Exploration of Dermato-venereology Teaching Combining the Problem-oriented Teaching Method with Computer Technology

Li Li¹, Qing Wu¹, YuLin Chen², Sha Li², XiaoJian Hu¹ *

¹Changsha Medica University, Changsha, 410219, China
²The First Affiliated Hospital of Changsha Medica University, Changsha, 410219, China

*Corresponding author e-mail: 81698394@qq.com

Abstract. The problem-oriented teaching approach (PTM) is a teaching approach that focuses on problem-oriented study and teaching through identification and solving of problems. Since the 1990s with the development of computer, some medical schools and colleges in China and Southeast Asia have started to apply the problem-based teaching approach and computer technology gradually. Currently, it is still in the initial and exploratory stage in China, and the lecture-based learning (LBL) plays a leading role in medical teaching. PTM is distinctly different from the traditional LBL teaching model where the teachers give lectures and the students are spoon-fed in classes. It has broken through the traditional teaching confinement based on explanations by teachers, and students can take the initiative to analyze and solve problems pertinently in teaching.

Keywords: Problem-oriented Teaching Approach, Dermatology, Teaching, Exploration, Computer Technology

1. Introduction

The incidence of skin diseases is high, which involves more than 3,000 diseases, including infectious, autoimmune, physical, pharmaceutical, metabolic, genetic, and other skin diseases [1-2]. The number of patients is large, the age range is broad, and the etiology of most cases is complicated, involving pathology, microbiology, immunity, molecular biology, genetics, metabolism, and other aspects. In particular, in the diagnosis of skin diseases, skin rash is often taken as the first element of diagnosis. The forms of skin rash vary significantly. One type of skin rash may appear in a variety of skin
diseases, and a variety of skin diseases may also present a form of skin rash. Through the traditional LBL teaching model [3-4], the morphological memory of dermatosis rash is relatively shallow, the connection between knowledge points is insufficient, and the rash memory is easy to be confused [5-6]. Hence, it is imperative to carry out PTM teaching in dermato-venereology among clinical undergraduate students.

2. Development of problem-oriented teaching approach in dermato-venereology teaching of clinical medicine undergraduates
The author attempted to conduct PTM teaching in the dermato-venereology teaching from 2013 to 2014, and achieved good teaching results. In every 3 courses of Dermato-venereology, the last one is selected for PTM teaching. As required by the clinical teaching syllabus, relatively typical and complete medical records are often selected as PTM teaching materials, such as skin infectious diseases, systemic lupus erythematosus, psoriasis, etc..

The whole implementation process of the problem-based teaching approach includes several steps, such as raising questions, collecting data, self-study, group discussion, and teacher summary. The teacher will send the patient's case information to the students, and the students can obtain useful information by consulting books and networks, and carry out preliminary analysis, diagnosis, and treatment, to lead out a series of questions as the content of self-study. Subsequently, the students focus on the cases, ask the related questions, seek the answers through teaching materials, network, literature retrieval, and by other means, and submit written materials within the specified time: Led by the leader of each discussion group, the students discuss on the information they have consulted, the preliminary inference results, and the initial treatment plan, express their own opinions and make summary. Then, the leader of each group makes presentation as a representative. Finally, the instructor summarizes and comments on the statements of each group, to clarify the ideas, guide the confusion, explain the difficulties, highlight the key points and make up the deficiencies for the students.

3. Advantages of problem-based teaching approach for dermato-venereology
(1) problem-oriented teaching approach has fully cultivated the capabilities of students to handle various clinical problems
The problem-oriented teaching approach closely combines the basic theoretical knowledge of Dermato-venereology with the clinical knowledge, accelerates the transformation process of Dermatology clinicians from trainees to junior doctors, and thoroughly cultivates the ability of trainees to deal with various clinical problems of Dermato-venereology, including the ability to discover, analyze, solve and reason problems, by combining their own problem finding data.

(2) Problem-oriented teaching approach has greatly improved the initiative of students in learning
The problem-based teaching approach improves the students' interest in dermato-venereology, and makes them willing to spend time to inquire and learn the diagnosis and treatment materials related to dermatology, instead of listening to teachers based on the “Cramming method” in teaching. The generation of learning interest can improve students' initiative in learning, make them change from “I have to learn” to “I want to learn”. The teachers also gradually change from “Subjects” to “Objects” in the teaching process, giving full play to the leading role of learners as the main body. PTM teaching can improve students' self-study ability at the same time. In University and future work, learning is
mainly self-study, rather than relying on teachers. Teachers are only responsible for conducting and solving puzzles, rather than instilling them all over the room.

(3) Problem-oriented teaching approach can find out the students' learning deficiencies more pertinently

The problem-oriented teaching approach is learner-centered autonomous teaching. In the process of data query and problem analysis, students will expose their own lack of knowledge and defects. At this time, teachers can answer the specific questions of students, correct and supplement them, and point-to-point make up for students' learning deficiencies, which is better than blind and non-focused indoctrination learning.

(4) Problem-oriented teaching approach helps cultivate good teamwork spirits and capabilities of students

For each clinical problem, the individual's diagnosis and treatment ideas are single, and the collective discussion helps to gather ideas, gather the strengths of all people, and make up for the weaknesses of individuals. Also, the teachers plays a vital role in the final summary. The answer and supplement are conducive to improving the ideological level of students for the organic combination of theoretical knowledge and clinical practice knowledge of dermatology.

4. Case study

The incidence of canine dermatosis was also different in different months of a year, as shown in Table 1. Totally 876 cases in the first-episode dermatosis were recorded in dogs during the survey period. In 2011, canine dermatosis mainly occurred in the four months (June, July, August and September), and the total number of cases in the four months of 6 and 9 was 531, or 60.62% of the total. The concentration trend of canine dermatosis in different months is shown in Figure 1 as follows.

Table 1. Onset of dermatosis in different months from April 2018 to March 2019

| Month   | January | February | March | April | May    | June   | July | August | September | October | November | December |
|---------|---------|----------|-------|-------|--------|--------|------|--------| ----------|---------|----------|----------|
| Number  | 12      | 18       | 24    | 48    | 109    | 134    | 146  | 123    | 128       | 67      | 43       | 24       |
| of cases/ case |        |          |       |       |        |        |      |        |           |         |          |          |

Figure 1. Incidence of canine skin diseases in different months from April 2018 to March 2019
As dermato-venereology problems are highly complex and nonlinear, the sum of gait classification issues can be obtained by the transformation. Thus, the optimal classification surface in gait classification can be obtained.

Will relax variables \(\xi_r (\xi_r \geq 0, i = 1, 2, \cdots, n)\) And make sure that the plane makes the hyperplane \(w^T x + b = 0\) To achieve key training.

\[
y_r = (w^T x_r + b) \geq 1 - \xi_r
\]

If \(0 < \xi_r < 1\) is met, the correct classification of sample points \(x_r\) can still be achieved. If \(\xi_r \geq 1\), the sample points will be misclassified. Hence, the gait classification algorithm is introduced as follows

\[
\psi(w, \xi) = \frac{1}{2} w^T w + C \sum_{r=1}^{H} \xi_r
\]

Where \(C\) is a normal number, i.e., penalty factor. Gait classification can be implemented through the quadratic programming issue as follows

\[
\begin{align*}
\max & \sum_{r=1}^{H} a_r - \frac{1}{2} \sum_{r=1}^{H} \sum_{f=1}^{H} a_r a_f y_r y_f (x_r^T x_f) \\
\text{s.t} & \quad 0 \leq a_r \leq C, i = 1, \cdots, n \\
& \quad \sum_{r=1}^{H} a_r y_r = 0
\end{align*}
\]

In the process of problem-based teaching approach, although students have become the main body of learning to some extent, teachers are still the subject-oriented, the evaluator and promoter of learning in teaching activities. Chinese medical college teachers generally rely on the traditional teaching model. They are lack of knowledge and understanding of the problem-based teaching approach, with the unreasonable design of the subject matter, and inadequate guidance of group discussion. It can affect the quality of the problem-based teaching approach to some extent. For the students, due to the long-term acceptance of the “Cramming method in teaching” and “Teacher-centered” indoctrination approach in high schools, students cannot adapt to the problem-based teaching approach after entering colleges and universities.

Currently, there is no reference for teaching materials in line with the PTM teaching available in the market. Hence, PTM teaching classes are set by the teachers themselves. To ensure the successful implementation of PTM teaching, some virtual patients, computer-aided teaching, medical software, and supporting high-speed campus networks are required. These resources are relatively abundant in national key medical universities but relatively scarce in general medical schools. The PTM teaching materials acquired by teachers mainly rely on their online search and their personal clinical and teaching experience.

In China, a large number of high school graduates are admitted to medical schools every year. From 1998 to 2010, the number of medical university students increased from 75188 to 533618.
Currently, the number of students in a small teaching class at the Third Military Medical University can reach 40-50, where one teacher has to consider the requirements of many students and interact with them at the same time, making it challenging to implement the problem-based teaching approach.

(4) PTM teaching evaluation system is not perfect currently, the evaluation of students' teaching effect is mainly based on the traditional theory examination + practice examination. Students' learning is still based on grasping the teaching focus and solving the teaching difficulties. The examination questions include the examination questions of practicing doctors, which are still based on selection, filling in the blank, noun explanation and question and answer. The discussion related to the question-oriented teaching approach itself Questions or case analysis questions can not occupy the mainstream of examination questions.

5. Conclusions
The successful implementation of the problem-based teaching approach has to be combined with the traditional LBL teaching model. As students have some preliminary professional knowledge they can put forward problems with some depth in PTM teaching and learning, make up for their learning deficiencies, allow teachers to mend the knowledge loopholes of students to some extent, and thus improve the learning depth. Teachers should adapt to the role change from “Teacher” to “Tutor” as soon as possible. Rather than cramming in teaching, teachers should only guide the teaching orientation.

In the PTM teaching classroom, the number of students should not be too large. An excessive number of students makes it difficult for teachers to attend to all students in the whole process and ensure the teaching effect of PTM. The corresponding reform of the teaching evaluation system should be carried out with the development of the problem-oriented teaching approach. For example, the written examination questions should be changed from objective questions to subjective discussions and case analysis questions. In this way, the real theoretical levels of students can be represented through the examination, which cannot be achieved merely by choosing among ABC. To ensure the smooth implementation of the problem-based teaching approach, we should follow up with the proper hardware supporting facilities at medical colleges such as high-speed campus networks, literature retrieval systems, computer-aided teaching, auxiliary medical systems, virtual dummy, and PTM supporting teaching materials.

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