EPIDEMIOLOGICAL ASPECTS OF THE PUBLIC HEALTH IN THE ZONE OF ECOLOGICAL DISASTER OF THE ARAL SEA REGION

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RELEVANCE

In the past few years, the Aral Sea region has received much attention in Kazakhstan. The complex environmental situation in the area related to agrochemical pollution significantly worsened the physical and chemical properties of the water of the river Syr Darya. That has been led to a change in climatic conditions of the whole region and had a very negative impact on the public health, physical sexual development of the younger generation [1].

Currently, there are a great deal of research on the negative effects of aridity of the region on the public health. There are unresolved legal, social, medical and organizational aspects of these problems [2]. One of the ways to stabilize the health situation in these conditions is to improve the governance and organizational structure of the state sanitary and epidemiological service in the field of active influence on the habitat and the public health. A very important factor is the adaptation of the activity of the sanitary and epidemiological service to the rapidly changing economic conditions which suggests the most efficient use of available resources [3, 4]. In this regard, special priority is improving the management and evaluation of the services of the sanitary and epidemiological supervision. The basis of evaluation of Sanitary-Epidemiological Service should be indicators of efficiency and effectiveness. It is necessary to develop estimates of the efficiency indicators of Sanitary-Epidemiological Service activity based on available resources and opportunities for their rational use. In ecologically adverse regions, as is the lower of the river Syr Darya, the development of such approach is the actual scientific problem, so the search for the new methodological approaches, the development of innovative management systems is an extremely urgent task of the hygienic science.

Our study included the follow objectives: giving a qualitative and quantitative description of the dynamics of multicomponent hygienic water pollution, drinking water in the Aral Sea region in the contemporary social and economic conditions of the region; establishing a quantitative relationship between the degree of contamination of drinking water and levels of intestinal infections and noninfectious diseases in order to draw up medium term hygiene forecasts.

MATERIALS AND METHODS

Natural ecological hygienic, sanitary and epidemiological, medical and sanitary, sanitary and toxicological studies. During the natural studies of sanitary and hygiene water research of water bodies and tap water were used standard methods of the laboratory determinations. The total mineralization, acidity, the presence of the heavy metals, oil products were determined by the in the water samples.

The real data of the materials of population treatment for out-patient clinics from the "Development history" (f.112 u) and "The individual card of outpatient" (f.25u) were recorded on a specially designed "study map of the morbidity level of the population treatment for out-patient clinics".

RESULTS AND DISCUSSION

Studying the dynamics of mineralization of the Aral Sea region water sources has shown that the level in the water dug wells for the period from 2007 to 2012 rose to 1701.4 1902.1 mg/l. Moreover, there is high content of calcium cations, magnesium and sodium. Content of chloride anion also exceeded the threshold limit concentration in 1 times. In this, population of 10 settlements are supplied with water from wells. And 18 settlements in the region use

imported method of drinking water. In the content of the imported water the level of sodium reached 48,4 ± 5,2 mg/l and magnesium 42,1 ± 3,9 mg/l. The mineral content is at around 997,4 ± 92,3 mg/l, that comes close to its threshold limit concentration.

In accordance with the results of the sanitary water quality assessment the Aral Sea region population were divided into 2 groups: the first group use higher mineralization water , the second group (control) use optimal water salt composition water corresponding Sanitary norms and rules 3.01.067-97 The Republic of Kazakhstan.

Comparative evaluation of overall morbidity indicators suggests that the highest level it had in the first group of the population. In this group the level of disease was in 1.9 times higher than in the second. One of the most reasons for the treatment of the population of the first group was hypertension (18,2 ± 1,6 per 1000 population) that is almost in 2 times higher than the morbidity incidence rate of the second group (9,5 ± 0,9 ‰). In the first group compared to the second is also high incidence of ischemic (7,3 ± 0,7 vs. 3,8 ± 0,08 ‰), cholelithiasis (6,1 ± 0,6 vs. 1,6 ± 0,1 ‰), urolithiasis (3,3 ± 0,3 vs. 0,9 ± 0,009 ‰) disease. The difference in the levels of indicators for the above diseases among population the first and the second groups was credibly (P <0.001) and morbidity of the population of the first group higher to 1.9 times than in the second group.

We found a high level of functional dependence of general morbidity of the population with the chloride content (r=0,8), sulfate (r=0,7), the quantity of dry residue (r=0,9). Hypertension, diseases of blood and blood-forming organs, diseases of the digestive organs have an average relationship with the level of mineralization, total hardness and chloride. The given values of the correlation coefficients are statistically credibly as they exceed their mistake more than in three times that is considered to be accepted in such calculations. Unfortunately, such dependence is still assessed without quantitative parameters, which did not give specific ideas about the regularities of changes in the public health status from the intensity of exposure to the water factor in the studied conditions. Meanwhile, the parameters of the quantitative dependence of changes in the health public indicators of the impact of environmental factors allow selecting the priority circle of the significant available on the factors of the evaluation indicators .That can greatly simplify the monitoring public health system. In the hot climate of the arid zone, in contrast to other climatic zones, with increasing hardness of the water increases the risk of urolithiasis disease with more severe clinical course.

We have studied the effect of higher water mineralization and water on the optimal content on the specific functions of the female body and gynecological morbidity. According to the age studied women of both groups was as follows: up to 20 years - from 2 to 5%, 21-30 years - from 25-30%, 31-40 years - from 36.9 to 44%, 41-50 years - 25.3 to 27%.

Most patients (95%) living in the area permanently. Menstrual function of women was studied based on inspections (conducted over 3 years), for this questionnaires were designed. The cellular composition of the vaginal contents of 150 women with menstrual disorders was investigated. The reproductive function was studied by statistical data development of the maternity hospital, antenatal clinic. Neonates status were evaluated on a hangar scale taking into account body weight, growth of neonates, length of hospital stay and recovery time of initial mass loss.

Comparative analysis of the menstrual function among women indicates that the most disorders had women among the first group who for a long time used the higher mineralization water. These women often have either a short menstrual cycle (less than 21 days; p <0.01) or longer (more than 31 days; p <0.01), or irregular menstruation. Noteworthy in this group is more frequent ovarian failure function in the form of heavy and prolonged menstrual periods (p <0.01). Menstrual disorders function had women in both groups, most often in the first group (68,13 ± 2,94%; p <0.001). Individuals in this group had predominant disorder type hyper menstrual syndrome (32,64 ± 2,83%), while in the control group (11,02 ± 3,18%; p <0.001); As for other types of menstrual pathology, they also detected in women in the highly mineralized water.

When studying cytogram at women suffering menstrual disorders it was detected a higher and prolonged maintenance of estrogens, which were determined also in the second phase of the menstrual cycle. This indicates the formation of anovulatory cycles as it seems cause menstruat disorders.

Data analysis of the reproductive function showed that women who drank high mineralization water has reduced number of pregnancies (p<0.05), increased specific gravity of spontaneous abortion (p<0.001), increased frequency of pregnancy pathology – toxicosis of the first and second half of pregnancy (p<0.001).

During child-bearing among women who drank higher mineralization water complicated untimely amniorrhea, discoordination labor, abnormal bleeding in the third stage of labor. This pathology was observed in 2–3 times less among the women of the second group.

Particular interest is the data on the evaluation of neonates in the early neonatal period. Dur-

ing the analysis of the collected material was found that women who drank higher mineralization water gave birth to children in a satisfactory state (with an estimate of 7–10 points), that is in 1.5 times less than women using water on the optimal salt composition ($p<0.001$). However, children with asphyxia mild and moderate limits (5–6 points) were born almost in 4 times more often among women of the first group than the control group.

High water mineralization has an adverse effect on fetal development, as evidenced by a decrease in body weight of neonates in women of the first group compared with the control group. The significant differences between the treatment groups is $p<0.001$. The body length of neonates of women in both groups were relatively equal. Thus, underweight at normal growth of neonates among the second group can be explained by a certain delay of fetal development which is seems cause by the disturbed metabolism and uteroplacental circulation due to morphological changes in the placenta.

Among the children whose mothers drank high mineralization water significantly reduced the adaptive indicators: the dynamic weight of neonates, the maximum loss of their initial body weight of more than 10% were significantly higher in the first group (28,41 ± 4,11%), than in the control group. (13 19 ± 3,59%). Analysis of gynecological morbidity showed that 68,7 ± 2,91% of women who drank higher mineralization water had a variety of gynecological diseases, the structure of which was dominated by inflammation of the uterus and appendages. In the control group of female gynecological disease was in 2 times lower. Thus, higher mineralization water is a factor of high intensity, have adverse effects on the specific functions of the female body (menstrual and fertility), as well as during pregnancy and child-bearing, the fetus and neonate. In addition, higher mineralization water increases gynecological morbidity which is in direct proportion to the duration of such water consumption ($r = 0,8$).

Increased mineralization water significantly disorders the specific functions of the female body. It is revealed more frequent violation of ovarian function by type hyper menstrual syndrome (in 3 times), significantly decreased the number of pregnancies, in 2 times increased spontaneous abortions and other disorders of pregnancy (toxicosis, nephropathy). Significantly reduced the number of children with various degrees of pathology (in 4 times), reduced birth weight.

CONCLUSION

Thus, the results of the assessment of the public health status in the Aral Sea region in such nosological forms of diseases like hypertension, cholelithiasis, gastric ulcer show the importance of the salt composition of the water in the etiopathogenesis of these diseases. Drinking water with high mineralization and hardness, increased content of some components of the salt composition leads to various physiological changes, especially in hot and dry climate of the Aral Sea region.

Analysis of the many years results of the medical and hygiene studies in the Aral Sea region have allowed us to improve the methodology for forecasting the hygienic conditions of water use and the level of morbidity associated with the water factor. Parts of this prediction were: hygienic forecasting of water quality of the river Syr Darya; hygienic drinking water quality forecasting and levels of morbidity associated with the water factor.

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