

## Problem-Based Clinical Cases Increase the Level of Pharmacology Education for Physiotherapy Students

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**Abstract: Problem statement:** Pharmacology course is mandatory course for physiotherapy students in most of Middle Eastern Universities. Most of physiotherapy students believe that they should not study pharmacology course during bachelor degree. In addition, their marks in pharmacology course were lower than other medical basic courses. **Approach:** The present study investigated how to improve the level of pharmacology education for physiotherapy students by introducing theoretical clinical cases showed the effect of physiotherapy on drug response. **Results:** The present study showed a significant difference in student performance before and after adding these clinical cases. **Conclusion/Recommendations:** This study concluded that addition of theoretical clinical cases which show the effect of physiotherapy techniques on drugs activity improved physiotherapy students performance in studying pharmacology.

**Key words:** Pharmacology education, physiotherapy students, medical basic courses, clinical cases

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### INTRODUCTION

Pharmacology is the study of the effect of the chemical compounds on the biological system (Filip *et al.*, 2007). It is a basic science for medical education where physician, pharmacist and nurse play a major role in prescribing, dispensing and administration of the drug to patients, respectively. However, medical staff in clinical centers includes physiotherapists and laboratory analysts play a minor role in drug prescription and administration. However, physiotherapist should be familiar about how physiotherapy could affect on drug therapy or versa vice (Dias *et al.*, 2010). It is reported that massaging of some areas on the body increases the absorption of some drugs on the site of administration. This increasing of absorption may be dangerous in some cases when the drug manages critical parameters in the body. It was reported that increasing in absorption rate of insulin injected by sub-dermal route induced hypoglycemia and might lead to coma (Calabrese, 2008). In addition, cold therapy reported to decrease drug absorption at site of administration (Tortorici *et al.*, 2007). Also, iontophoresis was reported to affects pharmacokinetics parameters of certain drugs (Akomeah, 2010; Pescina *et al.*, 2010; Vaghani *et al.*, 2010).

Pharmacology course is mandatory for physiotherapy students in most of Universities. It is taught in a classical way in which a drug class lecture consists of pharmacodynamics, pharmacokinetics, main

drugs, clinical uses and side effects. Lecturers of pharmacology noted that physiotherapy students get the lowest grades in pharmacology course in comparison with other basic medical courses during bachelor degree study. Many lecturers, especially in Middle Eastern Universities, tried to solve this problem by reducing the number of chapters and units which should be taught during pharmacology course for physiotherapy students. However, there was not a significant increasing in the level of pharmacology education for physiotherapy students.

Studies about pharmacology education for physiotherapy students are limited, if absent. Accordingly, the aim of the present study is to evaluate an educational scientific method for increasing the level of teaching pharmacology course for physiotherapy students.

### MATERIALS AND METHODS

The present study was done at second studying semester on 2010, in Aljouf University, Skaka, Saudi Arabia. The syllabus of the first month was a classical way in teaching pharmacology for physiotherapy without addition of theoretical clinical parts. In the second month, the way of teaching pharmacology was changed by which a simple lecture for drug group consisted of: Pharmacodynamic, clinical uses, side effects and theoretical clinical cases about the effect of physiotherapy on drug activity were added for first

time. These clinical cases were published in highly respected journals. After that the evaluation of student's performance (55 physiotherapy students belong to Aljouf University, Skaka-Saudi Arabia) in pharmacology course was done by putting different type of questions represented 3 different parts in the second exam at the same studying semester:

- Part one: Represented pharmacodynamics of the drug class
- Part two: Represented clinical uses and side effects
- Part three: Represented clinical cases about the effect of physiotherapy techniques on the activity of some drugs

The average of student's performance in the whole exam was calculated and compared with first exam marks at first month (without clinical cases, part three).

The average marks for each part of the exam was calculated and converted to percentage (%) by dividing the correct answered questions to the total questions in each part and multiplied by 100.

Z-test,  $p < 0.05$  was used as a comparative statistical tool for comparison of the student's marks before and after addition of clinical cases part.

### RESULTS

Fifty five students were evaluated for pharmacology course before and after adding of theoretical clinical cases at the same studying semester. The results showed a significant increasing in the average of total marks in pharmacology exam in the second month after adding of clinical cases part to the syllabus (Table 1). In addition, the marks of students in the clinical cases part were significantly higher than the marks of other two parts (pharmacodynamics and clinical uses) in the second exam at the same studying semester (Table 2).

Table 1: The average of total marks in the second month after adding of theoretical clinical cases part to the syllabus

The total average marks for first month (without clinical cases part) out of 30	The total average marks for second month (with clinical cases part) out of 30%
16	24*

\*: Statistical higher,  $p$ -value  $< 0.05$

Table 2: The average of total marks in the second month exam after adding of theoretical clinical cases part to the pharmacology syllabus

Parts of pharmacology exam for physiotherapy students	Average of marks for each part in the exam 100% (%)
Pharmacodynamics	20
Clinical uses and side effect	47
Clinical cases about the effect of physiotherapy techniques on the activity of some drugs	85*

\*: Statistical higher,  $p$ -value  $< 0.05$

### DISCUSSION

Most of the physiotherapy students believe that it is unnecessary to study pharmacology course during bachelor degree and this course should be restricted for medicine and pharmacy students. However, pharmacology course is essential course for physiotherapist where they are in direct contact with a patient who takes medicine in most cases. After changing the way of teaching pharmacology course for physiotherapy students and introducing the theoretical clinical cases about the effect of some techniques used in physiotherapy on the activity of some drugs, students attitude toward the importance of studying pharmacology course increased and they recognized from problems in the clinical cases how was good background in pharmacology helping in solving some problems faced physiotherapists.

The present study showed that problem-based learning system increased the level in teaching pharmacology for physiotherapy students where the overall marks were increased after addition of clinical cases part in which physiotherapy techniques affect drugs activity and therapy outcome (Alhaqwi *et al.*, 2010). These cases practiced them on problems which may face it in future where they need to be familiar about some clinical properties of the drug and pharmaceutical route of administration (Banning, 2003). These problem-based learning increased the behavior for physiotherapy students to learn more about drugs which are used commonly for chronic and acute diseases (Carrega and Byrne, 2010).

This study reported that pharmacodynamics part in the exams which depended on the biochemistry of the drugs was associated with the lowest marks (Calderon *et al.*, 2010). This might be due to the attitude toward pharmacodynamics of the drugs that it was not important for physiotherapist to know about it. In addition, biochemistry was not taught before pharmacology course for most of the students which might be the main reason for the low marks for the students in the pharmacodynamics part.

### CONCLUSION

The present study concluded that addition of theoretical clinical cases which represent the effect of physiotherapy techniques on drugs activity and therapy outcome increased the level of pharmacology education for physiotherapy students.

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