity of preschool children, negative dynamics of indicators of preschool children's readiness to study at school [1, 2, 5, 6]. Currently, teachers offer a wide range of technologies for psychological and physical development of preschool children, while there are no medical recommendations on the maximum occupancy of groups based on comprehensive scientific sanitary and hygienic and clinical studies [,12,14,15].

The aim of the study was to assess the sanitary and hygienic situation in pre-school institutions with different occupancy groups, and to study its impact on the health status of children.

Materials and methods. To objectively assess the sanitary and hygienic situation in groups with different occupancy rates and its impact on the indicators of physical and neuropsychological development of preschool children aged 3-7 years and the level of their somatic health, an in-depth clinical and laboratory examination of children of two standard groups was conducted. The groups were comparable in age and gender and did not differ in socio-economic factors of health risk ($p = 0.87—0.98$). To achieve this goal, we used the results of sanitary and hygienic studies (determination of the level of air pollution in playrooms and atmospheric air with organic substances of industrial origin, assessment of the intensity of acoustic exposure, microclimate parameters, bacterial air pollution in playrooms), chemical and analytical studies (determination of average daily concentrations of formaldehyde and phenol in the atmospheric air and air of playrooms of preschool institutions, the content of these compounds in the blood of children), epidemiological studies (retrospective analysis of the incidence of preschool students), clinical and functional studies (spirography, rhinomanometry, cardiointervalography) and laboratory (content of stress hormones: cortisol, norepinephrine and serotonin) studies. All studies were carried out according to unified methods on standard certified equipment, laboratory studies were performed in accredited laboratories. Results and discussion. As a result of sanitary and hygienic studies, it was found that when the occupancy rate of groups of kindergartens under study is more than 20 people, the deficit in the area of play spaces in group cells reaches 40 % (based on

from the requirements of SanPiN 2.4.1.3049-13 in terms of area per child) ($p = 0.003$). The study of the air quality of gaming rooms showed that in the observation pre-school the phenol content was 2 times higher than in the comparison pre – school ($p = 0.0001$) and 4.6 times higher than the MPCC ($p = 0.001$), and the formaldehyde content was 1.9 times higher than in the comparison pre – school ($p = 0.0001$) and 2.7 times higher than the MPCC. It was found that the increased content of phenol and formaldehyde in the indoor air did not depend on their concentration in the atmospheric air (0.004—0.007 mg/m3 and 0.001— 0.002 mg/m3, respectively) and was not associated with external sources ($R2 = 0.12—0.16$; $p = 0.72—0.84$). The study of bacterial contamination of air play rooms showed that the compaction of the groups already in the 1000-1100 total bacterial count reached 1360,91 ± 550,49 CFU/m3 (vs 1151,67 ± 688,76 CFU/m3 Doo comparison; $p = 0,61$), while in 30 % of samples were present conditionally pathogenic flora (St. aureus) c microbial 4-20 number of CFU/m3 (in OED No. 2 St. aureus was absent, $p = 0.04$). A direct correlation was established between the total microbial number of bacterial contamination in the indoor air of group cells and the presence of conditionally pathogenic flora (St. aureus) ($R2 = 0.69$; $p = 0.001$). The level of equivalent noise generated during play sessions in the observation pre-school was higher than that in the comparison pre-school (75.80 ± 0.12 dBA vs. 63.00 ± 1.55 dBA, $p \leq 0.001$), and the duration of exposure was 6 or more hours. In the course of chemical and analytical studies, it was found that the content of phenol and formaldehyde in the blood of children of preschool institutions with high filling groups reached 0.020 ± 0.003 mg/dm3 and 0.0029±0.0003 mg/dm3, respectively, and significantly 2.9—1.9 times higher than similar indicators in children of preschool institutions of comparison (0.0069 ± 0.004 mg/dm3 and 0.0015 ± 0.0002 mg/dm3, respectively; $p = 0.03—0.001$). Based on the results of a retrospective – for the period 2010-2013-comparative analysis of access to medical care (MHIF data) children attending pre-school institutions with a large number of groups were found to have an increased level of morbidity, progressive character from 2010 to 2013 and exceeding the average Russian indicators for a number of nosologies. A direct correlation was also established between the incidence of allergic respiratory diseases in children ($R2 = 0.39$; $p \leq 0.0001$), herpetic mucosal infection and other forms of stomatitis ($R2 = 0.32$; $p = 0.015$), atopic dermatitis ($R2 = 0.87$; $p = 0.005$), functional intestinal disorders and dyspepsia ($R2 = 0.74—0.84$; $p = 0.009—0.035$), acute serous otitis media ($R2 = 0.89$; $p = 0.003$), acute conjunctivitis ($R2 = 0.79$; $p = 0.018$), urinary tract infections ($R2 = 0.85$; $p \leq 0.008$), kidney and ureter diseases ($R2 = 0.78$; $p = 0.024$), and increased staffing of groups. When comparing the results of somatometric studies, it

was found that in children of the compacted groups, the indicators did not correspond to the physiological age standards 1.2—1.8 times more often, and the relative risk of growth rate disorders and annual body weight gain, developmental disharmony and body weight deficit was 1.5—2.2 times higher than in children of the pre—reference groups (R = 1.54—2.24; DI = 1.13-3.01; p = 0.02-0.03). A direct correlation was established between the indicator of group occupancy and the number of children with disharmonious physical development (R2 =0.25-0.38; p=0.02-0.0001). When conducting a functional study of the state of the cardiovascular system, it was found that in children of pre-school observation, violations of the processes of myocardial excitability were recorded 1.5 times significantly more often than in children of pre-school comparison (55.9% vs. 36.7 %; p= 0.02), and the risk of delay in the rate of development of the functional capabilities of the cardiovascular system, violations of the processes of myocardial excitability and regulation of vascular tone, as well as the development of episodic arterial hypertension is 1.4 – 10 times higher compared to the pre—comparison period. A direct correlation was also established between the group occupancy rate and an increase in heart rate in children, as well as a violation of the processes of myocardial excitability (R2 = 0.34; p = 0.02). The results of the study of the functional state of the upper respiratory tract by rhinomanometry showed that the total air flow in preschool children with high filling groups was lower than the physiologically permissible (p = 0.002) and the indicator of the comparison groups (407.98 ± 56.73 cm3 / sec

against 529.48 ± 51.32 cm3 / sec; $p \leq 0.001$). In general, violations of nasal patency were recorded 5 times significantly more often in the groups of high staffing (43.8 % and 8.7 %; p < 0.001). The relative risk of nasal breathing disorders in children attending follow—up pre-school institutions was more than 7 times higher than that in comparison pre-school institutions (HR = 7.77; DI = 2.41-13.88; p = 0.02). A comparative assessment of the functional state of the autonomic nervous system based on cardiointervalography revealed that about 10 % of children attending crowded groups have hypersympathicotonic initial vegetative tone (p < 0.001 to the comparison pre-school) and 50 % have hypersympathicotonic reactivity (versus 17 % in the comparison pre-school; p < 0.001). The relative risk of developing hypersympathicotonic vegetative reactions in response to exercise in children of the "compacted" groups was 5 times higher than in children of the pre-reference groups (R = 5.0; DI = 2.81-9.11; p = 0.03). Analysis of the results of the assessment of attention function showed that the average group assessment score in children under observation did not exceed 4.12 ± 1.22 points and was lower than the level of the comparison groups (6.07 ± 0.64; p = 0.005) and the physiological norm (p = 0.012). The number of children with a low level of attention in pre-school institutions of increased staffing was 56.3 %, which is 1.5 times higher than in comparison pre-school institutions (36.4 %; p = 0.02). With an increased occupancy of pre-school groups from 31.3 to 56.3 % of children have an insufficient level of development of spatial praxis, kinesthetic organization of movements and attention. The relative risk of delayed cognitive function development in children attending the follow-up pre-school was 1.2 times higher than that in the comparison pre—school (R = 1.2; DI =1.01-4.32; p = 0.03). The study of the hormonal profile showed that in children attending pre-school institutions with a large number of groups, the content of stress hormones in the blood was significantly higher than in children of reference pre – school institutions (cortisol – 350.01 ± 50.89 nmol/cm3 vs. 269.62 ± 45.05 nmol/cm3; p = 0.022; norepinephrine – 309.13 ± 8.32 pg/cm3 vs. 282.70 ± 12.05 pg/cm3; p = 0.001), and the level of serotonin-lower (231.83 ± 34.41 ng/cm3 vs. 295.96 ± 43.04 ng/cm3; p = 0.025). Comprehensive assessment of somatic healthIt was established that the result of violation of the child's natural processes of growth and maturation of life support systems and their insufficient adaptive potential associated with high occupancy of pre-school groups is an increased incidence of acute respiratory viral and bacterial infections (R2 = 0.79; p = 0.005), diseases of the nervous system (OR = 2.97; DI = 1.49—4.96; p = 0.01), chronic inflammatory and proliferative diseases of the upper respiratory tract (R2 = 0.32-0.89; p = 0.01—0.003), allergic diseases of the respiratory system and skin

(bronchial asthma, respiratory allergosis, atopic dermatitis (R2 = 0.39—0.89; $p \leq 0.0001$). It should be noted that there were significantly more children with multiple organ diseases (health group III) in the compacted groups (19.2% vs. 5.8 %; p = 0.006). The relative risk of developing multiple organ pathology in children in the pre-study group was 4.0 times higher than in the comparison group (HR = 3.85; DI = 2.17-6.11; p = 0.04). Conclusion. As a result of the study, convincing data were obtained that when completing group cells of pre—school institutions built according to standard projects No. 214-2-22 and 212-2-64, with a staff of more than 20 children, the deficit in the area of playrooms reaches 40 %, the noise intensity level increases (76-79 dBA), the content of phenol and formaldehyde in the air of playrooms is 2.3-4.6 times higher than the MPCC, and the total microbial number in the air of playrooms reaches 1360.91 ± 550.49 CFU/m3, while 30% of samples contain conditionally pathogenic flora (St. aureus) with a microbial number of 4-20 CFU/m3. Unfavorable sanitary and hygienic conditions during the re-compaction of groups cause an increase in the incidence of diseases of the nervous system, allergic diseases of the respiratory system, acute and chronic pathology of the upper respiratory tract in children. In children attending such groups, the relative risk of developing physical development disorders, a decrease in the adaptivereserve of the cardiovascular system, the development of functional disorders of the upper respiratory tract and autonomic nervous system, and the formation of multiple organ pathology increases up to 1.5-7.0 times.

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