Mitra J. Pengab. Mas. Multidisiplin, Vol 01, No 01, Maret 2025
e-ISSN: 3090-6512

OPEN ACCESS

MIMP Marasofi International Media and Publishing

Training on Oral Drug Administration in Test Animals as an Effort to Strengthen Pharmacology Practicum Competence

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Abstact— Training in the skill of administering oral medication to test animals is a form of community service aimed at enhancing pharmacy students' competencies in pharmacology laboratory practices. This activity will take place on May 19, 2025, in the Pharmacology Laboratory at Kadiri University. It will consist of direct training that includes theoretical presentations, demonstrations, and independent practice by students, accompanied by guidance from instructors and laboratory staff. The materials presented include the anatomy of the mouse digestive system, the basic principles of oral gavage, the ethics of using test animals, and safety aspects. The evaluation results indicate that this training has enhanced the participants' understanding of oral gavage techniques as well as their skills in performing the procedure safely and accurately. Based on the comparison of pretest and posttest scores, as well as practical observations, there is a significant improvement in the technical skills and ethical attitudes of the students. This training also enhances the understanding of the importance of animal welfare in pharmacological experiments. This activity is expected to serve as a sustainable model for enhancing the quality of practical learning in the field of pharmacy education.

Keywords: Pharmacology Training, Oral Medication Administration, Test Animals, Oral Gavage, Laboratory Skills, Pharmacy Education.

1. Introduction

Pharmacology practicums are an essential component of a pharmacy student's learning journey, aimed at providing a deep understanding of the effects, mechanisms, and administration methods of drugs in test animals. A fundamental skill that students must master during these practicums is the oral administration of drugs to laboratory animals, commonly known as the oral gavage technique. This standard procedure is widely used in various research and testing scenarios to assess the pharmacological effects of active substances on lab animals like mice or white rats [1]. This skill requires precision in dosing and a thorough understanding of the animal's anatomy, ethical treatment, and safe handling techniques to prevent stress or injury. Structured and effective training is crucial to ensure students gain the necessary competencies to conduct pharmacology practicums proficiently [2].

The skill of oral drug administration is often not mastered through theoretical learning alone. Many students face challenges when performing oral gavage for the first time due to either a lack of conceptual understanding or limited hands-on experience. This can undermine student confidence, increase the

Diterima: 02 Maret 2025, Direvisi: 23 Maret 2025, Disetujui untuk diterbitkan: 30 Maret 2025
https://doi.org/10.64123/mjpmm.v1.i1.4

likelihood of errors during practice, and jeopardize the welfare of the test animals [3]. On the other hand, as pharmacy curricula increasingly emphasize competence and practical skills, such training becomes essential. Training in oral drug administration for test animals is not merely an introduction to lab procedures but also a formative experience in laboratory ethics, adherence to animal welfare principles, and preparing students for research challenges in pharmacy and biomedical fields [4]. Through community engagement in such training initiatives, it is hoped that there will be a tangible improvement in students' skills and confidence in performing oral drug administration techniques. The primary audience for this training includes pharmacy students who are currently undertaking or about to embark on pharmacology practicums, with learning facilitated through active participation, direct demonstrations, and individual guidance during practice [5].

The training activities will cover brief theoretical insights into oral drug administration principles, introduction to the tools and materials used, animal usage ethics, and hands-on repetition until students achieve the required competence. This approach ensures that participants grasp both the technical aspects and the moral and ethical responsibilities as future health professionals [6].

The demand for preclinical research in drug and supplement development is increasing, where nearly all studies require oral drug administration techniques to evaluate a compound's bioavailability, effectiveness, and toxicity. Therefore, pharmacy students must be equipped with these technical skills early on to fully participate in future research and professional work [7]. Besides focusing on technical and academic aspects, this training aims to instill teamwork values, responsibility toward lab animals, and self-reflection abilities when faced with mistakes or challenges during practice. Students are encouraged to be open to feedback, enhance their perseverance, and cultivate the professional attitude needed in a scientific work environment [8]. With this training program, it is expected that student knowledge, skills, and attitudes toward pharmacology lab practices will improve, particularly concerning oral drug administration. This initiative is also intended to serve as an ongoing training model within pharmacy education institutions, becoming an integral part of a lab skills learning system that prioritizes quality and safety rather than being a one-time practice [9].

As an academic community service effort, this training is anticipated to have a long-term impact on improving the quality of pharmacy education, especially regarding laboratory skills and animal usage ethics [10]. Faculty members and lab staff involved in this activity are also expected to receive feedback that will help refine competence-based teaching and training methods continuously [11].

The success of this training will significantly contribute to the institution's goal of producing pharmacy graduates who excel not only in theoretical knowledge but also in practical competence and uphold high integrity in conducting scientific tasks involving test animals [12]. This aligns with the vision of pharmaceutical higher education to cultivate professionals who are outstanding, humanistic, and responsible. Additionally, this initiative offers an opportunity for lecturers and lab technicians to develop training approaches that are adaptive, contextual, and tailored to student needs [13]. With active involvement from various stakeholders, this training can serve as a pivotal moment to enhance the overall quality of pharmacological practicums and strengthen an academic culture that prioritizes ethics, competence, and professionalism.

2. Metodology

The training for administering oral medication to test animals took place on Monday, May 19, 2025, at the Pharmacology Laboratory of Kadiri University. This activity is structured as a hands-on training program that includes guidance from instructors, laboratory technicians, and students participating in the training from the Pharmacy Study Program. The training will commence at 08:00 WIB and will continue until 14:00 WIB.

The event began with an opening and remarks from the Coordinator of the Pharmacology Laboratory, who conveyed the objectives of the training and highlighted the significance of mastering the oral gavage technique in enhancing the laboratory competencies of pharmacy students. Subsequently, the session continued with theoretical material presented by the pharmacology lecturer, covering the anatomy of the mouse digestive tract, fundamental principles of oral drug administration, ethical considerations in the use of test animals, as well as associated risks and methods for their prevention.

Figure 1. Mind Maps

Figure 2. Coordination Before The Practicum

Following the presentation of the theory, participants will be divided into several small groups to engage in a demonstration session. The instructor and laboratory technician demonstrated the procedure for administering oral medication using a specialized mouse feeding tube. The demonstration began with the correct way to hold the animal, followed by an introduction to the tools employed, and concluded with the technique for gently inserting the medication into the stomach while ensuring there is no injury to the digestive tract or risk of aspiration. This demonstration is conducted repeatedly so that all participants can observe closely and clearly understand the various stages.

After the demonstration session, participants were given the opportunity to practice independently in turn, with direct guidance from the instructor and laboratory assistant. Each group should consist of 5-6 students to ensure optimal interaction between the participants and the facilitator. Students take turns repeating the procedure, starting with the preparation of tools, the ethical handling of mice, and continuing with the administration of oral medication according to the specified simulated dosage. During the practice session, the supervisor recorded the accuracy of the techniques, the calmness in working, and the adherence to the principles of animal welfare.

To ensure the understanding and skills of the participants, an individual evaluation form is to be provided for completion by the guiding lecturer. This evaluation includes indicators of technical skills, understanding of procedures, and ethical attitudes when working with test animals. The results of this evaluation will also serve as feedback for future learning processes. In addition, participants are requested to complete a reflection sheet containing their impressions, challenges, and suggestions regarding the training that has been conducted. This reflection is an essential part of improving future activities.

Throughout the course of the activities, all procedures were conducted in accordance with laboratory safety protocols and ethical standards for animal research. Personal protective equipment, such as lab coats, gloves, and masks, is utilized by all participants and facilitators. Laboratory cleanliness is strictly maintained, and test animals are treated according to the 3R principles (Replacement, Reduction, Refinement) to minimize stress and the likelihood of injury.

This training session concluded with a group discussion and a question-and-answer segment between the participants and the speaker. The discussion was lively, covering various challenges faced by participants during practice, as well as technical questions regarding different techniques and modifications of tools. The speaker also provided advice and strategies for independently developing these skills, as well as the significance of maintaining proper documentation throughout the process of administering medications to test animals.

As the final part of the training, a brief post-test will be conducted to assess the participants' improvement in understanding the material that has been presented. The post-test questions are created in the form of multiple-choice and brief case studies, and they are analyzed to assess the effectiveness of the training methods. The results of the post-test reveal a significant improvement in participants' technical knowledge and ethical awareness after completing the training.

This training makes a significant contribution to strengthening students' competencies in pharmacology, particularly in practical and critical laboratory skills. This activity also serves as a way to implement a competency-based curriculum that emphasizes the integration of theoretical knowledge and practical skills in the field. Thus, this training not only aids students in their practical readiness but also equips them with essential skills for research and careers in the pharmaceutical field.

3. Results and Discussion

The training on administering oral medication to test animals, conducted on May 19, 2025, at the Pharmacology Laboratory of Universitas Kadiri, yielded several significant findings related to the

enhancement of student competencies in pharmacology laboratory practices. Based on the direct observations conducted by the supervising lecturer and the laboratory assistant throughout the activity, as well as the evaluation of individual student skills in performing the oral gavage procedure, supplemented by data gathered from feedback questionnaires distributed after the practical session, an overall picture emerged indicating that this training has had a significant positive impact on students' conceptual understanding and practical skills.

Figure 3. Oral Training Process Of Mice

Most participants demonstrated a substantial improvement in their understanding of the concept of oral gavage. This is reflected in the comparison of the results from the pretest and posttest administered prior to and subsequent to the activity. The average score of participants on the pretest was 62. 5, while on the posttest, it increased to 85. 4. This improvement indicates that a systematic delivery of material, the use of supportive visual media, and a communicative approach by the facilitator significantly contribute to a deeper understanding of the theory.

In addition to a theoretical understanding of the material, the participants' technical skills have also improved. Most participants successfully performed the oral gavage procedure correctly, in accordance with the established protocol. This success is evident in the students' ability to prepare equipment, measure dosages accurately, and inject the medication solution into the stomach of the mice without causing stress or injury to the animals. Direct support from instructors and lab assistants during practical sessions plays a significant role in reducing technical errors and fostering students' confidence.

The discussion of the results from this training indicates that a training approach involving direct demonstrations by lecturers and laboratory assistants, followed by closely monitored independent practice, is an effective method for mastering laboratory skills. Participants expressed that the demonstration session was very helpful in visualizing the technical steps in a tangible way, while the independent practice session provided them with the opportunity to explore, experiment, and learn from their mistakes in real-time.

Furthermore, the aspects of ethics and animal welfare are also a significant focus of this training.

Participants are trained to comprehend the significance of the 3R principles (Replacement, Reduction, Refinement) in the use of test animals, and they are engaged in discussions about the moral responsibilities of a researcher in treating test animals with care. This indicates that the training not only focuses on technical skills but also helps to develop the character and professional attitudes of students as future pharmacists or researchers in the field of pharmacy.

The results of the feedback questionnaire indicate that most participants are satisfied with this training, including the content, delivery methods, timing, and the laboratory facilities utilized. Several suggestions that were raised include the necessity for a longer practice time, increasing the number of oral gavage tools to reduce waiting time, and additional training that covers the administration of medication via parenteral methods. These suggestions indicate that the participants exhibit a strong enthusiasm and desire for further improvement in the laboratory skills learning process.

Training can be concluded as a successful program in enhancing the academic and practical skills of pharmacy students. This success is attributed to careful planning, active involvement of the instructors, and a strong eagerness to learn among the participants. Training of this nature is expected to serve as a model for ongoing activities that support the achievement of outstanding competencies among graduates in the field of pharmacy, particularly in the areas of laboratory work and pharmacological research.

4. Conclusion

The training on administering oral medication to test animals conducted at the Pharmacology Laboratory of University Kadiri successfully achieved its goal of enhancing students' competencies in pharmacology laboratory practice. This activity not only provides theoretical knowledge about the oral gavage technique but also enhances students' technical skills through well-structured and closely monitored hands-on practice.

The training method that combines theoretical instruction, demonstrations, and independent practice has been shown to be effective in enhancing participants' understanding and skills. Moreover, the active participation of lecturers and laboratory assistants in providing immediate feedback during practical sessions positively influences the enhancement of students' technical skills and confidence.

Based on the evaluation results, it is evident that this training offers significant benefits to participants in terms of cognitive, affective, and psychomotor aspects. Therefore, training of this nature needs to be continuously developed and conducted regularly to support the formation of pharmacy graduates who are competent, professional, and prepared to engage in both research and laboratory-based pharmaceutical services.

The success of this training also highlights the significance of collaboration among lecturers, laboratory staff, and students in creating a conducive and effective learning environment. It is anticipated that this activity will serve as a model of good practice in laboratory learning and will lay the groundwork for similar initiatives with a broader reach in the future.

Acknowledgments

The author expresses gratitude to Universitas Kadiri, particularly to the Faculty of Pharmacy, for their full support in carrying out this community service project. Expressions of gratitude are also extended to the Coordinator of the Pharmacology Laboratory and the laboratory staff who have provided facilities and technical assistance throughout the event. High appreciation is also extended to all student participants in the training who have demonstrated enthusiasm, active participation, and a strong commitment to learning throughout the training process.

This activity will not be successfully carried out without the contributions and collaboration of various parties, including the team of lecturers responsible for the Pharmacology course who have assisted in the preparation of materials and the implementation of evaluations. It is hoped that this activity will provide lasting benefits in strengthening student competencies and serve as a model for similar training activities in the future.

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