

IMPACT OF SELF-DIRECTED LEARNING ON KNOWLEDGE AND STUDENT PERCEPTION REGARDING NORMAL MICROBIAL FLORA AMONG PHASE II MBBS STUDENTS

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ABSTRACT

Background: Self-Directed Learning (SDL) is a core component of Competency-Based Medical Education (CBME), promoting active learning and student responsibility in the learning process. Incorporating SDL into microbiology teaching may enhance conceptual understanding and foster lifelong learning skills. The objective is to evaluate the effectiveness of a structured Self-Directed Learning session on knowledge and student perception regarding normal microbial flora among Phase II MBBS students. **Materials and Methods:** An educational interventional study with a pre-test and post-test design was conducted among Phase II MBBS students in the Department of Microbiology at a tertiary care teaching institution. Students completed a pre-test questionnaire assessing baseline knowledge using an online Google Form accessed through a QR code. A structured SDL session was conducted using a trigger case related to antibiotic-associated fungal infections. Students were divided into small groups and explored topics related to normal microbial flora under faculty facilitation. Following the SDL session, students completed a post-test questionnaire and a perception survey. Data were analyzed using descriptive statistics and independent t-test. **Result:** A total of 150 students were invited to participate. Ninety-eight students completed the pre-test and seventy-seven students completed the post-test. The mean pre-test score was 6.49 ± 1.94 , while the mean post-test score increased to 7.83 ± 1.67 . The improvement in knowledge scores was statistically significant ($t = -4.92$, $p < 0.001$). Most students reported positive perceptions toward SDL, indicating that it improved understanding of the topic, encouraged independent learning, and enhanced engagement through group discussion. **Conclusion:** Self-Directed Learning significantly improved knowledge and generated positive perceptions among Phase II MBBS students regarding normal microbial flora. Incorporating SDL into microbiology teaching can enhance conceptual understanding and promote active learning aligned with CBME objectives.

INTRODUCTION

Normal microbial flora refers to microorganisms that colonize various parts of the human body without causing disease under normal circumstances. These microorganisms play important roles in host defense, metabolism, and immune system modulation. Disturbance of the normal microbial flora, particularly due to antibiotic use, may lead to opportunistic infections and microbial imbalance.^[1-5] Traditional lecture-based teaching methods often provide limited opportunities for active student engagement and may not promote deeper conceptual understanding. With the introduction of

Competency-Based Medical Education (CBME) by the National Medical Commission, there is increasing emphasis on learner-centered teaching strategies.^[6-9] Self-Directed Learning (SDL) is an educational approach in which learners take responsibility for identifying their learning needs, locating appropriate resources, and evaluating their learning outcomes. SDL encourages critical thinking, collaborative learning, and lifelong learning skills.^[10,11] Although SDL has been widely promoted in medical education, its application in microbiology teaching remains limited. Therefore, the present study was conducted to evaluate the impact of SDL on knowledge acquisition and student perception

regarding normal microbial flora among Phase II MBBS students.

MATERIALS AND METHODS

Study Design: Educational interventional study with pre-test and post-test design.

Study Setting: Department of Microbiology, Sri Chamundeshwari Medical College Hospital & Research Institute, Channapatna, Karnataka, India.

Study Duration: One month.

Study Participants: Phase II MBBS students attending microbiology classes.

Sample Size: A total of 150 students were invited to participate in the study.

- 98 students completed the pre-test
- 77 students completed the post-test

Inclusion Criteria

- Phase II MBBS students attending microbiology classes
- Students willing to provide informed consent

Exclusion Criteria

- Students absent during pre-test or post-test session

Study Procedure

The study was conducted in three phases.

Phase 1: Pre-test

Students were oriented regarding the SDL activity and the objectives of the study. Baseline knowledge was assessed using a 10-item multiple-choice questionnaire administered through Google Forms using a QR code.

Phase 2: Self-Directed Learning Session

Students were divided into small groups of 8–10 students.

A trigger case scenario was introduced: “Why do broad-spectrum antibiotics predispose to fungal infections?”

Students explored the following topics:

- Composition of normal microbial flora at various body sites
- Functions of normal microbial flora
- Factors affecting microbial balance
- Clinical implications of disturbance of normal flora

Faculty members acted as facilitators guiding discussion and helping students access appropriate learning resources.

Phase 3: Post-test and Perception Survey

Following the SDL session, students completed a post-test questionnaire assessing knowledge regarding normal microbial flora.

A 10-item perception survey using a 5-point Likert scale was administered to evaluate students’ perceptions toward SDL.

Students were also asked to provide a short reflection describing one new concept they learned during the SDL session.

RESULTS

A total of 150 students were invited to participate in the study. Among them, 98 students completed the pre-test questionnaire, and 77 students completed the post-test questionnaire.

Table 1: Knowledge Assessment

Test	Number of Students	Mean Score	Standard Deviation
Pre-test	98	6.49	1.94
Post-test	77	7.83	1.67

The mean post-test score was higher than the mean pre-test score, indicating improvement in knowledge following the SDL intervention.

Statistical analysis using independent t-test demonstrated that the difference between pre-test and post-test scores was statistically significant ($t = -4.92, p < 0.001$).

Student Perception

The perception survey revealed that most students had positive attitudes toward Self-Directed Learning.

Students agreed that SDL:

- Improved their understanding of the topic
- Encouraged independent learning
- Enhanced engagement through group discussion
- Helped relate microbiology concepts to clinical relevance
- Should be implemented for other microbiology topics

Student Reflection

Qualitative analysis of student reflections revealed several key themes:

- Importance of beneficial role of normal microbial flora

- Understanding of antibiotic-associated disruption of microbial balance
- Awareness of opportunistic infections
- Better appreciation of clinical relevance of microbiology concepts

DISCUSSION

The present study demonstrated that Self-Directed Learning significantly improved students’ knowledge regarding normal microbial flora. The improvement in post-test scores indicates that SDL promotes active engagement and deeper understanding compared with traditional lecture-based teaching methods.

Previous studies in medical education have reported that SDL enhances student motivation, critical thinking, and independent learning skills. In the present study, group discussions and facilitated learning helped students explore the topic more comprehensively.

The trigger case scenario relating antibiotic use to fungal infections helped students connect microbiological concepts with real clinical situations. Positive student perceptions toward SDL further support its integration into microbiology teaching within the CBME framework.

Limitations

- Single institution study
 - Limited post-test response rate
 - Perception data based on self-reported responses
- Future multi-institutional studies may provide stronger evidence regarding the effectiveness of SDL in microbiology education.

CONCLUSION

Self-Directed Learning significantly improved knowledge and generated positive perceptions among Phase II MBBS students regarding normal microbial flora. Integrating SDL into microbiology teaching can enhance conceptual understanding, encourage independent learning, and support the goals of competency-based medical education.

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