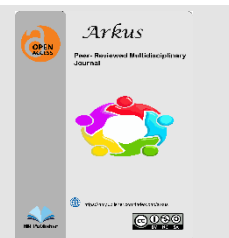




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The Effect of Providing Steamed Tempe on Hot Flashes Symptoms in Menopausal Women in the Mulya Mekar Health Center Area, Purwakarta Regency, Indonesia

Aan Rosanti^{1*}

¹Politeknik Bhakti Asih, Purwakarta, Indonesia

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*Corresponding author:

Aan Rosanti

E-mail address:

aanrosanti@polbap.ac.id

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ABSTRACT

The isoflavones in tempe, such as genistein and daidzein, are compounds known as phytoestrogens. Phytoestrogens are plant compounds that have a structure similar to the human hormone estrogen. Since decreasing estrogen levels is one of the main characteristics in menopause, the isoflavones in tempe have attracted the attention of researchers. They hypothesized that these phytoestrogens might help reduce menopausal symptoms, including hot flashes, because they can bind to estrogen receptors in the body. This study aimed to determine the effect of giving steamed tempe on the symptoms of hot flashes in menopausal mothers in the Mulya Mekar Health Center Area, Purwakarta Regency, Indonesia. This study is experimental research with a pre-post-test approach without a control group and uses primary data, namely measuring the severity scale of hot flashes symptoms. A total of 30 research subjects took part in this study. This study shows that the intervention of providing processed tempe is effective in reducing the severity of hot flashes symptoms in postmenopausal mothers. There was a decrease in the severity of hot flashes symptoms and was stated to be statistically different, $p < 0.05$. In conclusion, there is an effect of giving steamed tempe on the symptoms of hot flashes in menopausal mothers in the Mulya Mekar Health Center Area, Purwakarta Regency, Indonesia.

1. Introduction

Menopause is a natural phase in a woman's life, which usually occurs around the age of 45 to 55 years. This phase is characterized by the end of the menstrual cycle and significant hormonal changes in the body. Menopause occurs when a woman experiences the cessation of her menstrual cycle for at least 12 consecutive months without menstruation. This marks the end of natural reproductive ability. Although this is an obvious physical characteristic of menopause, this process is often accompanied by other symptoms that can affect the woman's well-being. During menopause, the body experiences striking hormonal changes, especially a decrease in estrogen hormone levels. Estrogen is a hormone that plays an important role in regulating the menstrual cycle and maintaining the health of reproductive

organs. This decrease in estrogen levels can cause a variety of symptoms and changes, including hot flashes, sleep disturbances, mood changes, decreased bone density, and long-term health risks such as heart disease and osteoporosis.¹⁻³

One of the most common symptoms experienced by women during menopause is hot flashes or sudden heat symptoms, which can cause discomfort and even disrupt the quality of daily life. Hot flashes are the experience of a sudden and intense sensation of heat that is often felt in the upper parts of the body, such as the face, neck, and chest. This sensation can come on quickly and be followed by excessive sweating. Hot flashes can be very brief or last a few minutes, and their frequency can vary from individual to individual. Hot flashes can interfere with daily activities and sleep quality. When hot flashes occur at night (night

sweats), they can cause serious sleep disturbances, which in turn can cause fatigue, mood disturbances, and difficulty concentrating. This sleep disorder can affect your overall quality of life. Although the exact cause of hot flashes is still not completely understood, it is known that the decrease in estrogen hormone levels during menopause plays a big role in the appearance of this symptom. Additionally, changes in body temperature regulation may also be a contributing factor. Hot flashes are an experience that generally feels like a sudden and intense sensation of heat, often followed by excessive sweating. Although these symptoms are usually harmless, they can seriously interfere with daily activities and sleep quality, which in turn can have a negative impact on the general well-being of a woman in menopause.^{4,5}

One approach that has gained attention in managing hot flashes symptoms in menopausal women is through changes in diet and nutritional intake. In this context, steamed tempe appears as an attractive option. Tempe is a food that has roots in Indonesian culture and has become a staple food in many parts of Southeast Asia. The process of making tempeh involves fermenting soybeans with the fungus *Rhizopus*, which produces a dense texture and distinctive taste. The uniqueness of tempe lies not only in its taste and texture but also in its rich nutritional content. Tempe is an excellent source of vegetable protein. Apart from that, tempeh also contains fiber, vitamins, minerals, and a number of bioactive compounds that are beneficial for health. These compounds include isoflavones, which are the focus of research in relation to the benefits of tempe during menopause. The isoflavones in tempe, such as genistein and daidzein, are compounds known as phytoestrogens. Phytoestrogens are plant compounds that have a structure similar to the human hormone estrogen. Since decreasing estrogen levels is one of the main characteristics of menopause, the isoflavones in tempe have attracted the attention of researchers. They hypothesized that these phytoestrogens might

help reduce menopausal symptoms, including hot flashes because they can bind to estrogen receptors in the body.^{6,7} This study aimed to determine the effect of steamed tempe on the symptoms of hot flashes in menopausal mothers in the Mulya Mekar Health Center Area, Purwakarta Regency, Indonesia.

2. Methods

This study is experimental research with a pre-post-test approach without a control group and uses primary data, namely measuring the severity scale of hot flashes symptoms. A total of 30 research subjects participated in this study, where the research subjects met the inclusion criteria. The inclusion criteria for this study were menopausal women in the Mulya Mekar Health Center Area, Purwakarta Regency, Indonesia. Research subjects were assessed for the severity of hot flashes symptoms before and after being given the intervention. The intervention given was in the form of giving 50 grams of steamed tempe for 3 days. To assess the symptoms of hot flashes, several rating scales are usually used that have been specifically designed to measure the level and intensity of these symptoms. One scale that is often used is the hot flashes severity scale. Data analysis was carried out using SPSS version 25 software. Univariate and bivariate analyses were carried out in this study. Univariate analysis was carried out to present the frequency distribution of each test variable, and bivariate analysis was carried out to determine the relationship between the test variables, with a p-value <0.05.

3. Results and Discussion

Table 1 presents the effectiveness of the pre and post-test interventions. This study shows that the intervention of providing processed tempe is effective in reducing the severity of hot flashes symptoms in postmenopausal mothers. There was a decrease in the severity of hot flashes symptoms, and it was stated to be statistically different, $p < 0.05$.

Table 1. Effectiveness of pre and post-test interventions.

Variable	Pre-test	Post-test	P-value*
The severity of hot flashes symptoms	4,78±0,33	1,82±0,19	0,001

*Dependent t-test, $p < 0,05$.

Isoflavones are compounds known as phytoestrogens, which have a similar structure to the hormone estrogen in the human body. When natural levels of the hormone estrogen in the body decrease during menopause, the body can experience a hormonal imbalance. The isoflavones in tempe act as estrogen-like agents, which means they can bind to estrogen receptors in the body. When isoflavones bind to the estrogen receptor, it can activate a biological response similar to what occurs when natural estrogen binds to the receptor. These include influences on the autonomic nervous system and body temperature regulation. Hot flashes, or sudden hot sensations commonly associated with menopause, can be the result of an imbalance in the hormone estrogen. By consuming foods containing isoflavones, such as tempe, some women report a reduction in their hot flashes symptoms. This may occur because isoflavones can help compensate for decreased estrogen by activating an estrogen-like response in the body.⁸⁻¹¹

One theory that has emerged about the cause of hot flashes is a problem with the body's thermostat, which regulates body temperature. The human body has a very complex temperature regulation system that controls body temperature within a very tight range. Disturbances in this mechanism can cause sudden fluctuations in body temperature, which in turn can trigger hot flashes. The isoflavones in tempe have been the subject of research because of their ability to influence the body's temperature regulation system. Some research suggests that isoflavones may help reduce sensitivity to temperature fluctuations that trigger hot flashes. In some cases, this may result in a reduction in the perceived symptoms of hot flashes. Isoflavones may have an effect on body temperature regulation by changing the way the body responds to temperature fluctuations. This can reduce the

intensity and frequency of hot flashes experienced by women during menopause.^{12,13}

Isoflavones have antioxidant properties that can help protect body cells from damage due to oxidative stress. During menopause, hormonal imbalances and changes in metabolism can increase oxidative stress levels in the body. The isoflavones in tempe can help overcome this oxidative stress by eliminating free radicals that damage body cells. Thus, isoflavones may potentially reduce the risk of inflammation and the symptoms associated with it, such as hot flashes. Hot flashes are sometimes related to inflammation in the body. This inflammatory process can stimulate heat receptors in the brain and produce symptoms of hot flashes. The isoflavones in tempe have anti-inflammatory properties, which can help reduce inflammation. By reducing levels of inflammation, isoflavones can influence the body's reaction to hot flashes and reduce their intensity.^{14,15}

4. Conclusion

There is an effect of giving steamed tempe on the symptoms of hot flashes in menopausal mothers in the Mulya Mekar Health Center Area, Purwakarta Regency, Indonesia.

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