The Application of Micro-classroom Combined with CBL Blended Teaching in the Diagnosis, Consultation and Treatment of Genetic Diseases of the Endocrine System

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Abstract: Objective: To explore the application effect of microclassroom combined with CBL blended teaching in the diagnosis, counseling and treatment of genetic diseases of endocrine system. Methods: 124 students who were interned in the Genetic Center of our hospital were selected, and the time interval of the selected cases was set from January 2022 to July 2024, and the research subjects were grouped into groups with reference to the method of randomized numerical table, in which there were 62 students in the control group and 62 students in the observation group. In the control group, conventional teaching was used, and in the observation group, microclassroom combined with CBL blended teaching was used, and students in all groups were required to continue teaching for 3 months. The assessment scores and critical thinking skills of the two groups were compared statistically. Results: The assessment scores (theoretical knowledge and practical skills) of students in the observation group were higher than those of the control group; the scores of critical thinking skills (truth-seeking, open-mindedness, analytical ability) of both groups were higher than those of the control group after the teaching, and the increase of the observation group was greater than that of the control group, with $P<0.05$. Conclusion: Adopting a microclassroom combined with the CBL blended program in the teaching of the diagnosis, counseling, and treatment of genetic diseases of the endocrine system is conducive to improving the assessment scores of students, and is beneficial to enhancing their performance. is conducive to improving students' assessment scores and enhancing their critical thinking skills.

***Keywords*:** genetic disorders of the endocrine system, microclassroom, CBL, blended learning

1. Introduction

Most of the traditional teaching mode adopts teacher-led lectures, and students can only passively accept the knowledge, which leads to their understanding of the complex pathogenesis of endocrine genetic diseases, various diagnostic means, accurate genetic counseling process and personalized treatment plans, only on the surface, and it is difficult to apply the theoretical knowledge to clinical practice. With the rapid development of the medical field, medical students are required to have a higher level of professionalism in the diagnosis and treatment of genetic diseases. Microclassroom has been gradually emphasized in the field of education for its short, content-focused, and convenient for students' independent learning, as well as the advantages of CBL (Case-Based Learning) teaching mode which is guided by real cases to stimulate students' active thinking and cultivate clinical thinking[1-2]. However, there are no research reports on the organic integration of the two and their application to the teaching of genetic diseases of the endocrine system. Based on this, the purpose of this paper is to explore the application effect of microclassroom combined with CBL blended teaching in the diagnosis, counseling and treatment of endocrine system genetic diseases, which is now described as follows according to the specific content of this study.

2. Information and methodology

2.1 General information

124 students who were interns in the Genetic Center of our hospital were selected, and the time interval of the cases was set from January 2022 to July 2024, and the study subjects were grouped into groups with reference to the random number table method, of which 62 were in the control group and 62 were in the observation group. The male to female ratio of the study subjects in the observation and control groups was 34:28 and 37:25 respectively; their ages were 20.~40 years and 20-40 years respectively; and their mean ages were (28.36±2.17) years and (28.29±2.24) years. By comparing the above data (gender and age) between the two groups, it can be concluded that there is no significant difference between the two groups ($P>0.05$), so the results of this study are not affected by the basic data and are comparable. Inclusion criteria: those

whose education is bachelor's degree or above; those who entered our genetic center for the first time for internship; those whose previous study basis is compatible, etc. Exclusion criteria: those who were absent from the examination; those who transferred to the hospital for study in the middle of the study; those who were on leave of absence during the internship, etc.

2.2 Methodology

In the control group, conventional teaching mode was adopted, and teachers prepared the lessons in advance according to the syllabus of endocrine genetic diseases, clarified the teaching focus, and emphasized on stimulating students' interest and innovation ability in the teaching design. During the teaching, the teachers maintained a rigorous attitude and focused on lecturing with the help of multimedia, while the students took notes in class and copied the courseware for reviewing after class. The observation group used microclassroom combined with CBL hybrid teaching, as follows: (1) Pre-preparation: a teaching team consisting of doctors from the Genetic Center, endocrine genetic disease specialists and genetics teachers from universities was set up to jointly design and implement the teaching. Focusing on endocrine system genetic diseases such as congenital adrenocortical hyperplasia and thyroid hormone resistance syndrome, the team will sort out the core knowledge points of pathogenic mechanisms, diagnosis and testing techniques, counseling and treatment. (2) Microclassroom teaching: The knowledge points will be made into 5-10 minutes microvideos, each focusing on one core content, incorporating animation and clinical cases. Students can watch the videos on their own before class and submit questions and doubts through the online platform. (3) CBL teaching: collect cases of genetic diseases of the endocrine system covering different types and severity of conditions, such as family aggregated diabetes genetic lineage and rare endocrine tumor genetic cases. Students will be grouped into 5-6 students in each group, and the case materials will be distributed. Students will be asked to analyze and discuss the diagnostic ideas, genetic counseling plan and treatment plan with the knowledge of the microclassroom, and each group will elect a representative to speak, and the teacher will comment and correct them, so as to cultivate the students' ability of clinical thinking and solving practical problems. Both groups continued teaching for 3 months.

2.3 Observation indicators

①Assessment scores, comparative analysis of the two groups of students' learning achievement data, including theoretical knowledge, practical skills. The full score is 100 points. ②Critical thinking ability, before and after the teaching was carried out, the simplified version of the critical thinking scale (CTDI-CV) was used to score respectively. The scale covers the dimensions of truth-seeking, open-mindedness, analytical ability, etc., and the score range of each dimension is 10-60 points, and the higher the score, the stronger the ability.

2.4 Statistical methods

The indicators were detected using SPSS 26.0, [cases (%)] for count data, line χ^2 test; ($\bar{x} \pm s$) for measurement data, line t test; data results calculated using statistical software P<0.05, that is, the difference is statistically significant.

3. Results

3.1 Appraisal results

Table 1: The assessment scores (theoretical knowledge and practical skills) of the students in the observation group were higher than those of the control group, P<0.05.

Table 1. Appraisal scores($\bar{x} \pm s$, points)

Groups	Number of examples	Theoretical knowledge	Practical skill
Control subjects	62	81.34±3.27	83.21±2.75
Observation group	62	86.58±4.03	89.13±2.06
t-value		7.950	13.566
P-value		<0.001	<0.001

3.2 Critical thinking skills

Table 2: The scores of critical thinking skills (truth-seeking, open-mindedness, and analytical skills) increased in both groups after the teaching compared to before the treatment, and the increase was greater in the observation group compared to the control group, p<0.05.

Table 2. Critical thinking skills ($\bar{x} \pm s$, points)

Groups	Number of examples	Searching for the truth		Open-mindedness		Analytical ability	
		Pre-instructional	Post-teaching	Pre-instructional	Post-teaching	Pre-instructional	Post-teaching
Control subjects	62	23.53±3.65	42.69±2.53*	25.73±3.09	45.34±2.62*	24.17±3.55	43.19±2.18*
Observation group	62	23.49±3.57	52.58±2.34*	25.65±3.12	54.32±1.45*	24.23±3.16	54.66±1.19*
t-value		0.062	22.597	0.143	23.613	0.099	36.364
P-value		0.951	<0.001	0.886	<0.001	0.921	<0.001

Note: Compared to before teaching,*P<0.05

4. Discussion

In the routine teaching of genetic diseases of the endocrine system, although students can transfer knowledge to a certain extent, it is difficult to fully mobilize students' learning enthusiasm and initiative, and the cultivation of clinical thinking and the ability to solve practical problems is not effective. Students often do not have a deep enough understanding of complex genetic mechanisms, diverse diagnostic methods and individualized treatment plans, and are difficult to apply theoretical knowledge flexibly when facing real cases. The emergence of microclassroom and CBL teaching mode brings new ideas to medical education. Microclassroom can help students utilize fragmented time to grasp knowledge efficiently; CBL teaching mode is oriented to real cases, which stimulates students to think actively and cultivates clinical thinking and the ability to solve practical problems.

The results of this study show that the assessment scores (theoretical knowledge and practical skills) of students in the observation group were higher than those of the control group, suggesting that the use of the microclassroom combined with the CBL hybrid program in the teaching of the diagnosis, counseling and treatment of genetic diseases of the endocrine system is conducive to the improvement of students' assessment scores. The reasons for this may be: microclassroom fragmentation of complex knowledge, each video focuses on a core, incorporating animations and cases, which fits students' cognition, reduces cognitive load, enhances intuitive and interesting knowledge, and builds up a solid foundation for theoretical knowledge learning; CBL teaching is based on real cases, and guides the students to analyze the diagnosis, counseling, and treatment plan of endocrine system genetic diseases. During the group discussion, students' minds collide, learn to think from multiple perspectives, and effectively cultivate clinical thinking, which is extremely critical to the practical skills assessment, allowing students to flexibly apply their knowledge and improve their practical skills[3-4]. In the construction of the knowledge system, the microclassroom teaches basic knowledge, CBL guides the application of knowledge, and the two complement each other. After a series of case studies, students can link fragmented knowledge, build a complete knowledge system of endocrine system genetic diseases, and clearly grasp the linkage of knowledge points, thus improving the assessment results.

The results of this study show that the scores of critical thinking ability (truth-seeking, open-mindedness, analytical ability) of both groups increased after teaching compared with before teaching, and the observation group increased more than the control group, suggesting that the use of microclassroom combined with CBL blended program in the teaching of diagnosis, counseling and treatment of genetic disorders of the endocrine system is conducive to the enhancement of their critical thinking ability. The reasons for this may be: in the microclassroom learning stage, students need to watch the video independently, face the complex knowledge of endocrine system genetic diseases, active thinking and understanding, and then exercise their active thinking and in-depth investigation ability, in order to lay the foundation for critical thinking; CBL teaching to real cases to start a group discussion, each student can based on their own knowledge and understanding of the opinions expressed, the students continue to break through the limitations of their own thinking, and learn to accept different perspectives, and gradually cultivate the ability to think critically. Students learn to accept different perspectives, gradually develop open-mindedness, and also improve their analytical ability in the process of analyzing the reasonableness of others' views. CBL teaching cases often have complex problems, and students have to use the knowledge they have learned to comprehensively analyze the patient's information in various aspects, and this problem-driven learning mode encourages students to constantly sort out their knowledge, analyze the problem from multiple perspectives, and form systematic analytical thinking, which effectively enhance critical thinking ability[5-6].

In summary, the use of micro-classroom combined with CBL hybrid scheme in the diagnosis, consultation and treatment of genetic diseases of the endocrine system is conducive to improving students' assessment scores, enhancing their critical thinking ability, and has high promotion and application value in clinical teaching.

References

[1] Sun Jian, Guo Xiaoyong. Application Value of MDT Combined with PBL in Endocrinology Clinical Practice[J]. Heilongjiang Medical Sciences, 2024, 47(5): 63-65+69.

[2] Liu Aiping, Li Jun, Chu Xiaojing. Discussion on the Teaching Mode of Endocrine and Metabolic Diseases Based on Online Demonstration Interactive System[J]. Modern Medicine and Health, 2024, 40(24): 4302-4305.

[3] Wu Fanglai, Huang Daxiang, Pan Yanli, et al. Application of Task-driven Combined CBL Teaching Method in Endocrinology Residency Training and Teaching[J]. Chinese Journal of Continuing Medical Education, 2024, 16(23): 75-79.

[4] Xing Xue. Application of BOPPPS Combined Rain Classroom Teaching Model in Endocrinology Teaching[J]. China New Communications, 2024, 26(21): 117-119+129.

[5] Sun He, Li Ling. Application of PBL and CBL Teaching Methods in Endocrinology Teaching[J]. Modern Distance Education of Chinese Medicine, 2022, 20(24): 23-25.

[6] Li Yinhui, Dong Liming, Ma Li. Application of Rain Classroom in Endocrinology Teaching[J]. Chinese Journal of Continuing Medical Education, 2020, 12(15): 68-70.