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Women's Reproductive Health in the Areas Bordering the Aral Sea Region

Ya. G. Turdybekova^{1,*}, I. L. Kopobayeva¹, B. Zh. Kultanov², T. S. Slobodchikova¹¹Department of Obstetrics and Gynecology, Karaganda State Medical University, Karaganda, Kazakhstan²Department of Molecular Biology and Medical Genetics, Karaganda State Medical University, Karaganda, Kazakhstan

Abstract

In order to assess the impact of climatic and anthropogenic factors of the Aral Sea region on reproductive health, we examined 435 women living in the Aktobe region of Kazakhstan, which borders the Aral Sea region. The survey was based on comprehensive clinical-functional and laboratory studies accounting regional environmental and ecological factors. The survey subject was the area of 2 settlements in Aktobe region. In both areas it was revealed that the examined women had later menarche at over 16 years. There is a trend toward younger age at menopause. Every third of the surveyed women suffered from pelvic inflammatory disease. Perinatal losses, spontaneous interruption, and/or stagnant pregnancy, which can be repeated, occurred in one in three women in the zone of ecological disaster.

Keywords

Women's reproductive health; Environmental factors; Aktobe region; The Aral Sea region of Kazakhstan

Introduction

The Aral problem, as the largest environmental disaster on the planet, acquired acute character. Intensive desertification and continuing, irreversible degradation of the environment, worsening living conditions, and increased morbidity result in new socioeconomic and environmental situations that require legislative solutions and legal regulation of social protection of the population living in environmentally disadvantaged areas [1]. One of the priority problems of the region is the degradation of pastures and arable lands. The Kazakh part of the Aral Sea region covers 59.6 million hectares, including the areas of Kyzylorda (22.6 million hectares), Aktobe (19.7 million hectares), Karaganda (8.7 million hectares), and South Kazakhstan (8.6 million hectares), or 22% of the total area of the country. The Aral Sea region is dominated by saline (10.7 million hectares), alkaline (9.9 million hectares), and crushed stone areas (3.2 million hectares). Almost all irrigated lands are affected by salinity. The largest area of saline lands is in the Kyzylorda (4.7 million hectares) and Aktobe (3.3 million hectares) areas and alkaline lands – in Aktobe (5.0 million hectares), Karaganda (1.9 million hectares), and South Kazakhstan (1.6 million hectares) areas. The degradation of pastures and vast grassland is ongoing. In the last two decades, in the Aral Sea region, there is a decrease in the total area of pastures from 45.0 million hectares to 41.5 million hectares and an increase in the area of degraded pastures from 4.8 million hectares to 6.4 million hectares. One of the reasons for the yield decrease is reputed the carry-over and dropping of toxic salts from the former bed of the Aral Sea.

Health is an important medical and social category, which is associated with the development of human resources in a state. One of the main components of health includes reproductive health. The health of people of childbearing age, their ability to reproduce, and safe motherhood are important aspects of public health. The reproductive health of population can indicate the impact of adverse environmental condition on the human body. In the context of ecological imbalance, the frequency of pathological pregnancy, perinatal morbidity and mortality, and miscarriage increases.

The most important criteria denoting the dynamics of health indicators include infant, maternal, and total mortality; fertility; and life expectancy of the population. In spite of the positive developments in

the demographic situation, there is a low level of health of women and children in Aktobe region. The aftermaths of adverse environmental effects on the reproductive system should be noted, as reproductive disorders affect not only the health of current but also future generations. In this respect, the greatest harm for living organisms are artificially synthesized chemicals belonging to the class of hormone-like xenobiotics (HPA), allocated to the group of reproductive toxicants, as well as some plant compounds belonging to the class of phytoestrogens. Many of them, having in composition the phenolic group, acquired the certain structural similarities with sex steroids. According to world literature, it is known that for the workers of hazardous industries, dysfunction of the hypothalamic-pituitary system, complications of pregnancy and childbirth, and increased incidence of fetal and neonatal pathology are common.

The aim of our work is the assessment of the reproductive health of women in those areas of Aktobe region which border the Aral Sea, based on integrated clinical, functional, and laboratory studies accounting regional environmental and ecological factors.

Materials and Methods

The subject was the area of 2 settlements in Aktobe region. The groups were formed on the basis of stratification (according to gender) and quota equal selection of women in the following groups: 18-29, 30-39, and 40-49 years in each locality. The inclusion criterion included the location of residence of women of reproductive age 18-49 in the area of ecological trouble during not less than 5 years and employment in occupations with hazard level not higher than second class. The material of study was blood and vaginal contents. Clinical and instrumental investigations were conducted: inspection of the cervix in the mirror, smears for the purity, oncocytology, bimanual examination, examination of the breasts, and pH definition of vaginal content.

***Corresponding author:** Turdybekova YaG, Department of Obstetrics and Gynecology, Karaganda State Medical University, Karaganda, Kazakhstan; E-mail: gyasminur@mail.ru

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Results and Discussion

The environmentally disadvantaged areas of the Aral Sea region are Yrgyz settlement and Shalkar city. The examination included 435 women aged 18-50 years. In both areas women experienced later menarche at age over 16 years, accounting 35.8% (36.4% in Shalkar city and 34.94% in Yrgyz settlement). Very often the first monthlies were delayed because of wrong way of life, poor nutrition and diet, frequent fluctuations in body weight, stress, nervous overload, grueling workouts, and unfavorable ecological situation – all of this has a negative impact on the body of girls. But later menarche may indicate more serious problems, such as lack of ovaries, uterine disease, dysfunction of hypophysis, or the disorders of the endocrine glands. At late menarche, in absolute majority of girls, regular menstrual cycle did not start for a long time; in one-third of them, the rare and/or scanty menstruation is stored until childbearing age, and in such cases primary oligomenorrhea was diagnosed.

During the analysis of gynecological diseases, it was noted that 23% (every fourth woman) suffered from inflammatory diseases of the uterus and appendages. Inflammatory processes predominated in the age groups of 18-29 and 30-39 years. The disease of cervix uteri was registered in 101 women, and 61.9% of women had inflammatory diseases of the uterus and appendages. The presence of cervical disease was prevalent in the group of 30-39 years. In all of the surveyed women, pH of vaginal contents was determined, and oncocytological examination of the cervix was carried out. Bacterial vaginosis was diagnosed by patients' complaints, clinical signs, data of pH-metry, and vaginal cytology data. The greatest number of women suffering from bacterial vaginosis was detected in the age group of 30-39 and 40-49 years (16.4 and 15.8%, respectively). In the age group of 18-29 years, 6.56% of cases were revealed. Cervical pathology occurred in 10-15% of cases among gynecological disorders in women of reproductive age.

Cervical cancer is currently the most frequent malignant disease of female genital mutilation. It accounts for about 12% of all malignancies identified in women. It is registered as the defined phasing and staging of pathological processes in the development of cervical carcinogenesis. There were background and precancerous diseases, carcinoma *in situ*, and widespread cervical cancer. The results of cytological smear signs of ASCUS (atypical squamous cells of undetermined significance, including inflammation) were found in the age group of 18-29 years in 8.6%, in the group of 30-39 years in 14.06%, and in the group of 40-49 in 11.6%.

Dysplasia is the expressed proliferation of atypical cervical epithelium with violation of its "layering" without involvement of stroma and germinal epithelium. According to the literature, dysplasia is the most common form of morphological cervical precancer. The frequency of the transition of dysplasia into preinvasive carcinoma is 40-64%. In 15% of patients with a background of dysplasia, there was a development of microcarcinoma. The histological classification of dysplasia (Richart, 1968): Cervical intraepithelial neoplasia (CIN) is divided into CIN I – mild dysplasia; CIN II – moderate dysplasia; and CIN III – severe dysplasia and preinvasive cancer.

According to our data, the cytological picture of CIN I and CIN II was most common in the age group of 40-49 years in Shalkar city and settlement Yrgyz (5 and 6.9%, respectively). The presence of inflammatory and background processes of genitals increases the risk of infertility, both female and male, and complications of pregnancy and childbirth. WHO estimates the incidence of infertility in women as 40%, in men – 45%, and 15% – due to the presence of incompatibility

of spouses and immunological factors. The joy of motherhood is one of the most important needs of each woman, planted by nature itself. According to initial estimates by WHO, 5% of the population were recognized as sterile based on anatomical, genetic, endocrine, and immunological reasons. The main medical causes of infertility were problems with ovulation (36%), obstruction of the fallopian tubes (30%), and endometriosis (18%) [2,3]. According to our research in the Aktobe region, it was revealed 2.9% women had primary infertility (6 cases in Yrgyz settlement and 6 cases in Shalkar city) and 5.6% had secondary infertility (8 cases in Yrgyz settlement and 15 cases in Shalkar city). The incidence of infertility prevails in Shalkar city.

The average age of menopause coming in women of Shalkar city is 40.4 years. Premature menopause was detected in women younger than 40 years in 5 cases (31%) and early menopause in women younger than 45 in 7 cases (43.75%). The average age of menopause coming in Yrgyz settlement is 42.5 years. Preterm menopause in women younger than 40 years was registered in 3 cases (25%) and early menopause in women younger than 45 in 4 cases (33%). This trend has an impact on the physical well-being of young women, their health, and social adaptation.

According to WHO data, today the incidence of this disease is estimated from 1-3% to 10% of female population. This condition is described as "a multifactorial syndrome, in which development can include genetic, immune, and environmental factors." Autoantibodies can damage the ovaries and other organs, such as the thyroid gland, activating apoptosis in their cells. Other possible causes include viral infections and chromosomal abnormalities (often the Turner's syndrome or various defects of X-chromosome). Possible environmental factors include chemical toxins [4,5].

Perinatal loss in women of Yrgyz settlement averaged 33% and in Shalkar city – 29.3%. Every third woman had a history of cases of spontaneous abortion and/or stagnant pregnancy, which can be repeated. The frequency of abortions increases with age. In 52% women of Yrgyz settlement, spontaneous abortion was observed once in their disease history, two abortions in 12%, and three in 8%. In 41% women of Shalkar city, spontaneous abortion was observed once in their disease history, two abortions in 22%, and three in 6.3%. The course and outcome of pregnancy depend on the biological condition of the mother's body and also on environmental factors: social, environmental, industrial, and other. The number of abortions among women of reproductive age in the study group was 35%. It should be noted that with the age increasing the number of women using abortion as a method of contraception increases too. In the age group of 18-29 years, the abortion rate was 9.35%, in the group of 29-39 years – 39%, and in the group of late reproductive age – 57.25%. According to the survey, 41% women in Yrgyz settlement use methods of contraception. This index was 41% in the age group of 18-29 years. The most frequent method of contraception in this age group was using an intrauterine method (65%), a barrier method (26%), and physiological method (8.7%). In the group of women at the age of 30-39 years, 48% women use methods of contraception. This age group often uses an intrauterine contraceptive method (80%), barrier method (8%), and spermicides (2%).

Women at the age of 40-49 years use contraceptive methods, in 34.5% of cases. The most preferred method of contraception in this age group is intrauterine device (80%), combined oral contraceptive is used by 10% of women, and spermicides by 5%. For comparison, according to the survey, methods of contraception are used by 40% women in

Shalkar city. In the age group of 18-29 years, this index was 27%. Women in this age group most frequently use an intrauterine method (64%), a barrier method (32%), and voluntary surgical sterilization (4.6%). In the age group of 30-39 years, 49% women use methods of contraception. This age group is more likely to use intrauterine contraceptive method (81%) and a barrier method (14%); other methods are used by 5.5% of women. Women at 40-49 years use contraceptive methods, in 44% of cases. The most preferred methods of contraception in this age group are intrauterine devices (69%); a barrier method is used by 12% and voluntary surgical sterilization by 8.6%.

According to the survey of the disease history, the following complications during pregnancy and childbirth were revealed in women of Yrgyz settlement: premature birth in 20 (12%) women; bleeding during pregnancy and childbirth in 3 (1.8%) women; and arterial hypertension and eclampsia in 4 (2.4%) cases. Cases of fetal death were observed in 9 (5.4%) women; early neonatal mortality was registered in 8 (4.8%) cases and intrapartum deaths in 1 (0.6%) case. In Shalkar city, premature births were registered in 22 (9.2%) women; bleeding during pregnancy and childbirth – In 3.7%, hypertension and eclampsia – in 3.7%.

Fetal death occurred in 3 (1.25%) women, early neonatal mortality in 9 (3.7%), and intranal mortality in 4 (1.67%). When establishing the parity of births and data of perinatal outcomes in women, the presence of children who had birth defects and inherited genetic diseases was revealed: in Yrgyz settlement – 3 cases of congenital malformations, including 2 cases of congenital heart disease of the fetus and 1 case of congenital malformations of digestive tract. In Shalkar city we registered 2 cases of congenital malformations of fetus, including 1 case of congenital heart disease and 1 case of congenital malformations of the urinary system of the fetus.

Conclusion

Thus, according to the result of the assessment of women's reproductive health and clinical examination, the following conclusions can be made. In the women of Aktobe region, later

menarche (36%) was observed. There was a tendency to rejuvenation of menopause coming. The frequency of menopause in Shalkar city is the following: premature – in 31%, early – in 44%; in Yrgyz settlement: premature – in 25%, earlier – in 33%. Perinatal loss in women in this region occurs in one in three (30%), so too the cases of spontaneous abortion and/or stagnant pregnancy. Infertility is found in 9.14% women of Aktobe region. Primary infertility is found in 2.9% of cases and secondary in 5.6% of cases. It should be noted that the frequency of infertility was higher in Shalkar city. The results of cytological research at the cytological ASCUS symptoms are most common in the age group of 30-39 years (15.8%) in Shalkar city, and in the group of 18-29 years (12.7%) in Yrgyz settlement. CIN I and CIN II are most common in the age group of 40-49 years (5%) in Shalkar city and Yrgyz settlement (6.9%).

In this regard, we can assume that the effect of high concentrations of dust and salt aerosols and products of human industrial activity, such as artificially synthesized chemicals belonging to the class of hormone-like xenobiotics and appointed to the group of reproductive toxins, as well as some vegetable compounds, referring to a class of phytoestrogens, lead to an increase in frequency of perinatal losses among the surveyed women. Our assumption about the complex impact of negative environmental factors and toxicants on women's reproductive health are consistent with previous studies of domestic and foreign scientists.

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