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SCREENING IN PROTEINURIA-HEMATURIA AMONG 5 - 26 YEARS OLD STUDENTS IN CLOSED COMMUNITY SCHOOL IN SURABAYA, INDONESIA

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ABSTRACT

The prevalence of low-income families Indonesian adults of age less than 50 years old with end stage renal disease (ESRD) has shown a steady increase for the recent three years. The chronic kidney disease (CKD) progress from earliest stage to end stage takes up to 5-20 years enables to find effective strategies for prevention when early detection is made. The objective of this study was to perform the prevalence of urinalysis abnormality (hematuria-proteinuria) and to analyze its associated factors. In this study the urine specimens of 459 students were collected. The blood and protein detection was tested by protein dipstick and light-microscopic examination. Physical examination and medical history were performed in cross-sectional study. This study reported that among a group of students aged 5-26 were found 154 cases of 459 students (33.6%) with urine abnormality as marked with the presence of both proteinuria and hematuria, that of proteinuria alone as well as both proteinuria and hematuria were also recorded (26.5%, 3.7%, 3.3%, respectively).In 15-26) the younger group showed a higher prevalence (41%) than the older group (15-26) showed 28.4%. Three from nine analyzed factors associated with the contribution of high prevalence of urine abnormality were significant. The younger group showed higher prevalence, male group showed greater prevalence and students without insurance coverage showed higher prevalence. In conclusion, there exist significant interrelationships between hematuria and other indicators. Hence socioeconomic and other conditions are important aspects which should be taken into account in formulating health policies, implementing health programmes. Economic crisis can have impact on vital organ maturity development in children in the early age.

Keywords: *hematuria, proteinuria, school-aged population*

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INTRODUCTION

The presence of proteinuria and hematuria in asymptomatic patients is most likely to be an early detection of CKD (Tiebosch et al. 1987), since it takes over a period of several years that the early stage of CKD progresses to its end stage (Krol et al. 2009). It is much important to identity the asymptomatic condition; Unfortunately, it is very likely that such study has not been much conducted in Indonesia. As CKD is a world-wide under-diagnosed health problem, the number of young adults with ESRD shows continuous increase, there has been recorded in Soetomo Hospital-Surabaya for the last few years that the number of young adults with ESRD shows a sharp increase (80, 120, 600 in 2006, 2007, 2008 in succession) (Santoso, unpublished data). The early detection of proteinuria and hematuria at younger age may enable to find effective strategies for prevention and finally result in the reduction of the high prevalence. The aim of this study was to identify the presence of proteinuria and hematuria at the younger age and to analyse the risk factors. This study -assumed to be a pioneer- hopefully can make a great contribution to prevent the increasing number of ESRD in Indonesia.

MATERIAL AND METHODS

Involved in this study were 459 students (228 male and 231 female) with a range of age from 5 to 26 years old. They were the students of 14 different schools located at Wiyung, a suburb area in the western part of Surabaya. As many as 72 were the students of 5 different elementary schools, 116 of 4 different junior high schools, 162 of 4 senior high schools and 109 of a single college.

Data collection was performed by a team of physicians and nurses of Soetomo Hospital and the representatives of the randomly selected schools with written informed

consent, this study targeted 500 student population and there were 459 eligible participants. The other 41 subjects (8.2% of the targeted population) failed the requirements, therefore were excluded from this study. In fact, the exclusion was caused not only by the parent's denials and the student's being absence, but also by the presence of several conditions fever, pyuria, urine too dilute and menstruation during the examination. We also exclude any other conditions that could have symptoms of hematuria, like acute urinary tract infections, acute glomerulonephritis, congenital urinary tract anomalies with obstruction, and trauma to genitals.

Not only the urinary test samples were obtained between 08.00 and 11.30 am, but also conducted during the time were the data collection and physical examination (age, gender, coverage of insurance, family medical history of diabetes mellitus, hypertension, CVD, stroke and the measurement of BMI and blood pressure). Through a chemically impregnated dipstick method was identified the presence of proteinuria (Glassock 2001). Microscopic hematuria examination was used to identify the presence of hematuria. Proteinuria was considered present if found 25 mg/dl, while hematuria was defined as 6 or more RBC/hpf (Grossfeld et al. 2001). Malnutrition was defined at BMI bellowed 18 kg/m2. Pre-hypertension was defined as mean systolic blood pressure 120-139 and diastolic blood pressure 80-89. Hypertension was defined as mean systolic blood pressure > 140 mmHg and diastolic blood pressure > 90 mmHg, or current use of antihypertensive medication (Chobanian et al. 2003). The data collected was processed in public health department, Airlangga University. The chi-square was used analysis of simple comparisons.

RESULTS

This study found a total of 33.6% prevalence ratio of urine abnormality among a group of students at the age of 5-26 (154 cases of 459). The urine abnormality is defined with three criteria i.e. the presence of both proteinuria and hematuria, the presence of proteinuria alone or of hematuria alone. A more detailed observation in this study, the prevalence of urine abnormality with hematuria alone shows 26.6% (122 cases of 459), with both hematuria and proteinuria in one subject 3.3% (15 cases of 459) (Table 2). Interestingly, when seen to the younger group (5-14 years old) this study showed a higher overall prevalence: i.e 41% (77 cases of 188). This study also reported 34.6%, 3.2%, 3.2% prevalences of urine abnormality with hematuria alone, with proteinuria alone, with both proteinuria and hematuria, respectively. Unlike the younger group which showed a higher overall prevalence of urine abnormality, the older group (15-26) showed a lower prevalence of as much as 28.4% (77 cases of 271). Reported in this study are prevalence of urine abnormality with hematuria alone (21.2%) and that with proteinuria alone (4.1%) (Table 2). To sum up, the younger group showed greater prevalence (41%) of urine abnormality than did the older group (28.4%), which is statistically significant.

This study explored 9 risk factors that might be associated with the high prevalence of urine abnormality among the student group at age 5-26. Of the 9 risk factors (age, sex, insurance status, parents history and DM, of hypertension status, of renal disease, nasal of mucose problem, family with cardiovascular problem, asthmatic problem), as many as three factors are significant. The three significant factors are age, sex and insurance status related to the prevalence of urine abnormality. In terms of age, the younger group (5-14 years old) students have the greater prevalence than the older group (15-26 years old). Regarding sex factor, male group has the greater prevalence of urine abnormality than the female group. Whereas, in regard with insurance status factor, students with no insurance have the greater prevalence of urine abnormality than student covered with insurance.

DISCUSSION

Several studies claimed that the presence of hematuria in young population might suggest a sign of kidney problem (Julian et al. 1991, National Kidney Disease Education Program 2003). This study showed a very high prevalence of hematuria of all population, aged 5-26 (26.6%). It requires careful interpretation whether the presence of hematuria is caused either by renal problems or the others (blood disorder or urinary tract problems) (Glassock 2001). Nevertheless, the very high prevalence shown in this study could not be ignored and underestimated for the reason of the criteria of inclusion and exclusion applied in the sampling method.

The fact that the number of occurrences of young adults with ESRD is also relatively high may suggest a correlation to the high prevalence of hematuria in younger group. Shown a higher prevalence of hematuria (34.6%) is the age of 5-14 years old. Conducted in this study are urinalysis screening and blood pressure measuring (the latter examination showed insignificance). As shown in the urinalysis-screening, a higher prevalence of hematuria happens in younger group (age 5-14: 34.6%). There must have multi-factors which can explain this outcome. Considering that the social-economy factors may play an important role in

affecting people's health condition (Barsoum & Sitprija 2007), this study would like to do some analyses on social-economy factors. For illustration, in 1998, children who were born in 1993 were in their golden period of growth (as in 1998, they were 5 years of age) . Owing to the prolonged monetary crisis, they might have inadequate food resources since 1998. Thus, those born in 1993 (5 years of age in 1998) underwent malnutrition. Such disorder may reflect the general health status of the community. This is quite alarming given that such condition is expected to boom during the coming two decades, which may undoubtedly reflect on the incidence of ESRD with a concomitant illness.

Table 1. Participant Characteristics and Prevalence of urine abnormality.

Characteristic	Abnormal urine	Normal urine	RR	Significant
All participants	459			
Gender				
Male	92	139		
Female	62	166		
Age group				
5-14 y	77	111		
15-26y	77	194	1.441	Sig
Covered by health insurance				
Yes	88	141		
No	61	157	1.373	Sig
Family history of				
Diabetes, Yes	21	49		
No	129	249	0.827	Not sig
Hypertension, yes	45	93		
No	105	205	0.945	Not sig
Renal disease,yes	4	13		
No	146	285	0.601	Not sig
Cardiovascular,yes	13	11		
No	137	287	1.676	Sig,0.047
Nasal mucous problem, yes	49	103		
No	99	194	0.95	Not sig
Asthmatic, yes	10	26		
No	140	272	0.747	Not sig

Table 2. Prevalence of urine abnormality (hematuria alone, proteinuria alone, both proteinuria and hematuria)

	Total population (459) (5-26 years old)	Younger group (188) (5-14 years old)	Older group (15-26 years old)
Overall prevalence	33.6 % (154 cases)	41 % (77 cases)	28.4 % (77 cases of 271)
Prevalence of urine abnormality with hematuria only	26.6 % (122 cases)	34.6 % (65 cases of 188)	21 % (57 cases of 271)
Prevalence of urine abnormality with proteinuria only	3.7 % (17 cases)	3.2 % (6 cases of 188)	4.1 % (11 cases of 271)
Prevalence of urine abnormality with both proteinuria and hematuria	3.3 % (15 case)	3.2 % (6 cases of 188)	Not found

Table 3. Association age and urine abnormality

	Urine abnormality		
	Hematuria alone	Proteinuria alone	Hematuria and proteinuria
Younger age group Older age group	RR=1.64, p=0.002	RR=0.91, p=0.931	RR=1.441, p=0.007

Table 4. Association several risk factor and hematuria among student

		Hematuria	No hematuria	RR	P
1	Sex: Male	44	166		
	Female	78	139	0.583	0.001 (S)
2	Age: <15	65	111		
	>15	57	194	1.626	0.002 (S)
3	Income: Poor	18	66		
	No poor	97	225	0.711	0.150 (NS)
4	Nasal mucosa problem: yes	79	194		
	No	37	103	1.095	0.673 (NS)
5	Hypertension: yes	34	93		
	No	84	205	0.921	0.719 (NS)
6	Diabetes melitus:yes	14	49		
	No	104	249	0.754	0.307 (NS)
7	Renal disease:yes	2	13		
	No	116	285	0.461	0.306 (NS)
8	Arthritis problem:yes	8	17		
	No	110	280	1.135	0.858 (NS)
9	Cardiovascular:yes	10	11		
	No	108	287	1.742	0.078 (NS)
10	Asthmatic: yes	8	26		
	No	110	272	0.871	0.650 (NS)

A global socio-economic crisis that began in 1997 in fact, gave a direct impact to the increase of unemployment rate in Indonesia. Fitzpatrick (2003) claimed that unemployment is major cause of ill health. That the monetary crisis in Indonesia continued until 2002 has caused prolonged high rate of unemployment. Further, as a result of high unemployment rate, women with bearing children during the fall of economic condition were most likely to experience inadequate nutrition.

That the younger group (age 5-14) showed higher prevalence of hematuria than the older group (age 15-26) was an interesting issue to learn. In order to reveal what might explain, we would look back the period of infancy and childhood of the subject population. The younger group (age 5-14) were found to have lived and grown in the domain of extreme poverty, high rate of unemployment due to the global monetary crisis.

Those who were born in 1993 and after (before the recovery in 2003) may have undergone malnutrition due to the prolonged monetary crisis. Meanwhile, the older group born in 1989 (age 26 when this research was conducted) had already gone through their golden period of growth. Also, those who were born before 1993 were living in a relatively-stable socio-economic condition (pre-global monetary crisis) must have been able to protect themselves from toxic and hazardous environment. Those born in 2002 (age 5 when this study was conducted) still got the impact of the monetary crisis as in 2001 they were still fetus, their mother might have inadequate nutrition for the recovery period of monetary crisis took many years in Indonesia. Their mothers had poor pregnancy outcome. In short, the generation of age 5 to 14 (born in between 1993 and 2002) was susceptible to the impact of the monetary crisis. Living in poverty is highly correlated with suboptimal health status (Dunston 2005).

The economic recession of the 1930s had caused high levels of unemployment, which had, in turn, led the scheme into financial difficulties (Mays 2003). Children are particularly vulnerable to factors that adversely influence their health and lead to disparities in health status. During gestation the developing fetus is subjected to the environment milieu of the womb which may be preconditioned by the mother's health or influenced by conditions that arise during pregnancy (Dunston 2006). For years, poverty has been associated with poor health due to the lack of basic body needs. The financial crisis, such as major economic crisis happened in Indonesia, can have impact on fetal development and vital organ maturity development (on early age of children's life).

This study found that the student population with health insurance coverage showed lower prevalence of hematuria; in other words, those uninsured showed higher prevalence. Some studies indeed reported that health access determined the health quality (Prudent et al. 2005). Another different study also showed that the most dramatic health disparity among racial and ethnic minorities was the inability to access health care due to the lack of health insurance. Further, Prudent mentioned that the lack of health insurance and, to a lesser extent, coverage with publicly funded insurance, determines the quantity and quality of health care the children receive.

Nevertheless, regarding to the limited facilities of health insurance package provided by the government, the possession of health insurance could not exactly account for the lower prevalence of hematuria. In other words, even though there was insurance coverage, it was not the insurance itself that roled in presenting lower outcome of urine abnormality (hematuria alone). Better socio-economic status and higher educational background should play important part in contributing relatively lower number of prevalence which is also defined that it was poverty which accounted for the high prevalence of students with hematuria. Prudent mentioned the link between poverty and an increased prevalence of a particular disease. He claimed that poverty was also associated with increased rates of many other chronic, progressive diseases with lower level of entry and retention in medical care – that long-term outcome is reflected in morbidity and mortality rates for most common diseases (Prudent et al. 2005), one of which is chronic renal failure. Other findings were difference observed in gender, where the prevalence in men was higher than that in women. However, to our knowledge, there were no studies explaining the influence of gender on haematuria until now.

CKD in its earliest stages usually shows asymptomatic condition, when it progresses to its end stage over 5-20 years, it is diagnosed late in its course. Therefore, early detection of CKD seems to be an important factor. Previous studies mentioned that patients with ESRD in developed countries averaged at above 59 and those in underdeveloped countries of younger age. Even the data in our center showed as many as 600 (out of 1000) patients with ESRD aged 35-45 years (Santoso D, unpublished data). As matter of fact, those with ESRD (age 35-45) must have had kidney damage at their younger age (5-26). Though there was symptomatic condition, still urinalysis study was reliable to detect the problem and further preventive actions could have been made. Therefore, the patients might not have had ESRD in their 35 to 45.

Although the result of this study is open to criticism, this study has shown an interconnection between hematuria (a sign of poor health condition) and prolonged monetary crisis. The high prevalence of hematuria in young population shown by this study should become such a great concern for government to take immediate actions of prevention. There are several major programs that can be undertaken to improve the poor health condition in Indonesia: First, an interventional health program for pregnant women living in low-socio economic area; second, provision of school meals and health education. In order to put the health program into good use, entire strata of organisation in community must be involved (Local Authority, Health Authority, and Central Government).

CONCLUSION

In conclusion, there exist significant interrelationships between hematuria, and other indicators. Hence socioeconomic and other conditions are important aspects which should be taken into account in formulating health policies, implementing health programmes. Economic crisis may have impact on fetal development and vital organ maturity development in children in the early age.

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REFERENCES

1. Barsoum RS and Sitprija V (2007). Tropical nephrology. In: Schrier RW (ed), Diseases of the Kidney & Urinary Tract, 8th ed., Philadelphia, Lippincott Williams & Wilkins, p 2013-2055
2. Chobanian AV, Bakris GL, Black HR et al. (2003). The Seventh Report of the Joint National Comitee on Prevention, detection, evaluation and treatment of high blood pressure: The JNC 7 Report. JAMA 289, 2560-2572
3. Davison AM and Grunfeld JP (1998). History and clinical examination of patient with renal disease. In: Davidson AM, Cameron JS, Grunfeld JP, Kerr DNS, Ritz E, Winearls CG (eds). Oxford Textbook of Clinical Nephrology, 2nd ed., Oxford, p 3-19
4. Dunston FJ (2005). Health disparities in children. In: Satcher D and Pamies RJ (eds), Multicultural Medicine and Health Disparities, New York, McGraw Hill, p 127-138
5. Fitzpatrick R (2003). Society and changing patterns of disease. In: In: Scambler G (ed). Sociology as Applied to Medicine, London, Saunders, p 3-17
6. Glassock RJ (2001). Hematuria and proteinuria. In: Greenberg A (ed), Primer on Kidney Disease, San Diego, Academic Press.
7. Grossfeld GD, Wolf JS, Litwin MS, Hrickak H, Shui C, Agerter DC, Carrol PR (2001). Asymptomatic microscopic hematuria in adults: Summary of the AUA best practice policy recommendations. American Family Physician 63, 1145-1154
8. Julian BA, Cannon VR, Waldo FB, Egido J (1991). Macroscopic hematuria and proteinuria preceding renal IgA deposition in patients with IgA. American Journal of Kidney Disease, p 472-479
9. Krol E, Rutkowski B, Czarniak P, Kraszewska E, Lizakowski S, Szubert R, Czekalski S, Sulowics W, Wiecek A (2009). Early detection of chronic kidney disease: Results of the PolNef study. Am J Nephrol 29, 264-273
10. Mays N (2003). Origins and development of national health service. In: Scambler G (ed). Sociology as Applied to Medicine, London, Saunders, p 205-234
11. National Kidney Disease Education Program (NIH Publication no. 03-53490) (2003). Bethesda, MD, National Institute of Health.
12. Prudent N, Ruwe MB, Meyers A, Capitman J (2005). Health-care access for children of immigrants. In: Satcher D and Pamies RJ (eds), Multicultural Medicine and Health Disparities, New York, McGraw Hill, p 139-152
13. Tiebosch A, Wolters J, Frederik P, van de Wielt, Zeppenfeldt E, van Breeda, Vriesman P (1987). Epidemiology of idiopathic glomerular disease: A prospective study. Kidney Int 32, 112-116