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Original research article

Albuminuria Screening with Urine Strip in Klong Luang Community, Pathum Thani, Thailand

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ABSTRACT

This study was to determine albuminuria prevalence and risk associations of albuminuria in people who lived in Klong Luang community. This cross-sectional study was conducted in Klong Luang community, Pathum Thani province, Thailand. The mid-stream urine and blood samples were collected from all participants for albuminuria testing with urine strip and blood urea nitrogen and creatinine analysis, respectively. Binary logistic regression was used for risk association analysis. Among 239 participants enrolled, 32 (13.4%) subjects had albuminuria. Creatinine was a significantly independent risk association for albuminuria (p<0.045, α=0.05). Participants who lived in this community were 13.4% albuminuria prevalence and creatinine was an independent risk association for albuminuria. Thus, Primary Health Care Services should follow up subjects with albuminuria and provide health education program to the Klong Luang community.

Keywords: Albuminuria; Prevalence; Risk association

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1. Introduction

Albuminuria is mainly associated with an increased risk of progressive kidney disease. It is also associated other diseases such as diabetes with kidney complication, hypertension and decline kidney function in old-aged group [1, 2]. Albuminuria can be classified into microalbuminuria and macroalbuminuria. Subjects, who had albumin excretion in urine between 30 to 300 mg/day are defined as microalbuminuria, while macroalbuminuria is urinary albumin excreted more than 300 mg/day [3]. Screening albuminuria can represent the early kidney abnormality and related diseases such as diabetic nephropathy, cardiovascular disease and hypertension [4-6]. Klong Luang community is a community located in Pathum Thani province and near the Thammasat University (Rangsit Campus). Thammasat University Hospital has been provided medical services to the general public including Klong Luang community. To reduce the development of chronic or severity cases such as kidney diseases, this study aimed to assess the prevalence and independent risk association of albuminuria in people who lived in Klong Luang community, Pathum Thani, Thailand. This information will help the Health Care team of Klong Luang Hospital to improve health care service and provide more effective health education and treatment.

2. Materials and Methods

2.1 Study population and study design

A cross-sectional survey was conducted in people who lived in Moo 8-16, Klong Luang district, Pathum Thani province, Thailand in March 2014. Participants who are older than 35 years old were voluntary included into this study, while pregnant women were excluded. There were 246 adult participants enrolled with signed consent form. However, the urine and blood samples were collected from 239 participants, while no urine sample was collected from 7 subjects. The research protocol was reviewed and approved by The Human Research Ethics Committee of Thammasat University.

2.2 Demographic data collection

Weight, height and blood pressure were measured with the standard equipment. The mean of individual blood pressure was calculated from two measurements.

2.3 Specimen collection and examination

Mid-stream urine samples were collected in clean plastic containers and immediately analyzed using DIRUI H13-Cr urine strips (Dirui Industrial Co. Ltd., China). This urine strip can determine 13 tests including albumin and microalbumin. Urine sediment samples were also examined using microscopic examination. In addition, blood samples were taken after overnight fasting and transported to the laboratory of Health Care Service Centre, Faculty of Allied Health Sciences, Thammasat University for blood urea nitrogen (BUN) and creatinine (Cr) analysis.

2.4 Statistical analysis

Prevalence and risk association factors for albuminuria were evaluated. Descriptive statistics were described for demographic data. Mann Whitney U-test was used to analyze the continuous variables. The category variables were analyzed by Chi-Square test. Univariate and multivariate analysis were also performed to identify independent risk associations using binary logistic regression. The level of significance was at p-value <0.05.

3. Results and Discussion

3.1 Characteristics of study population

In this study, 239 urine and blood samples were collected from participants. Albuminuria screening with urine strip can be divided into 2 groups; there were 207 subjects without albuminuria in the first group including 52 (25.1%) male and 155 (74.9%) female.

Median of age was 49.0 (33.0-84.0) years old. Median of BMI was 26.2 (17.1-35.7) kg/m^2. Median of systolic BP and diastolic BP were 122.0 (83.5-173.5) and 77.0 (45.0-123.0) mmHg. Medians of BUN and creatinine levels were 10.0 (4.0-23.0) and 0.7 (0.5-1.4) mg/dL respectively. There were 32 albuminuria subjects in the second group including 9 (28.1%) male and 23 (71.9%) female. Median of age, BMI, systolic BP, diastolic BP, BUN and creatinine were shown in Table 1. Comparison of continuous variables using Mann-Whitney U-test between two groups, there were not significantly different (p>0.05). The category variable such as sex was analyzed using Chi-Square test. It was not significantly different (p=0.717, α=0.05) as shown in Table 1. In those who had albuminuria, there were 8 (28.6%) hypertension and 2 (7.1%) diabetes mellitus (data not shown).

Table 1. The characteristics of participants with or without albuminuria.

Characteristics	Normal N=207 Median (min-max)	Albuminuria N=32 Median (min-max)	*p*
Age (years)	49.0 (33.0-84.0)	51.0 (28.0-68.0)	0.559
Sex (male/female)	52/155	9/23	0.717
BMI (kg/m^2)	26.2 (17.1-35.7)	26.1 (18.5-35.9)	0.946
Systolic BP (mmHg)	122.0 (83.5-173.5)	126.8 (104.5-192.0)	0.059
Diastolic BP (mmHg)	77.0 (45.0-123.0)	76.0 (63.5-117.5)	0.710
BUN (mg/dL)	10.0 (4.0-23.0)	10.5 (4.0-33.0)	0.201
Creatinine (mg/dL)	0.7 (0.5-1.4)	0.8 (0.5-1.8)	0.180

3.2 Prevalence and risk associations

The albuminuria prevalence was 32 (13.4% (95%CI: 9.3%-18.4%)) cases, 6 (2.5%) cases presented microalbuminuria while 26 (10.9%) cases presented macro-albuminuria. All microalbuminuria samples were confirmed. The granular cast (0-1/LPF) was found in one microalbuminuria case while other cases had normal urine sediments. Univariate and multivariate analysis showed that creatinine level was an independently risk associated with albuminuria (p=0.045, α=0.05). In those who had high creatinine level more than normal range, they had 8.0 times (95%CI: 1.1-61.6) higher risk for albuminuria than those who had normal creatinine level after adjusting for sex, age, BMI, blood pressure and BUN.

Albuminuria screening with urine strip is a simple and cheap testing as well as yielding rapid results. This DIRUI H13-Cr urine strip can determine macroalbuminuria and microalbuminuria. The albuminuria prevalence in Klong Luang community was 13.4% (10.9% macroalbuminuria and 2.5% microalbuminuria). Previous study examined albuminuria in 357 Thai people aged 35 and older at *Ban Nayao*, Chachoengsao province using *Combur* and *Micral* test strip [7]. The results showed that micro-albuminuria prevalence was 26.61% and macroalbuminuria was 3.08%. The prevalence of microalbuminuria from Ban Nayao report was higher than Klong Luang community; it might depend on sensitivity of urine strip test and health condition of participants who lived in the community. Previous study used two urine strip tests to analyze the first morning urine samples, it had more chance to find more cases of microalbuminuria. In this study, one case of microalbuminuria and one case of macroalbuminuria were diabetic mellitus. Another study detected microalbuminuria in 820 asymptomatic individual students from twelve secondary schools in Nigeria using *Micral* test strip [8]. The prevalence of microalbuminuria was 33.2%. It was significantly higher in females, obesity, hypertension, diabetes mellitus and family history of hypertension and diabetes mellitus. Many studies reported microalbuminuria is related to hypertension, cardiovascular disease, renal disease and diabetic mellitus [1,9-11]. Micro-albuminuria is an early

sensitive marker of renal disease including chronic kidney diseases (CKDs). Therefore, early detection in asymptomatic individuals may be helpful in prevention of renal dysfunction. In this study, univariate and multivariate analysis showed that creatinine was an independently risk associated with albuminuria, while many studies reported creatinine clearance, e-GFR, HbA1C, diabetic mellitus and hypertension were the independent risk association for microalbuminuria [12-15]. However, the limitation of this study was lacking of blood chemistry such as fasting plasma glucose, HbA1c, e-GFR, Albumin Creatinine Ratio (ACR) and underlying disease. This study was the first albuminuria screening in Klong Luang community. Information of this study was provided to Health Care Staffs at Klong Luang Hospital for following-up albuminuria subjects. Health Care Staffs will set up education programs in the next time.

Table 2. Univariate and multivariate analysis of risk associations for participants with albuminuria

Characteristics	Enrolled subjects	Albuminuria subjects N (%)	Crude OR (95%CI)	*p*	Adjusted OR (95%CI)	*p*
Sex						
Male	61	9 (14.8)	1		1	
Female	178	23 (12.9)	0.9 (0.4-1.9)	0.717	1.1 (0.4-3.5)	0.832
Age group (years)						
< 40.0	43	5 (11.6)	1		1	
40.0-49.9	76	10 (13.2)	1.2 (0.4-3.6)	0.809	1.1 (0.3-3.5)	0.868
50.0-59.9	108	15 (13.9)	1.2 (0.4-3.6)	0.712	0.9 (0.3-3.0)	0.976
≥ 60.0	12	2 (16.7)	1.5 (0.3-9.0)	0.645	1.2 (0.2-7.6)	0.851
Body Mass Index						
Normal	91	12 (13.2)	1		1	
Overweight	147	20 (13.6)	1.04 (0.5-2.2)	0.972	0.9 (0.4-2.1)	0.929
Blood pressure (mm/Hg)						
Normal (<140/90)	208	26 (12.5)	1		1	
Abnormal (≥140/90)	30	6 (20.0)	1.8 (0.7-4.7)	0.265	1.5 (0.5-4.3)	0.478
BUN						
Normal	235	31 (13.2)	1		1	
Abnormal	4	1 (25.0)	2.2 (0.2-21.8)	0.502	0.5(0.03-10.4)	0.672
Creatinine						
Normal	233	29 (12.4)	1		1	
Abnormal	6	3 (50.0)	7.0 (1.4-36.5)	0.020*	8.0 (1.1-61.6)	0.045*

Note: **P*-value <0.05

4. Conclusion

Albuminuria, especially micro-albuminuria, is a urine chemistry to represent glomeruli filtrate dysfunction. Participants in this Klong Luang community have never been tested for albuminuria before. In the present study, the prevalence of albuminuria in Klong Luang community was 13.4% and creatinine was an independently risk associated with albuminuria. The information of this study is beneficial for the home health care service at Klong Luang community to follow up albuminuria subjects. For reducing the development kidney disease in the future, health education program and community awareness program should be provided to the Klong Luang community.

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