

## Problem-Based Learning Strategy to Improve Medical Students' Interest in Biochemistry Course Based on $\beta$ -Endorphin Hormones

<sup>1</sup>Tri Setyawati\*, <sup>2</sup>Mery Napitupulu, <sup>3</sup>Muhammad Sabir, <sup>4</sup>Afadil

<sup>1</sup>Departement of Biochemistry, Faculty of Medicine, Tadulako University, Indonesia.

<sup>2,4</sup>Chemistry Study Program, Faculty of Education, Tadulako University, Indonesia

<sup>3</sup>Departement of Microbiology, Faculty of Medicine, Tadulako University, Indonesia.

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**ABSTRACT:** The study aims to measure the effectiveness of PBL learning strategies based on the  $\beta$ -endorphin hormone on the interest of medical students studying biochemistry. There is a tendency in medical students at Tadulako University to lose their interest in learning basic subjects but directly learn clinically. Problem-Based Learning Strategies are strategies that can stimulate higher-order thinking skills and possible to arouse the interest of students and  $\beta$ -endorphin hormones so they enjoy learning about biochemistry. The sample collected by purposive sampling methods and conducted with pre and post group control design then analyzed by using SPSS with the Kruskal Wallis test. The Post-Hoc test showed that the higher the levels of  $\beta$ -endorphin the more the interest of students studying biochemistry. PBL learning strategies affect student learning interest ( $p < 0,000$ ).

**Keywords:** Learning strategies, Problem-Based Learning, interests, biochemistry,  $\beta$ -endorphin hormone.

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### I. INTRODUCTION

The quality of education in organizing learning is largely determined by the ability of lecturers or teachers to deliver teaching material. In delivering the subject matter to students a teacher is required to be clever in his role in bringing students following the expected goals. This is determined by how a teacher chooses and uses methods in the teaching and learning process that is under the subject matter and the objectives to be achieved. <sup>1,2</sup> According to Ruseffendi (1980), the term learning strategy is any chosen wisdom, which has been associated with factors that determine the color or strategy, that is: a) The selection of subject matter (teacher or student); b) Presenters of subject matter (individual or group, or independent study); c) How to present subject matter (inductive or deductive, analytical or synthesis, formal or non-formal); d) Target recipients of subject matter (groups, individuals, heterogeneous, or homogeneous).<sup>3</sup> Learning strategies can be a strategy in conducting learning activities aimed at changing the state of learning into expected to learn.<sup>4,5</sup>

Problem Based Learning is a form of learning strategy based on problems. Problem-based learning can be interpreted as a series of learning activities that emphasize the process of solving problems faced scientifically. By the Indonesian Medical Council, the PBL method is recommended in the study of medical students.<sup>6</sup> Someone who has an interest in learning in himself then he will achieve the desires or ideals, but if a student has no interest in learning then the student will not be able to achieve the desires or ideals. Students interest in learning is needed in learning so that students have an interest in the material being taught. In addition to students' interests, they also need encouragement or movement to achieve their goals or ideals. According to Slameto (2010), it is stated that interest is a large capital in achieving or obtaining goals of interest.<sup>7</sup>

Individual interest is defined as a deep interest in something that already exists and is a desire from within oneself to understand giving rise to new experiences. Whereas situational interest arises spontaneously, and it is temporary. Three factors distinguish situational interest; the first triggers interest, second maintains situational interest regarding feelings and third is to maintain situational interest as a value.<sup>8</sup> Interest can be measured through 4 indicators as mentioned in Slameto (2010), namely an interest in learning, attention in learning, motivation to learn and knowledge. Interest in learning means that if someone is interested in a lesson then he will have a feeling of interest in the lesson. He will be diligent in learning and continue to understand all the knowledge related to the field.<sup>7</sup> He will follow the lessons enthusiastically and without any burden on him. Attention is the concentration or activity of one's soul towards observation, leaving aside anything other than what is noticed. With interest, students will have attention in learning, their souls and minds will be focused on what is learned.<sup>9,10</sup> Interest in learning is the tendency of individuals to have pleasure without coercion to cause changes in knowledge, skills, and behavior. Feeling happy is influenced by the activity of one hormone  $\beta$ -endorphin hormone.<sup>11</sup>

The hormone endorphins are chemicals such as morphine that are produced by the body. Endorphins have the effect of reducing pain and triggering feelings of pleasure, calm, or happiness. This hormone is produced by the central nervous system and the pituitary gland. There are several types of endorphin hormones including beta, gamma, and alpha. Endorphin hormone has the function of reducing stress, increasing concentration and also increasing creativity.<sup>12</sup> This study focus on the application of PBL learning strategies to improve their endorphin and increase students' interest to study biochemical course.

## II. RESEARCH METHODOLOGY

This study used a quasi-experimental research method with a post-test only control group design. Student interest was measured using a questionnaire consisting of 25 questions. The subject of the research was the first batch of medical students who were taking biochemical studies. The sampling technique used was accidental sampling.

The beta endorphin hormone is measured using the ELISA (Enzyme linkage immunosorbent Assay) technique with  $\beta$ -Endorphin for the human kit with catalog No. EH0696 Range 15.625-1000 pg/ml. The test used to determine the effect of the  $\beta$ -endorphin hormone on interest uses the One-Way ANOVA test and if it is not normally distributed then the Kruskal Wallis test is used. And to determine the relationship between  $\beta$ -endorphin hormone levels with the interests of students using the Pearson correlation test. However, if it is not normally distributed, it uses a non-parametric test, the Spearman test

## III. RESULTS AND DISCUSSION

Questions regarding students' Interest in the questionnaire describe student motivation, pleasure, level of knowledge and attention. These question can be found in number 1, 4, 5, 6, 17, 19, and 25 respectively, and the number of students who interest in biochemistry shown in Tables 1.1, Table 1.2, Table 1.3, and Table 1.4

Table 1.1 Medical Students' Interest in Biochemistry Course based on General Indicator

Answer	Question						
	1	4	5	6	17	19	25
Strongly Disagree	0	6	1	17	24	1	4
Disagree	2	52	31	68	86	3	31
Agree	95	69	71	35	26	78	82
Strongly agree	39	9	33	16	0	54	19
Total	136	136	136	136	136	136	136

Table 1.2 Medical Students' Interest in Biochemistry Course based on Attention Indicators

Answer	Question				
	10	11	12	13	20
Strongly Disagree	18	12	0	0	17
Disagree	100	80	7	7	100
Agree	16	39	77	60	17
Strongly agree	2	5	52	69	2
Total	136	136	136	136	136

Table 1.3 Medical Students' Interest in Biochemistry Course based on Motivation Indicators

Answer	Question						
	3	14	15	18	22	23	24
Strongly Disagree	0	1	1	2	0	0	0
Disagree	7	1	31	76	2	4	3
Agree	114	72	71	54	92	94	86
Strongly agree	15	62	33	4	42	38	47
Total	136	136	136	136	136	136	136

Table 1.4 Medical Students' Interest in Biochemistry Course based on Knowledge Indicators

Answer	Question					
	2	7	8	9	16	21
Strongly Disagree	0	6	1	17	24	1
Disagree	2	52	31	68	86	3
Agree	95	69	71	35	26	78
Strongly agree	39	9	33	16	0	54
Total	136	136	136	136	136	136

$\beta$ -endorphin hormone levels were measured using the ELISA (Enzyme Linkage Immunosorbent Assay) method with  $\beta$ -endorphin reagents for human 96 wells. Students are required to fast for an entire night or less than 8 hours then their blood serum is taken for analysis. The results of examining beta endorphin hormone levels can be seen in Table 1.5 below.

Table 1.5 Beta Endorphin Levels Hormone Serum of Medical Students\*

Beta endorphin levels (pg/ml)	N	Mean
endorphin level 18-77	24	13,38
endorphin level 78-137	4	22,50
endorphin level > 137	55	55,91
Total	83	

\*Primary data 2019

The normality test results above show that the value of the Shapiro Wilk Test obtained  $p = 0.000 < \alpha = 0.05$ . it means that the data is not normally distributed, so the analysis continues with non-parametric analysis or the Kruskal Wallis Test.

The descriptive analysis results above show that of 83 respondents had an average interest of 85.17 with a standard deviation of 12.003 and the lowest interest of 55 and the highest of 98. Ranks table shows that 24 respondents have endorphin levels 18-77, and 4 respondents have endorphin levels of 78-137, and 55 respondents have endorphin levels > 137.

Statistical test results show the value of  $p (0.000) < \alpha (0.05)$ , meaning that the null hypothesis is rejected and the alternative hypothesis is accepted. In conclusion, there are differences in student interest based on levels of endorphins. This means that the level of endorphins affects student interest.

The highest interest is at the level of endorphin levels > 137 with an average interest value of 92.67 with the lowest interest value of 78 and the highest of 98. Endorphin levels of 78-137 have an average interest value of 76.25 with the lowest interest value of 75 and the highest of 78. The level of endorphin levels 18-77 has an average interest value of 57.92 with the lowest interest value of 55 and the highest of 84.

Post hoc test results showed the highest average interest was at endorphin levels > 137, then endorphin levels 78-137, and the lowest at endorphin levels 18-77. The difference in the average value of interest between endorphin levels > 137 and endorphin levels 18-77 is 23,214. The difference in the average value of interest between endorphin levels > 137 and endorphin levels 78-137 was 16,423. and the difference in the average value of interest between endorphin levels 78-137 and endorphin levels 18-77 of 6,792.

Furthermore, to see the correlation or the relationship between  $\beta$ -endorphins with the interests of students using the Spearman correlation test. This is because the Kolmogoriv-Smirnov normality test shows a significance value of  $p < 0.00$  which means it is not normally distributed so it is not feasible to use the Pearson metric test.

The results of the correlation of beta endorphins and interests can be seen in Table 1.6 below.

Table 1.6 Correlation of Beta Endorphin Hormone Levels on Medical Students Interest to study Biochemistry

Endorphin	Interest	Correlation Spearman
83	83	0.000

The data normality test results above show the Shapiro-Wilk test has a sig value of four data at  $p < 0.05$ . it means that the four groups of data are not normally distributed, then the right correlation test is the non-parametric correlation test (Spearman Test). Spearman correlation test results showed a correlation between variables with each value  $p < \alpha (0.05)$ .

Based on the results of the research above shows the correlation between endorphins levels and students' interest in studying biochemistry.  $\beta$ -endorphin hormone influences students' interest in studying biochemistry courses. Table 1.6 shows that the Spearman test obtained P values  $<0.005$ . This means that there is a correlation between  $\beta$ -endorphin hormones and student interests. The higher levels of the beta endorphin hormone the higher the interest in studying biochemistry courses.

This is supported by a theory about the function of the hormone Endorphins which can increase concentration. The endorphin hormone can produce euphoric feelings that are very similar to those produced by other opioids. The hormone endorphins are most often released into the human body during stressful conditions or in times of pain. The entry of endorphins into the system at the same time often causes nausea or nervous feeling in the stomach. However, the number of endorphins released varies from one individual to another so that an event that stimulates the secretion of this neurohormone can significantly increase endorphin levels in some people but not always in others.<sup>13</sup>

In addition to stress and pain, endorphin secretion is also triggered by the consumption of certain foods, such as chocolate and chili. Indeed, the increased characteristic of body endorphin levels caused by chocolate is believed to play an important role which states that chocolate is a portion of comfort food in times of stress. Also, due to the release of endorphins associated with chili, causing chili has been used in a variety of medical treatments, especially as part of therapy for chronic pain. Several types of physical activity, especially aerobics, have also been linked to increased endorphin secretion in recent years. Undergoing massage or acupuncture therapy is also believed to stimulate the production of this hormone.<sup>14,15</sup>

In the field of psychiatry, experiments on the use of endorphins as a therapy for mental disorders have been carried out. The synthetic endorphin hormone is injected or given intravenously in patients with depression and schizophrenia. After being administered intravenously, the patient is assessed and measured the level of behavior change that results. The result is depressed patients can experience significant improvement in behavior within two to four hours after treatment using beta-endorphin. However, endorphin treatment did not show significant changes in schizophrenia patients.<sup>16,17</sup> Low levels of endorphins can cause personality disorders, especially in the regulation of mood and mood. Endorphin deficiency is known to be associated with several disorders such as depression, the low excitatory threshold for excitatory pain and chronic pain sensations that are not clear causes.<sup>17</sup> Symptoms that arise when a person experiences depression due to lack of endorphins, among others, the emergence of feelings of sadness and depression, which continues - constantly, decreased appetite, sleep disturbance, feeling that he is not useful, in severe conditions ideas can arise to end life immediately or commit suicide.<sup>17</sup>

The interest of students has a role in giving birth which will automatically facilitate the creation of concentration to prevent distraction from outside attention. Interest in learning is a positive attitude that can sometimes occur in students. This condition must be suppressed as much as possible, meaning that students must be endeavored to experience a comfortable, calm and enjoyable condition in learning. So that students have a great interest in conducting teaching and learning activities. The high interest in learning will be able to follow the learning process well so that he will be able to produce the best performance in their learning.<sup>7,8,9</sup>

#### IV. CONCLUSION

Problem-based learning strategy effective to improve the medical students' interest to study biochemistry. The level of  $\beta$ -endorphin affected students' interest to study. The higher levels of endorphin students study more serious than students with a lower level of endorphin. It can be concluded that there is a correlation between endorphins levels and students' interest in studying biochemistry.

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