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Exploring Knowledge Gaps in Systemic Lupus Erythematosus Among Pre-Clinical Students and Junior Doctors in Medical Faculty

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ABSTRACT

Understanding knowledge gaps is crucial for developing more effective educational interventions that bridge the gap between Theory and practice. This study aimed to evaluate knowledge gaps in Systemic Lupus Erythematosus between pre-clinical students and junior doctors at a medical faculty. A cross-sectional study was conducted with 250 participants, divided equally between pre-clinical students and junior doctors (n = 125 each). Variables such as gender, year of Education, GPA, and study time were analyzed. Knowledge was assessed in five domains: pathophysiology, clinical manifestations, diagnosis, treatment, and complications. Linear regression analysis was used to identify factors associated with mean knowledge scores. No significant differences in gender distribution or study time ($p = 0.899$, $p = 0.633$, respectively). However, GPA scores were significantly higher among junior doctors ($p < 0.001$). Pre-clinical students scored higher than junior doctors in all SLE-related domains. GPA and study time were the strongest predictors of higher scores (Beta = 0.917, $p < 0.001$; Beta = 0.261, $p < 0.001$). GPA and study time significantly contributed to SLE knowledge scores, while gender and educational year did not. These findings suggest that academic performance and consistent study habits play critical roles in mastering SLE concepts among medical trainees.

Introduction

Systemic Lupus Erythematosus (SLE) is a chronic autoimmune [1] disorder characterized by diverse and complex clinical manifestations [2], affecting multiple organ systems [3]. As a condition with significant morbidity, early diagnosis and effective management are critical for improving patient outcomes [4] [5]. However, understanding the pathophysiology, clinical presentation, and treatment of SLE can be challenging due to its complexity. complexity [6]. Medical trainees, including pre-clinical students and junior doctors, often face difficulties in mastering the essential knowledge required to manage SLE cases .effectively [7].

Medical Education is designed to provide students with both theoretical and practical.l knowledge [8]. Pre-clinical students typically focus on the foundation.al sciences [9], while junior doctors are more engaged in hands-on patient care and exposure to patients [10]. Despite their clinical exposure, junior doctors may experience knowledge gaps in some theoretical areas due to the transition from learning to practice.ng medicine [11]. This raises concerns about how well medical training prepares future doctors to manage complex autoimmune diseases, such as SLE.

Although studies have assessed knowledge retention in medical trainees, there is limited research comparing the specific

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knowledge of SLE between pre-clinical students and junior doctors. Understanding these gaps is crucial for developing more effective educational interventions that bridge the gap between Theory and practice. This study seeks to examine the differences in SLE-related knowledge between pre-clinical students and junior doctors at a medical faculty. By analyzing factors such as academic performance, study habits, and gender, this research aims to identify the predictors of knowledge retention and highlight areas in need of curricular improvement.

Methodology

Research Design

This was a cross-sectional study conducted at the Faculty of Medicine, Universitas Brawijaya, to assess knowledge gaps related to SLE among pre-clinical students and junior doctors. The study aimed to compare SLE knowledge between these two groups and identify factors associated with higher knowledge scores. Data were collected using a structured questionnaire, and participants were selected through convenience sampling. The study was conducted from April to June 2024. The Ethics Committee of the Faculty of Medicine at Universitas Brawijaya has approved this study.

Data Sources

A total of 250 participants were recruited, consisting of 125 pre-clinical students and 125 junior doctors. Pre-clinical students were defined as those in their first three years of medical Education, while junior doctors were in their fourth and fifth years, having completed at least one clinical rotation. Participants were eligible for the study if they were currently enrolled in the medical program and agreed to participate voluntarily. Exclusion criteria included individuals who had completed their final clinical year or those who had prior specialty training in rheumatology or related fields.

Data Collection Technique

The questionnaire used for data collection was divided into two parts. The first part collected demographic information, including age, gender, academic year, GPA, and average weekly study time. The second part assessed knowledge related to SLE, covering five domains: pathophysiology, clinical manifestations, diagnosis, treatment, and complications. Each domain consisted of multiple-choice questions (MCQs) based on validated curriculum content. The questionnaire was piloted among a small group of students and junior doctors to ensure clarity and validity before being used in the full-scale study.

Analysis Methods

Descriptive statistics, including means and standard deviations, were calculated for continuous variables, while categorical variables were expressed as frequencies and percentages. Independent t-tests were used to compare knowledge scores between pre-clinical students and junior doctors across the five SLE domains. Linear regression analysis was performed to identify predictors of higher mean scores, with GPA, study time, gender, and academic year included as independent variables. A p-value of < 0.05 was considered statistically significant. Data were analyzed using SPSS version 25 .for Windows

Result and Discussion

A total of 250 participants were included in the study, comprising 125 pre-clinical students and 125 junior doctors. The gender distribution was similar between the two groups, with 54.4% of pre-clinical students and 53.6% of junior doctors being male ($p = 0.899$). The academic year of study differed significantly between the groups ($p < 0.001$), as

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expected, with pre-clinical students in their first, second, or third years, and junior doctors in their fourth or fifth years. Both groups reported similar weekly study time, with pre-clinical students averaging 22.3 hours per week and junior doctors 22.7 hours per week (p = 0.633). However, GPA scores were significantly higher among junior doctors (mean GPA, 3.41 ± 0.14) compared to pre-clinical students (mean GPA, 3.23 ± 0.42; p < 0.001) (**Table 1**).

Table 1. Subject Characteristics

Variables	Pre-Clinical Students (N=125)	Junior Doctors (N=125)	P
Gender; n (%)			
• Male	68 (54.4%)	67 (53.6%)	0.899
• Female	57 (45.6%)	58 (46.4%)	
Year Educational Level; n (%)			<0.001
• 1st year	43 (34.4%)	0 (0%)	
• 2nd year	39 (31.2%)	0 (0%)	
• 3rd year		0 (0%)	
	43 (34.4%)		
• 4th year	0 (0%)	64 (51.2%)	
• 5th year	0 (0%)	61 (48.8%)	
Study time (hours/week, mean ± SD)	22.3 ± 6.9	22.7 ± 7.1	0.633
GPA scores (mean ± SD)	3.41 ± 0.14	3.23 ± 0.42	<0.001

In the comparison of SLE knowledge scores, pre-clinical students consistently outperformed junior doctors across all assessed domains (Table 2). In the domain of pathophysiology, pre-clinical students scored 58.4 ± 8.6, while junior doctors scored 55.0 ± 7.9 (p = 0.001). Similar trends were observed in clinical manifestations (57.6 ± 8.4 vs. 54.4 ± 8.3, p = 0.003), diagnosis (58.3 ± 8.1 vs. 55.0 ± 9.0, p = 0.003), treatment (57.6 ± 7.9 vs. 54.8 ± 8.5, p = 0.007), and complications (58.2 ± 8.7 vs. 54.7 ± 8.3, p = 0.001). The overall mean score was significantly higher for pre-clinical students (58.0 ± 7.1)

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compared to junior doctors (54.8 ± 7.2, p = 0.000), indicating that pre-clinical students demonstrated superior knowledge of SLE in this study.

Table 2 Score Comparison between Pre-Clinical Students and Junior Doctors

Variables	Pre-Clinical Students (N=125)	Junior Doctors (N=125)	P
Pathophysiology	58.4 ± 8.6	55.0 ± 7.9	0.001
Clinical Manifestations	57.6 ± 8.4	54.4 ± 8.3	0.003
Diagnosis	58.3 ± 8.1	55.0 ± 9.0	0.003
Treatment	57.6 ± 7.9	54.8 ± 8.5	0.007
Complication	58.2 ± 8.7	54.7 ± 8.3	0.001
Mean Scores	58.0 ± 7.1	54.8 ± 7.2	0.000

A linear regression analysis was conducted to identify factors associated with higher mean SLE knowledge scores (Table 3). GPA and study time were the strongest predictors of higher scores. GPA had a standardized coefficient (Beta) of 0.917, with each one-point increase in GPA associated with a 15.417-point rise in the mean knowledge score ($p < 0.001$, 95% CI: 14.760 to 16.073). Study time also showed a significant positive association with mean scores, with each additional hour of study time per week associated with a 0.273-point increase in the mean score (Beta = 0.261, $p < 0.001$, 95% CI: 0.233 to 0.313). Group (pre-clinical students or junior doctors), gender, and educational year were not significantly associated with the mean knowledge score, as indicated by their p-values ($p > 0.05$), suggesting that these factors did not have a meaningful impact on SLE knowledge.

Table 3: Factors Associated with the Mean Score of SLE Knowledge Among Groups

Variable	B	Beta	p	95% (upper, lower)
Group	-0.220	-0.015	0.709	(-1.382, 0.942)
Gender	0.280	0.019	0.322	(-0.276, 0.836)
Educational Year	0.003	0.001	0.990	(-0.405, 0.410)
GPA	15.417	0.917	<0.001	(14.760, 16.073)

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Study Time	0.273	0.261	<0.001	(0.233, 0.313)

This study provides valuable insights into the knowledge gaps related to SLE among pre-clinical students and junior doctors. Contrary to what might be expected, pre-clinical students demonstrated significantly higher scores in all domains of SLE knowledge compared to junior doctors, despite the latter's greater clinical exposure. The findings highlight important factors, such as GPA and study time, which were identified as significant predictors of knowledge scores. In contrast, variables like group (pre-clinical vs. junior doctors) and gender had no significant impact.

Previous research indicates that medical students often have study habits such as dedicating 3-4 hours per day, which helps improve their knowledge of medicine. conditions [12]. This is consistent with findings that participants spend 22.3-22.7 hours per week studying, or 3-4 hours per day. GPA findings show that preclinical students have higher GPAs compared to junior doctors. This is influenced by the initial assessments required to advance to the junior doctor stage. GPA serves as an indicator of preclinical students' competence and predicts future performance as junior doctors [13]. This study reveals no significant difference in knowledge scores between males and females. This result contrasts with previous research, which found that females generally had higher knowledge scores ($p < 0.026$). However, this could also be influenced by the number of respondents and ot.her factors [14].

Our results align with previous research, which shows that theoretical knowledge retention may be higher among students engaged in pre-clinical Education. This curriculum is heavily focused on classroom learning. Similar studies have reported a decline in theoretical knowledge once students transition to clinical rotations, where practical skills often take precedence over textbook knowledge.ok learning[15]. For example, the study evaluated the physiology knowledge loss in medical students in Ahvaz Jundishapur University of Medical Sciences in Iran, and found that junior doctors often struggle to maintain their theoretical understanding of complex diseases, such as SLE, due to the demands of patient care and time .limitations [16]. The loss of knowledge is correlated with time. The reason why pre-clinical students have a better understanding of SLE (Systemic Lupus Erythematosus) is that this knowledge is highly applicable during medical students' clinical years. In contrast, junior doctors, who are further removed from their medical school years, focus more on practical patient management and may not engage with theoretical aspects as frequently.

Another study conducted in London with 356 volunteers also showed that knowledge loss is inversely correlated with increased retention time. This is based on the idea that learning in clinical years is the most memorable and valuable for application to real patients. That vertical teaching may be beneficial for specific subjects [17]. This suggests that while clinical exposure is vital for skill development, it may not constantly reinforce theoretical concepts. Repetition of learning is highly recommended at each level of Education to prevent knowledge loss.

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One plausible explanation for these findings is the differing nature of pre-clinical and clinical Education. Pre-clinical students may be more immersed in theoretical knowledge, preparing for exams and developing foundational understanding, whereas junior doctors may be more focused on practical application and p.atient care [18]. Additionally, junior doctors' engagement in various clinical tasks may limit the time they have for continuous review of Theory.cal content [19]. Another contributing factor could be that SLE, as a relatively rare and complex disease, may not be a primary focus during clinical rotations, which often prioritize more common diseases. conditions [20].

Despite the valuable insights, this study has several limitations. First, the sample size, although sufficient for statistical analysis, may not be representative of all medical faculties. The study was conducted in a single institution, which limits the generalizability of the results to other medical schools with different curricula. Second, the study relied on self-reported measures for variables such as study time, which could introduce reporting bias. Additionally, knowledge was assessed using a questionnaire that might not fully capture the depth of understanding required for managing SLE in clinical practice.

Conclusion

In conclusion, this study found that pre-clinical students demonstrated superior knowledge of SLE compared to junior doctors, highlighting potential gaps in the retention of theoretical knowledge once students transition to clinical practice. GPA and study time were significant predictors of SLE knowledge, while gender and educational year did not Influence scores. These findings suggest the need for a more integrated approach to medical Education, one that provides ongoing reinforcement of theoretical concepts alongside clinical experience. Future research should focus on evaluating similar knowledge gaps across other medical conditions and institutions to inform curriculum development and improvement.

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Author Contribution

All authors contributed to the design, writing, and editing of the manuscript. All authors read and approved the final version of the manuscript. manuscript

Conflict of Interest

There was no conflict of interest in this research.

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