**TITLE PAGE**

**Title:** Comparison of Risk of Malignant Index (RMI), CA125, HE4, Risk of Ovarian Malignancy Algorithm (ROMA) and Ultrasound Score for Diagnosis of Epithelial Ovarian Cancer in Patients with a Pelvic Mass

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COMPARISON OF RISK OF MALIGNANT INDEX (RMI), CA125, HE4, RISK OF OVARIAN MALIGNANCY ALGORITHM (ROMA) AND ULTRASOUND SCORE FOR DIAGNOSIS OF EPITHELIAL OVARIAN CANCER IN PATIENTS WITH A PELVIC MASS

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ABSTRACT

**Background**: Epithelial ovarian cancer is the second most common of gynecologic cancer and the leading cause of gynecologic cancer-related death. In 2008, 225,000 new cases were diagnosed and 140,000 women died of the disease worldwide ([1](#_ENREF_1)). The utmost important for long-term survival in women with epithelial ovarian cancer is optimal debulking surgery ([2-4](#_ENREF_2)). In addition, the surgical outcome is superior if patients are operated on by gynecologic oncologists. Therefore, pre-surgical discrimination of benign diseases and epithelial ovarian cancer plays a critical role in ovarian cancer management and survival.

**Objective**: To comparison the risk of malignant index (RMI), cancer antigen-125 (CA125), human epididymis protein 4 (HE4), risk of ovarian malignancy algorithm (ROMA) and Sassone ultrasound score for diagnosis of epithelial ovarian cancer in patients presenting with a pelvic or ovarian mass/tumor.

**Design**: Prospective cohort study

**Setting**: Women over 18 years old clinically diagnosed pelvic or ovarian masses/tumors undergoing elective surgery at Rajavithi Hospital between January 2012 and December 2012 were prospectively enrolled. Pelvic ultrasonography, CA125 and HE4 levels were examined preoperatively. The Sassone score, RMI and ROMA values were determined.

**Main outcome measures**: Using the pathologic diagnosis as reference, the performance of all five tests for discrimination between benign diseases and epithelial ovarian cancer was analyzed from sensitivity, specificity and area under the curve (AUC) of Receiver Operating Characteristic (ROC) plot. The optimal cutoff value was calculated by Yoden Index method.

**Results**: A total of 260 women were evaluated, of which 158 had benign diseases, 66 had epithelial ovarian cancer (EOC), 28 had borderline tumors and 8 had other malignant diseases. The resultant accuracy values using the AUC of ROC curves for RMI, CA125, HE4, ROMA and Sassone ultrasound score to distinguish between EOC versus benign diseases showed 88.7%, 82.3%, 84.9%, 89.1% and 77.3%, respectively. The HE4 level and ROMA values had the similar highest accuracy in premenopausal women (AUC 90.2% and 90.0%), whereas RMI values had the highest accuracy in postmenopausal women (AUC 89.4%). Patients with borderline ovarian tumors and clear cell carcinoma revealed a high number of false negative cases in all of five parameters

**Conclusions**: Although ROMA was the most numerically accurate method, RMI showed no significant difference in performance with ROMA in discrimination between benign ovarian diseases and EOC. Moreover, the benefit of ROMA value and HE4 level revealed obviously in premenopausal women. However, clear cell carcinoma patients were the defect of all five tests.

**Key words:** pelvic mass, epithelial ovarian cancer, Risk of Malignant Index, CA 125, HE 4, Risk of Ovarian Malignancy Algorithm, Sassone ultrasound score

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