Change of Environments and Health Conditions of Residents nearby the Aral Sea, Kazakhstan

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[Background] The Aral Sea was the fourth largest lake in the world before 1960s. It receives water from Syrdarya River flowing through Kazakhstan and Amudarya River flowing through Uzbekistan, and has no outlet. At present both water volume and surface is 1/3 of the original size because of over usage of water in cotton and rice fields in upper streams. This is called the largest environmental catastrophe in the 20th century. It was reported that residents nearby the Aral Sea complain physical problem, which is called "ecological disease" by local docters. I have been included the ecological disease project in Kazakhstan since 1995. This presentation is mainly the results of our investigation carried out in East Aral Sea region, Kazakhstan in summer 2000.

[Study Design] This epidemiological study was designated to examine environmental and disease status both at group and individual levels. In order to compare two districts, severe and mild environmentally degraded regions, were chosen, namely Kazalinsk where locates in the mouth of Syrdarya River, and Zhanakorgan where locates about 500 km upper along with the Syrdarya River.

[Subjects and Sampling] Samples of school-age children born in 1985 to 1993 (6 to 15 years of age) were selected from the list of children at the regional health centers.

Equal number of boys and girls were randomly selected according to birth year at each health center. Mothers or guardians living with eligible children were invited to come to the health center on a designated day with children. Informed consents were obtained from their parents.

[Data Collection] Questionaire and simple medical checks were performed. Two types of questionnaire were prepared. Medical questionnaire interview contained clinical symptoms, sanitary conditions, socio-economic and demographic background. Dietary questionnaire was used 24-hour dietary recall method for subsample of the subjects in order to collect more quantitative dietary information. As medical checks anemia and respiratory function tests in addition to hight and weight measurements were performed at each site. Spot urine and non-fasting blood were collected and transferred to Japan under frozen condition. Hair samples were also collected.

[Results] (1) Response rate was 84%: 815 among 972 children samples responded to the survey. This number was cons'.._d of 18% of all the children in the area.

(2) General health status was considered to be good in more than 90% of the subjects without inter-district difference. The most prevalent recent symptom was headache followed by diarrhea, cough, and abdominal pain.

The percentage of recent gastrointestinal symptoms were significantly higher among girls and all in Kazalinsk than in Zhanakorgan.

(3) As the anthropometric status, mean height-for-age, weight-for-age and weight-for- height z-scores for all were insignificant between two districts. The prevalence of stunting or wasting was insignificant between the districts, too.

(4) Anemia: Hemoglobin, MCV, MCH and MCHC were significantly lower while red blood cell and hematocrit were significantly higher in Kazalinsk among boys and girls. Prevalence of anemia was significantly higher in Kazalinsk (62.0%) than in Zhanakorgan (38.6%) (p<0.001).

(5) Respiratory function: % forced vital capacity (%FVC) and % peak expiratory flow (%PEF) were significantly different between Kazalinsk and Zhanakorgan, while forced expiratory volume in one second (FEV_{10}) was not differed between Kazalinsk and Zhanakorgan. Prevalence of restrictive pattern of pulmonary dysfunction was significantly higher among boys and girls in Kazalinsk than in Zhanakorgan. Prevalence of obstructive pattern showed no difference between two districts.

(6) Dietary habits were assessed with a food frequency questionnaire for all available children (n=799) and with 24-hour recall for the selected subsample (n=114). The results of the questionnaire survey showed a higher frequency of intake (p<0.001) in main staples at dinner, fish, and nuts in Kazalinsk. In contrast, it was higher (p<0.001) for meats, vegetables (green/yellow), vegetables (others), potatoes, fruits (fresh), fruits (processed), and confectioneries in Zhanakorgan. Tea intake was 1.2 cups/day higher in Kazalinsk (p<0.001).

(7) The other analytical results such as element concentrations in blood, urine and hair samples will be presented next opportunity.

[Conclusion and Future Study Directions]

Although preliminarily, above results show on the disease and environmental figures of children in East Aral Sea region based on the epidemiological survey carried out in summer 2000. This survey was mainly focused on medical, rather than environmental sides. The continuous collaboration between the local and the Japanese staffs are inevitably necessary in order to achieve our final goal, i.e., health of the children. It leads to promote quality of life (QOL) for not only children but also all residents in the area.

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