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School Urine Screening Program in Japan: History, Outcome, Perspective

Masataka Honda M.D. Ph.D.

**Tokyo Metropolitan Children's Medical Center, Department of Nephrology and
Clinical Research Support Center**

History and urine screening methods

A program of urine screening (US) for asymptomatic hematuria and proteinuria in school children has been conducted since 1974 by the Ministry of Education (Ministry of Education, Culture, Sports, Science and Technology: MEXT at present) in Japan with great success in the early detection of asymptomatic renal disease.

The methods of School US system were recommended by School Health Association (SHA) by the request of MEXT. Guidebook of recommendation was repeatedly revised to the 4th version until now. The latest one was revised in March, 2021. Municipal (city, town, and village) editorial board and school health manager in regional medical association with school doctors decide their own US system at each school based on the guidebook recommendation. Urine tests of school US are performed twice at each school every year by examination companies under the involvement of school doctor, nurse and teachers. Students with abnormal urine tests are required for further detailed examination. The methods of detailed examination of school US vary depending on each municipality and certain methods are recommended by SHA. SHA pointed out urine tests of first morning urine by dipstick should be performed twice and cut-off is + in both proteinuria and occult blood (OB). If one of them or both are positive by urine test, students are taught to receive detailed examination. They receive interview, physical examination, blood pressure, urinalysis, urinary protein/creatinine (PCR), urinary β_2 microglobulin/creatinine and blood test including albumin, creatinine and C3 in detailed examination.

Outcome

In the first urine test, the positive rate of protein by dipstick was 0.6%, 2.1% and 2.1% in elementary(E), junior high (J) and high schools (H), respectively from the nationwide survey in 2016. The positive rate of protein in secondary urine test, however, decreased down to one tenth (0.1, 0.4 and 0.2% in E, J and H, respectively). The positive rate of OB in secondary urine also decreased down to 0.2, 0.4 and 0.2% in E, J, H, respectively. The positive rate of second test with both protein and OB were 0.07, 0.08, and 0.10% in E, J and H, respectively. From the above data, only 0.3 to 0.5% students needed further examination. These data were significantly different from those in USA.



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In the study of Chiba City, total of 9544 (0.3-0.5% of positive rate in each year) students showed abnormal results after detailed examination from 1975 to 2014 year. Out of 9544 students, 334 (3.5%) were found to have certain diseases and 310 (3.2%) were diagnosed with chronic glomerulonephritis (CGN) including 204 (65.8%) of IgA nephropathy. The discover rate showed 0.6/ 10 thousands of total students. Murakami reported that 425 out of 31552 (1.3%) students showed abnormal US and 30 out of 425 (7.1%) students were proven to have CGN with 70% of IgA nephropathy. The rate of CGN was 1/ ten thousands. The contribution of US significantly reduced ESKD caused by CGN in Japan. In these periods, the incidence rate of CGN closely related with ESKD in children < 20 years old decreased from 33.1% in 1981-1986 to 3.9% in 2006-2011. Yamagata et al. reported that they analyzed the incidence rates of GN which caused ESKD in adult from 1983 to 1999, and that of only the generations who received school US (<45 years old in 1999) ~~were only~~ decreased in comparison with older age. In Japan, IgA nephropathy has been mostly discovered by US, and in the meanwhile, the treatment of IgA is outstandingly improved. That may cause decrease in the frequency of CGN in Japan. Dr. Hattori reported ESKD caused by glomerulonephritis in Japan became one forth in USA in 2008.

Perspectives

Reconstruction of US system

We surveyed school US system and current status in all schools and educational boards in municipal government in 2014. We found that many different US systems existed at each school regarding US and detailed screening. These issues may induce excessive abnormal results in the students who should be normal or missed the students who needed further evaluations. Japanese Society for Pediatric Nephrology (JSPN) involved strongly in SHA from the 2011 and revised instruction book which was published by SHA. Committee of CKD in JSPN performed various activities for the efficient and effective nationwide system. JSPN appointed the representatives of special nephrologists in each prefecture for making the best system in related each municipality. Furthermore, JSPN made US manual in 2015 using flowchart and Q & A for the simple and easy to understand regarding US system for the US participants. About 6000 volumes were already sold. Now, we are making a new version.

Discovery of CAKUT

Recently, the prevalence rate of CAKUT occupied about 60% in CKD and 50% in ESKD in Japan, but many patients with CAKUT have not been detected by US. We examined several urinary markers. Then, we introduced urinary be-ta 2 microglobulin/ creatinine ratio and protein/creatinine ratio in the detailed examination of US from 2021 revised instruction of US.

Conclusion

Although the school US in Japan has been tremendously useful for the reduction of ESKD, further improvement is still desirable.