

# THE EFFECT OF REALITY THERAPY ON THE SEROTONIN LEVEL AND DEPRESSION SCORE IN CERVICAL CANCER PATIENTS

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## ABSTRACT

**Introduction:** Cervical cancer is cancer occurring in the cervix uteri, which is mostly caused by an infection by human papillomavirus (HPV). Women diagnosed with advanced cervical cancer suffer emotional stress that can lead to depression. This condition causes decreasing quality of life, decreasing level of serotonin, and an increase in depression score. Giving reality therapy to patients is expected to have positive effects. **Methods:** The research was conducted through an experiment with pre-test and post-test design. The research samples were 15 subjects taken through consecutive sampling from the Polyclinic of Obstetrics and Gynecology of Dr. Moewardi Hospital Surakarta starting in March 2015. The analysis of serotonin level was conducted in Prodia Laboratory. The experimental data was analyzed using a t-test ( $\alpha = 0.05$ ). **Results:** The average level of serotonin of the research subjects after receiving reality therapy was higher ( $223.59 \pm 41.20$ ) compared to that before the therapy ( $82.77 \pm 27.02$ ). From the t-test analysis with  $p = 0.00$ , it was found that the average depression score after receiving reality therapy is lower ( $11:40 \pm 4.80$ ) compared that before the therapy ( $17:33 \pm 5:52$ ). **Conclusion:** There was a significant increase in the serotonin level and a significant decrease in the depression score as the effect of reality therapy given to patients with advanced cervical cancer.

**Keywords:** Serotonin, depression score, reality therapy, advanced cervical cancer

## INTRODUCTION

Cervical cancer arises from and grows in the cervix uteri, particularly on the epithelial surface or the outer layer of the cervix, and is mostly caused by infection by human papillomavirus (HPV). This cancer begins in the metaplastic epithelium of the squamocolumnar junction region, which connects the vaginal mucosa and the endocervical mucosa. Every year, there are 500,000 new cases of cervical cancer and more than 250,000 associated cervical cancer deaths worldwide. In Indonesia, having a population of more than 220 million people, there are approximately 52 million women suffering from cervical can-

cer.<sup>1</sup> Nowadays, cervical cancer is the leading cancer killer among women of reproductive age.<sup>2</sup>

Women diagnosed with advanced cervical cancer are more vulnerable to emotional stress, which can lead to decreased quality of life and depression because they have to undergo a series of treatment and therapy.<sup>3</sup>

Serotonin is produced from the tryptophan metabolism, an essential amino acid that will be converted to 5-hydroxytryptophan (5-HTP) through hydroxylation and then converted to 5-hydroxytryptamine (5-HT, serotonin) through decarboxylation, which can be found in a relatively high amount in the hypothalamus and midbrain. Serotonin works as a

transmitter at the end of the synapses between one neuron and the others, which can speed up the process of delivering impulses. Serotonin is secreted by the ends of the fibers of the raphe nuclei (neurons) located in the lower half of the pons and medulla. The function of the serotonin system in the brain is determined by the location of the projection system. Projections on the frontal cortex are required for the regulation of mood, and projections on the basal ganglia are responsible for obsessive compulsive disorders. Anxiety and panic attacks are mediated by serotonin function in the limbic system, and sleep disorders are mediated by a lack of serotonin in the sleep center in the brain stem.<sup>4</sup>

Reality therapy is one of the therapeutic modalities that can be relied upon in treating patients with advanced cervical cancer. During the psychotherapy, patients with depression talk to a psychotherapist to help them identify the factors that trigger depression. This therapy helps people with depression in understanding the behavior, emotions, and ideas that contribute to their depression; and it is expected that the patients can solve and fix their problems.<sup>5</sup>

Beck Depression Inventory (BDI) was introduced in 1961 by Dr. Aaron T. Beck and was developed to assess signs of depression in the behaviors of adolescents and adults. BDI is designed to standardize the assessment of the severity of depression and to describe simply the changes of the symptoms during the course of psychoanalysis or psychotherapy. Depressive attitudes and symptoms can be seen specifically in this patients group, and the BDI was described by claims

and the numerical assessments of each claim.<sup>6</sup> The objective of this study is to analyze the effect of reality therapy on the serotonin level and depression score of patients with advanced cervical cancer.

## METHODS

The research is conducted through an experimental with pre-test and post-test design. The subjects of the research are 15 patients with advanced cervical cancer (stage 2B–4) in the Obstetrics and Gynecology Clinic of Dr. Moewardi Hospital Surakarta who were selected through consecutive sampling. The researchers chose patients who meet several restricted requirements. The inclusion criteria include: can communicate well, able to speak Indonesian, aged 35–55 years, and meet the criteria of BDI (mild to moderate). The exclusion criteria are patients with cancers of other organs, pregnancy, severe mental disorders (psychotic), and history of depression treatment.

After the patients signed an informed consent and the researchers received authorization by the ethics committee of the Faculty of Medicine of Universitas Sebelas Maret, the research began with examining the patient's serum serotonin level and depression score using BDI. Then, the patients were given psychotherapeutic interventions in form of reality therapy by a competent psychiatrist in 6 meetings of 45-minute sessions each week. After the reality therapy, the patients' serum serotonin levels and depression score were examined one more time. The data was then analyzed through a statistical test using SPSS for Windows version 17.00.

## RESULTS

Table 1. Data of the characteristics of the research subjects

Variable	Category	Number	%
Age	<40 years old	2	13.3
	>40 years old	13	86.6
Occupation	Employed	5	33.3
	Housewife	10	55.7
Education	Low	12	80
	High	3	20

Table 2. After Kolmogorov–Smirnov test, the data was normally distributed. T-test of the average serotonin level before and after reality therapy

Group	Amount of Sample (N)	Serotonin Level	P
Before Psychotherapy	15	82.77 ± 27.02	0.00
After Psychotherapy	15	223.59 ± 41.20	

p < 0,05

From the t-test table above, it can be seen that the distribution of the average serotonin level in the group after reality therapy is higher than that before the therapy.

Table 3. After Kolmogorov–Smirnov test, the data was normally distributed. T-test of the average BDI before and after reality therapy

Group	Amount of Sample (N)	BDI Score	P
Before Psychotherapy	15	17.33 ± 5.52	0.00
After Psychotherapy	15	11.40 + 4.80	

p < 0,05

From the t-test table above, it can be seen that the distribution of the BDI score in the group after reality therapy is lower than that before the therapy.

## DISCUSSION

In Indonesia, the precise incidence of cervical cancer is unknown but is estimated that cervical cancer is the most common type of cancer, which affects approximately 36% of all female cancer patients and 40 thousand new patients each year. 66.4% patients who came to the hospital are already in the advanced stage, mostly at stage 2B to 4B, and approximately 37.3% or more than one-third of patients are at stage 3B, in which the kidney function is already impaired. <sup>1</sup> This case requires special attention because 87% of cervical cancer occur in developing countries and become the second cause of cancer death after breast cancer. <sup>7</sup>

One of the problems that arise in cervical cancer cases is that women with higher risks of cancer do not have the awareness to undergo early screening. The purpose of early screening is to identify the incidence of a disease in every population in order that early intervention and management can be done. <sup>2</sup>

This study found that the serotonin level of the patients before receiving reality therapy was (82.77 + 02.27) mg/dL and was higher after receiving the therapy (223.59 + 41.20) mg/dL. A comparative analysis between the

two results indicated significant difference with p = 0.00. The patients' depression score before receiving psychotherapy reality was (17:33 + 5:52) and became lower after the therapy (11:40 + 4.80). A comparative analysis showed a difference with p = 0.00. This research can be used to support previous studies that suggest psychotherapy reality as an adjunctive therapy for patients with advanced cervical cancer.

A past research compared the improving level of cortisol after reality therapy and after standard therapy in advanced cervical cancer patients in Dr. Moewardi hospital Surakarta in 2015. The result of the research indicated a significant improvement in the patients' cortisol level after receiving reality therapy, with the value of p = 0.001 and OR 16, which means that reality therapy given to patients with advanced cervical cancer may decrease their cortisol levels up to 16 times better compared to standard therapy. <sup>8</sup> The similarity between the past research and this research is the use of reality therapy as a form of psychotherapeutic intervention.

Another research in 2015 analyzed the difference between advanced cervical cancer patients' serotonin level and pain score be-

fore and after reality therapy in Dr. Moewardi hospital Surakarta. The result indicated  $p = 0.00$ , which means there were differences in the patients' serotonin level and pain score after receiving reality therapy compared to other patients who received standard therapy, which is statistically significant.<sup>9</sup> The similarity between the 2015 research and this research is that both analyze the patients' serotonin levels. However, the previous research did not measure the depression score of the patients.

Another research analyzed the level of depression in cervical cancer patients in Adam Malik Hospital using the Beck Depression Inventory score. The result showed 37.3% patients suffered from mild depression and 34.7% suffered from severe depression.<sup>10</sup> This study only measured the BDI scores of cervical cancer patients without measuring the serotonin level.

There has not been any research that studies the correlation between serotonin levels with depression score after reality therapy in advanced cervical cancer patients. Based on the research mentioned above, it can be said that reality therapy has a very important role as an adjunctive therapy for patients with advanced cervical cancer. This research analyzes how much reality therapy affects the patients' depression score associated with the increasing level of serotonin.

Patients with advanced cervical cancer can experience stress, which if not addressed properly can progress to be depression. Depression can occur because of fear, anxiety, and confusion related to the illness, feelings

of guilt combined with concerns about their future sexual activity that may be affected by cancer treatment, and so on.<sup>2</sup> Depression is a disease that can affect the body, thoughts, and feelings as well as influence patterns of eating, sleeping, and the mood of an individual. The incidence of depression in patients with terminal and chronic diseases is 20%, in patients with diabetes is 9–27%, and in stroke patients is 20–30%.

Psychotherapy will improve the quality of life of patients and increase their five-year survival rate.<sup>12</sup> With psychotherapeutic interventions, the ventromedial prefrontal cortex (vmPFC) activities will increase and the amygdala activity will decrease. This will lead to a decrease in the dorsal raphe nucleus, ventrolateral part (DRVL) activities so that the serotonin transporter will decrease. Besides, the activities of the dorsal part of the dorsal raphe nucleus (DRD) and the ventral part of the dorsal raphe nucleus (DRV) also increase so that the patients' serotonin level will rise. There have been several past studies that showed the effect of psychotherapy in cancer patients, which explained that psychotherapy can affect the patients' psychosocial function and immunity, as well as improve the lymphocyte proliferation.<sup>4</sup>

## CONCLUSION

Reality therapy increases the serotonin level of patients with advanced cervical cancer. In addition, reality therapy decreases the patients' depression score.

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