



## Consuming Probiotic Foods Copes with Stress in The Pandemic Era

Az-Zafira Syairul F<sup>1</sup>, Fauziatul Khusna<sup>1</sup>, Sania Rahmatika<sup>1</sup>

<sup>1</sup> Departement of Chemistry Education, UIN Walisongo, Semarang, Indonesia

### ARTICLE INFORMATION

Received: March, 17, 2021

Revised: July, 3, 2021

Available online: August, 2021

### KEYWORDS

covid-19, probiotic foods, coping stress

### CORRESPONDENCE

E-mail:

[azzafira\\_1808076060@student.walisongo.ac.id](mailto:azzafira_1808076060@student.walisongo.ac.id)

[fauziatulkhusna\\_1808076058@student.walisongo.ac.id](mailto:fauziatulkhusna_1808076058@student.walisongo.ac.id)

[saniarahmatika\\_1808076050@student.walisongo.ac.id](mailto:saniarahmatika_1808076050@student.walisongo.ac.id)

### A B S T R A C T

One of the problems facing today is the Covid-19 pandemic. This problem has an impact on health, economic, social, religious, and psychological aspects. Psychological issues include anxiety and stress. The authors suggest consuming probiotic foods such as tempeh and yogurt to cope with stress. Probiotics contain bacteria in the intestines having an essential role in brain function, stress, and neurodevelopmental disorders. In addition, it has a beneficial effect on physical and psychological health.

## INTRODUCTION

As time goes by, human technology increases developing, especially in the era of 5.0 society. Society 5.0 is created through technological developments that minimize inequality in humans and economic problems in the future (Emawati, 2020). The world currently faces the covid-19 virus outbreak. The government's efforts to break the spread of covid are minimizing social activities and social interactions outside the home. The social interactions restriction referred to Regulation of the Minister of Health Number 9 of 2020 concerning Guidelines for Large-Scale Social Restrictions (PSBB) to accelerate breaking the spread of covid-19. All activities outside the home are recommended to be kept to a minimum and follow the health protocols. This situation causes office employees, teachers, students, and various other professions to use digital media (internet) to minimize social interactions.

The Covid-19 pandemic has various impacts on all aspects of life, not only health aspects but also economic, social, religious, and psychological aspects. Adaptations to the Covid-19 pandemic in everyday living are not convenient. The adaptation affects physical and mental health in society. The psychological problems include anxiety and stress. There has been an increase in confirmed cases of COVID-19 every day. This situation created pressure in the community around the world. Excessive anxiety and stress affect

health by decreasing the body's immune system, making it more susceptible to the virus (Fitria, Neviyarni, Netrawati, & Karneli, 2020).

Stress is an adaptive response influenced by psychological processes in an individual. It is a consequence of external (environmental) actions, situations, or events resulting in mental and physical tension. In addition, External actions, events, and situations are sources of stress (Ivancevich, Konopaske, 2006). Stress causes narrowing of blood vessels and muscle stiffness, impacting increased blood pressure leading to hypertension (Arisjulyanto, 2018).

Anxiety and depression are psychological disorders caused by stress. Both have symptoms of body organs malfunctioning innervated by the autonomic nervous system (Mutawalli, L., Setiawan, S., 2020). Depression is a mental health disorder often experienced by people with some symptoms such as sleep disturbances, decreased appetite, and weakness. When it happens continuously, it will reduce the immune system in the body. Meanwhile, anxiety is an uncertain feeling that contains fear and concern about the future (Fitria, L., Neviyarni, Netrawati, & Karneli, 2020).

There are physical and psychological symptoms in an individual with anxiety. Physical symptoms include cold fingers, accelerated heart rate, cold sweats, dizziness, decreased appetite, lack of sleep, and chest tightness. Meanwhile, psychological symptoms include fear, inability to focus, restlessness, and desire to escape reality (Sundari, 2005). Various efforts have done to overcome mental health in individuals with a psychological disorder. One of them is by consuming probiotics. Probiotics prevent the changes in the immune response related to psychological stress. The bacteria in probiotic foods produce bioactive compounds. The compounds include bacteriocins, metabolic enzymes, amino acids and peptides, short-chain fatty acids, vitamins, antioxidants, anti-inflammatory substances, and immune modulators. In addition, it also contains exopolysaccharides, one of which is the gut microbiota. Gut microbiota has a role in brain function, stress, and neurodevelopmental disorders (Fachri Naufal, Diaru Fauzan Farizy, 2020). Homeostatic disturbances in the gut are related to the central nervous system, causing various diseases such as mood disorders, depression, and anxiety.

## **METHOD**

The method in this research was library research. The authors collected information and data by studying various references and previous research results in books, dissertations, theses, journal articles, and other scientific papers. Then, the data was rereviewed to compare the two or more objects to get valid and objective data.

## RESULTS & DISCUSSION

According to World Health Organization, probiotics are live microorganisms that can benefit consumers (Chugh, B., & Eldin, 2020). Probiotics are good microorganisms in the living body giving benefits to health. They survive for a sufficient amount of time until the intestine obtains the maximum desired effect. Probiotic provides beneficial health effects through mechanisms to prevent adhesion or colonization of pathogens, produce metabolites, and modulate the immune system to produce immunoglobulin antibodies (Chugh, B., & Eldin, 2020). It has the potential to prevent possible changes in the immune response associated with psychological stress. The human body contains many microbiomes related to the central nervous system. Probiotic bacteria produce bioactive compounds. The compounds include bacteriocins, metabolic enzymes, amino acids and peptides, short-chain fatty acids, vitamins, antioxidants, anti-inflammatory and immune-modulating substances (Chugh, B., & Eldin, 2020). Those molecules can improve intestine function and promote health.

The gut microbiota is responsible for a wide range of metabolic activities, including the digestion of food and the production of biologically active substances. Previous studies emphasized that the microbiome had an essential effect on central nervous systems disorders. Psychological disorders - such as depression, anxiety, and stress – are not immune-mediated diseases of the central nervous system (CNS). A recent study showed that the gut microbiota had an essential role in brain function, stress, and neurodevelopmental disorders (Fachri Naufal1, Diaru Fauzan Farizy1, 2020). Disorders of the intestine affect the central nervous system causing various disorders such as mood disorders, depression, and anxiety disorders.

Recent research showed the association between the causes of depression related to a neurotransmitter imbalance and gut microbiota composition. The gut microbiota composition affected the function of the CNS and vice versa. Meanwhile, CNS disorders disrupted the balance of the intestinal microbiota and digestive system. Furthermore, the reciprocal correlation between the brain and intestine was known as the Brain-Gut Axis (Paraprobiotik, 2020). That correlation indicates that depression treatment should not only by stimulating the brain with drugs – such as monoamine-based antidepressants – and psychotherapy. However, probiotic food can be an alternative in the treatment.

Consuming probiotic products plays a good role in health, especially in boosting the immune system and preventing depression. One of the probiotics foods is tempeh. Tempeh is an Indonesian dish made of fermented soybeans. *Rhizopus oligosporus* is the main microbe used in tempeh fermentation. Tempeh fermentation results from various molds, yeasts, lactic acid bacteria (LAB), and gram-negative bacteria, making tempeh very rich in probiotics (Paraprobiotik, 2020). Research by Rüfer CE, Kulling SE (2006) showed that soy isoflavones had an antioxidant effect and reduced oxidative stress. Isoflavones could reduce oxidative stress by increasing antioxidant activity in the body. In addition, Ahmad A, Ramasamy, et

al. 1 (2015) compared the isoflavones in soybeans and tempeh. They found that tempeh had greater antioxidant activity. The IC<sub>50</sub> values of soybean and tempeh isoflavones against BACE1 were 10.87 and 5.47 mg/ml, respectively. Isoflavones in tempeh had stronger DPPH free radical scavenging activity (IC<sub>50</sub> = 2.67 mg/ml) than soybean (IC<sub>50</sub> = 10 mg/ml). In conclusion, tempeh is healthy food to reduce oxidative stress through aglycone enrichment.

Tempeh contains vegetable protein with consumption recommendations of about 150-300 grams of cooked ingredients per day on a 1500-2100 calorie diet. The protein in tempeh is 18 mg per 100 grams. Meanwhile, the protein consumption needs in children aged < 1 year are 2-3 g/kg/day and 1-6 years are 1.5 - 2.5 g/kg/day. In addition, Ardiana (2011) used 200 grams/day of tempeh for one month in her study. Tempeh produces protein and isoflavones to reduce stress (Sukini, 2017).

Yogurt generally uses *Lactobacillus* and *Bifidobacterium* bacteria. *Lactobacillus acidophilus* helps lactose digestion, stimulates the immune response, and controls blood cholesterol levels. It is a dairy product obtained from lactic acid fermentation by *Lactobacillus bulgaricus* and *Streptococcus thermophilus* (Prasetyo, 2010). Fermented milk products play a role in maintaining health in the intestine. The development of probiotic products positively affects health in humans. Many research shows that consuming probiotic products plays a good role in health, especially in increasing the immune system (Widiyaningsih, 2011).

Researchers recently discovered that breakfast with yogurt help to treat depression. A study published in the journal Scientific Reports suggested that probiotics support depression treatment. The study was conducted by a team of researchers from the University of Virginia School of Medicine. Study co-author Professor Alban Gaultier said depression treatments had many side effects. So, it was essential to have other effective alternative treatments. In the study, the researchers exposed mice to high levels of stress until showing symptoms of depression. Then they compared the bacteria levels before and after the experiment. They found a significant correlation between gut bacteria levels and mental health. It appears that *Lactobacillus* (gut bacteria) affected a blood metabolism called kynurenine associated with depression. Administering *Lactobacillus* supplements reduced stress in the mice.

Research by Bravo et al. (2011) showed that administration of lactic acid bacteria (LAB) found in yogurt affects the expression of GABA receptors (Gamma-aminobutyric acid) in corticosterone production and depression or anxiety behavior through the vagus nerve. The LAB boosts the immunity system and digestion system in the body. Yogurt contains *Lactobacillus* bacteria having a role in destroying harmful bacteria in the intestines. The bad bacteria can block serotonin and dopamine production, and both hormones affect mood in mental health. The decreased hormones manifest in a bad mood and produce the stress hormone cortisol. Consuming probiotics affects brain-gut interactions (Paraprobiotik, 2020).

The yogurt consumption recommendation per day is based on age and daily intake, one cup for children aged two to three years and two cups for ages four to eight. The recommendation for ages nine and over is to consume three cups per day (Behrends, 2012). The recommendation can minimize the harmful impact of excessive yogurt consumption.

In addition, palm juice drink contains the bacteria *Lactobacillus casei* and *Lactobacillus Plantarum*. The bacteria produce organic compounds and hydrogen peroxide, which are antibacterial (Khotimah & Kusnadi, 2014). The drink can be an alternative for lactose intolerance – a body cannot digest lactose. Dairy-based products commonly contain lactose (Retnowati & Kusnadi, 2014).

## CONCLUSIONS

Consuming probiotic foods copes with stress in the pandemic era. The authors recommend tempeh and yogurt. Probiotics contain bacteria in the intestines having an essential role in brain function, stress, and neurodevelopmental disorders. In addition, it has a beneficial effect on physical and psychological health. We suggest paying attention to daily consumption recommendations to minimize the harmful impact of excessive consumption.

## REFERENCES

- Arisjulyanto, D. (2018). Open Access Pengaruh Teknik Relaksasi Otot Progresif Terhadap Penurunan Tekanan Darah Pada Penderita Hipertensi Di Mataram. *Perawatan Kesehatan Primer*, 8(4), 10–13. 1079.1000309.
- Behrends, D., Tickner, C. and Franzen-Castle, L. (2012) ‘MyPlate: Dairy Group’, (June), pp. 0–2. Available at: <http://www.nationaldairycouncil>.
- Chugh, B., & Eldin, A. (2020). Bioactive Compounds Produced by Probiotics in Food Products. *Food Science.*, 32, 76–82.
- Fachri Naufal, Diaru Fauzan Farizy, W. T. U. (2020). Psikobiotik: Peran Mikrobiota Usus Dalam Kesehatan Jiwa. *Medula*, 10(3), 545–551.
- Fitria, L., Neviyarni, Netrawati, & Karneli, Y. (2020). Konseling Terapi Cognitive Behavior Mengatasi Kecemasan Selama Pandemi Covid-19. *Jurnal Pendidikan Dan Konseling*, (2859: 23-29).
- Ivancevich, Konopaske, & M. (2006). *Perilaku dan Manajemen Organisasi*. Jakarta: Erlangga.
- Khotimah, K. and Kusnadi, J. (2014) ‘Antibacterial Activity of Probiotic Date Fruit (*Phoenix dactylifera* L.) Beverages Using *Lactobacillus plantarum* and *Lactobacillus casei*’, *Jurnal Pangan dan Agroindustri*, 2(3), pp. 110–120.
- Mutawalli, L., Setiawan, S., & S. (2020). Progressive Muscle Relaxation Therapy As An Alternative To Overcome Future Stress., 4(3), 41–44.
- Paraprobiotik, S. (2020). Perubahan Perilaku Grooming dan Imobilitas Mencit Balb/C, 14(01).
- Prasetyo, H. (2010). Pengaruh Penggunaan Starter Yoghurt Pada Level Tertentu Terhadap Karakteristik Yoghurt Yang Dihasilkan. *Skripsi, Universitas*.
- Retnowati, P. A. and Kusnadi, J. (2014) ‘Probiotic Beverages Manufacture of Date Palm Fruit (*Phoenix*

dactylifera) Extract with Lactobacillus casei and Lactobacillus plantarum Isolate', *Jurnal Pangan dan Agroindustri*, 2(2), pp. 70–81. Available at: <https://jpa.ub.ac.id/index.php/jpa/article/viewFile/39/46>.

Sukini, M. A. (2017). Efektivitas Konsumsi Nugget Tempe kedelai Terhadap Kenaikan Berat Badan Balita Kurang Gizi. *Jurnal Kebidanan*, 06.

Sundari, S. (2005). *Kesehatan Mental Dalam Kehidupan*. Rineka cipta. jakarta: Penerbit Rineka Cipta.

Widiyaningsih, E. N. (2011) 'Peran Probiotik Untuk Kesehatan', *Jurnal Kesehatan*, 4(1), pp. 14–20.