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## COST - EFFECTIVENESS ANALYSIS OF RADIOIMMUNOASSAY AND IMMUNOTURBIDIMETRIC TESTS FOR MICROALBUMINURIA

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**Objective:** To perform cost - effectiveness analysis of radioimmunoassay and immunoturbidimetric tests as diagnostic markers in detection for microalbuminuria

**Setting** : King Chulalongkorn Memorial Hospital

**Design** : Retrospective study

**Subjects** : data about cost and effectiveness of two categories for detection for acute pancreatitis performing by radioimmunoassay and immunoturbidimetric tests

**Methods** : Review relating literature then economical-based cost-effective analysis was performed.

**Results** : Cost-effectiveness of radioimmunoassay test was 267.86 baht /diagnosis and of immunoturbidimetric test was 80.65 baht/diagnosis

**Conclusion:** immunoturbidimetric was more cost-effective method than radioimmunoassay for detection for microalbuminuria

**KEY WORDS** : cost-effectiveness, microalbuminuria

Microalbuminuria (MAU) has been recognized as an independent and reliable predictor for future development of overt proteinuria in diabetic patients.<sup>1</sup> It represents the condition in which abnormal micro quantities of albumin, not detectable by simple urine dipstick, are excreted into the urine. It is associated with a high morbidity and mortality form of diabetic nephropathy<sup>2-5</sup> as well as coronary artery diseases.<sup>1</sup> Furthermore, there have been many reports on the association between microalbuminuria and an increasing incidence of diabetic retinopathy.<sup>1</sup>

Therefore, microalbuminuria is an important biomarker for monitoring complications of diabetic patients. In case which high blood sugar control is successful, microalbuminuria is also decreased.<sup>6</sup>

The standard method for detection of microalbuminuria is radioimmunoassay method.

But due to the fact that this method is difficult to perform and have to expose to radioactive substance, therefore, the immunoturbidimetric method for determination of microalbuminuria is introduced. Not only efficacy of these diagnostic tests but also economical aspects of them should be considered. This study was set to analyze cost-effectiveness of the laboratory tests for the determination of microalbuminuria. The result from this study can be a guideline and help the physician to select the proper and economical method for the detection for microalbuminuria.

### MATERIALS AND METHODS

Data about cost and effectiveness of two laboratory diagnostic tests for microalbuminuria; radioimmunoassay and immunoturbidimetric tests were reviewed. Cost in this study was set as customer cost of financial unit and presented in baht. Prevalence of disease detected in popula-

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tion from the previous study<sup>7</sup> was set as utility. Results from each category were collected and analyzed using economical statistical method. The probabilities for each methods were determined from the test characteristics derived from our previous validation studies.<sup>7</sup> The expected cost of each strategy was derived by multiplying the cost for each method with the probability of that method and subsequently adding all such products derived from the methods of that strategy. Similarity of the expected utility of each strategy was determined.

## RESULTS

Customer cost and utility of each diagnostic method was shown in Table 1. Expected cost and utility of each method and cost - effectiveness of each method was presented in Table 2. The results have shown that immunoturbidimetric is more cost-effective method than radioimmunoassay in the detection for microalbuminuria (Figure 1).

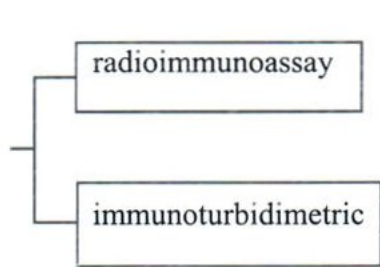
**Table 1.** Costs and utilities of diagnostic methods for microalbuminuria.

Methods	result	Path probabilities	Customer costs (baht)	Utilities (rate)
Radioimmunoassay	+	0.33	150	0.33
	-	0.67	150	0.67
Immunoturbidimetric	+	0.14	50	0.33
	-	0.86	50	0.67

**Table 2.** Cost-effectiveness analysis.

Strategies	Expected cost	Expected utility	Cost-effectiveness*
Radioimmunoassay	150	0.56	267.86
Immunoturbidimetric	50	0.62	80.65

\* cost effectiveness = expected cost/ expected utility



	results	probabilities	costs	utilities
radioimmunoassay	+	0.46	150	0.33
	-	0.54	50	0.67
immunoturbidimetric	+	0.46	50	0.33
	-	0.54	50	0.67

**Fig. 1.** Decision tree depicting laboratory diagnostic tests for microalbuminuria strategies and associated probabilities, costs and utilities.

**DISCUSSION**

Slight albuminuria or microalbuminuria, defined as an albumin concentration above normal but still negative by conventional dipstix testing, has recently been recognized as an early marker for diabetic complications especially for diabetic nephropathy.<sup>2,3</sup> In type 2, non - insulin - dependant diabetic patients, microalbuminuria can also serve as an indicator of early death from cardiovascular diseases.<sup>1</sup> Therefore, identification of microalbuminuria in diabetic patients implies a benefit for diabetic care.

There are many methods for determining microalbuminuria. RIA is a widely used quantitative method for microalbuminuria detection. Some limitations of this method such as, long time required for turn-over and its radiation hazard should also be considered. Therefore, an alternative methods using immunoturbidimetric test for detection of microalbuminuria have been developed.

Therefore, there are many tests for detection of microalbuminuria used in the present day. Each method has its specific property and different from the others. Checking for its efficacy and cost-effectiveness should be performed. Furthermore, in the present day, the concept of health economics was widely

discussed. Each laboratory test should be check for its economical effectiveness. Therefore, this study can be a good basic information for the selection of a diagnostic test for microalbuminuria.

In this study, two common diagnostic methods for detection screening of microalbuminuria were evaluated. It was shown that the expected cost of immunoturbidimetric determination was lower than that of the radioimmunoassay test. Furthermore, the expected utilities of the immunoturbidimetric test was also higher than radioimmunoassay test. Therefore, the study revealed that immunoturbidimetric was more cost-effective method. Therefore, the selection to use this determination as a diagnostic test for microalbuminuria is rational.

This study has taken the cost for the test which the patient has to pay each test, so the cost-effectiveness analysis in this study will affcet on the patient directly.

This study has done at only one hospital and the capital investment for the laboratory, the building, the apparation and the salary of the technicians, etc. were not taken into account. Therefore, further study as a multi centric setting is recommended.

This study made use of customer cost that patient had to pay for the test in analysis so the cost-effectiveness analysis in this study can be indicated the real effect to the patient who was the customers. Based on the principle that patient should get the most cost-effective laboratory test, therefore, cost-effectiveness analysis of present laboratory service should be studied.

This study did not use total laboratory cost, which consists of direct and indirect cost and is difficult to find and the setting is limited at only one hospital. Therefore, further study as a multi center setting is recommended.

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