

The Potential of Bioactive Peptides from Animal Protein Sources as a Mental Health Problems Prevention

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ABSTRACT: Protein is one of the substances of nutrition macro that is needed by the body are known to contain bioactive peptides. Protein sources can be from vegetables and animals, based on research an animal protein sources more complete, balanced, easily digested and absorbed than vegetable protein sources. Some sources of animal protein (milk, eggs, meat, and products derived and processed) were reported that contain of bioactive peptides. Bioactive peptide has effect as antimicrobial, antithrombotic, antihypertensive, opioid, immunomodulatory, binder minerals, antioxidants, and prevent mental health disorder. The purpose of this paper is to review the peptide bioactive, relationship of mental health with peptide bioactive, and prevention of mental health problems with bioactive peptide from animal protein sources. Peptides bioactive is an organic substance that is formed by amino acids (2-30 pieces) with the bond of the peptide and the weight of the molecule is small (unit Dalton). Mental health is the condition of the welfare (well-being) of an individual that is aware of its ability to own, can cope with the pressure of life which is normal, can work in a productive and can give a contribution to the community. Peptides bioactive shows such as opioids and inhibit the activity of the enzyme prolyl endopeptidase (PEP, EC 3.4.21.26) that play a role important in the treatment of disorders of the mind because work on the system nerve central (CNS) and can give the effect of a positive on motivation, behavior, stress, control the intake of food or the perception of the sense of pain. Some proteins of animal that has been proven to be able to prevent mental health problems namely, bovine, yogurt, and fresh milk. Still a lot of opportunities in the business of exploration of the source of the protein animal in producing the product peptide bioactive for commercial.

Keywords: Animal protein sources, bioactive peptides, mental health, prevention

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INTRODUCTION

Mental health is a factor essential that should get the attention of serious us together. According to the data of the Research, the Basic Health of the Ministry of the health of INDONESIA, the prevalence of the disorders of the soul heavy in Indonesia increased 312% of the year 2013 (to 1.7 per mile) to 2018 (7 per

mile) (Agency for the Research and Development of Health Ministry of Health, 2018). The rise in problems mental health will impact negatively, especially for the economy of the country (Khoirunnisa and Sukartini, 2020). Based on UU No. 18 Tahun 2014, the health of the soul/mental not just limited to the problems of the disorders of the soul that

weight but rather the condition when an individual can develop for physical, mental, spiritual, and social so aware of the ability that is possessed to cope with the pressure, can work in a productive, and able to contribute to the community. Understanding this indicates that the health of the mental can be used as an indicator of the productivity of the country. However, the problem of health mental still is a *low priority issue* (policy curative is preferred compared to preventive, promotive, and rehabilitative) in the majority of countries developed (Ridlo, 2017).

Intake of nutrition is one of the factors that are associated with the health of the mental. Anggraini (2014) reported that there is a relationship between depression with the status of nutrition. Protein is one of the substances of nutrition macro that is needed by the body is known to contain bioactive peptides that can prevent the occurrence of the disorder health mental (Lafarga & Hayes, 2014). Peptides bioactive is a sequence of 2-30 acid amino acids that will *release* from the protein when the presence of the process heating, curing, cooking, and fermentation of the source of the protein. A protein of animal origin is the wrong one source of protein that is already widely reported with the content of peptide bioactive is efficacious for health (antihypertensive, antioxidant, antimicrobial, opioid, antithrombotic, and the effect of the health of the other). Based on the terms of this, the purpose of writing the article is to *review* the potential of peptide bioactive from animal protein sources to prevent mental health problems.

Bioactive Peptides

Peptides bioactive is a fragment of the protein is specific which have impacted positively on the function or

condition of the body and can affect health (Kitts and Weiler, 2003). Peptides bioactive is the substance an organic which is formed by the acidic amino acids (2-30 pieces) with the bond of the peptide, the weight of the molecule is small (unit Dalton), composed of acidic amino acids that are hydrophobic when shaped protein proline-lysine-arginine and the role is critical in supporting the health of human. According to Sánchez & Vázquez (2017), peptide bioactive has activities such as drugs and can be classified based on the way it works is that as antimicrobial, antithrombotic, antihypertensive, opioid, immunomodulatory, binder minerals, and antioxidants. Peptides bioactive also can prevent the occurrence of the disorder health mental (Lafarga & Hayes, 2014).

Peptide bioactive produced through a series of process isolation, characterization, and measurement bioactivated (figure 1) from the food source of proteins of vegetable and animal sources (exogenous) and endogenous (synthesized from the organism). Based on the results of the research Górška-Warsewicz et al. (2018); Mariotti & Gardner (2019) shows an animal protein sources are complete, balanced, and easily digested and absorbed compared with vegetable protein. Some sources of animal protein that are reported to have components of the peptide bioactive include milk, eggs, meat, and products derived and processed.

Milk contains imonoglobulin which give the effect of imunoprotektif and lactoferrin that are as antimikroba (Sánchez & Vázquez, 2017). Fermentation of milk with the use of bacteria acid lactic (BAL) to improve the content of peptide bioactive with a price that is low and nutrients are positive (Hayes et al., 2007). The results of the research Jäkälä & Vapaatalo (2010), consume fermented milk

containing peptide bioactive able to lower the pressure the blood of *L. helveticus* LBK-16H from the production of milk containing peptide bioactive Val-Pro-Pro and Ile-Pro-Pro, which shows a decrease in the pressure of the blood in rats, which is hypertension with the presence of the activity of ACE inhibitors. Eggs many contain substances with the potential and the effects of therapeutic (Zambrowicz et al., 2011). Sequence peptides bioactive Arg-Val-Pro-Ser-Leu are obtained from

the protein of the white of the egg synthesized by chemical and tested for biological that shows the activity of inhibition of ACE, as well as the stability of the better in the channels of the gastrointestinal (Yu et al., 2011). Meat and products of its derivatives containing peptide bioactive which is proven to show the effect of antihypertensive, antioxidant, and bioactive other, which is beneficial for the health of human beings (Sánchez & Vázquez, 2017)

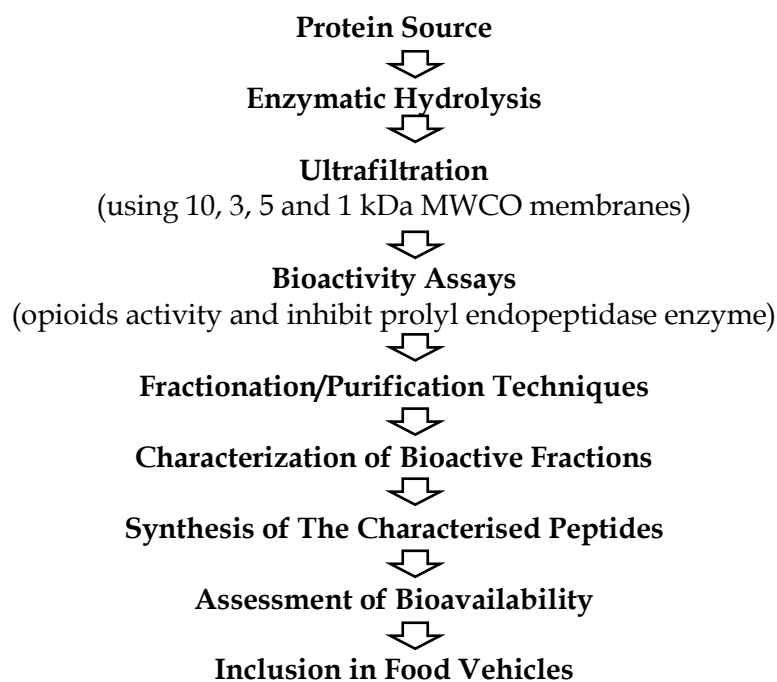


Figure 1. The production of Bioactive Peptides (Lafarga et al. 2014)

The Relationship Mental Health and Bioactive Peptides

According to WHO (2013), health mental is the condition of the welfare (well-being) an individual that is aware of its ability to own, can cope with the pressure of life which is normal, can work in a productive and able to give a contribution to the community. The classification of disorders health mental disorders mental according to the WHO, consists of a variety of problems, with

different symptoms. However, they are generally characterized by some combination of abnormal thoughts, emotions, behavior, and relationships with other people. Examples are schizophrenia, depression, disability intellectual, and disorder because of the abuse of drugs, disorders of affective bipolar, dementia, disability intellectual, and disorders of development, including autism (WHO, 2017).

According to Law Number 18 of the year 2014, in the context of the health of the soul, known two - terms for individuals who experience the disorder of the soul. First, People with problems of mental disorder is a person who has the problem of physical, mental, social, growth and development, and/or quality of life so that it has the risk of having a disorder of the soul. Second, people with mental disorders are the people who experience the disorder in the mind, behavior, and feelings that manifested itself in the form of a set of symptoms and/or changes in behavior that are meaningful, as well as can cause suffering and obstacles in the run function of the person as a human. Based on the data Research Health Foundation year 2013 is known to consist of disorders mental-emotional (depression and anxiety), and disorders of the soul weight (psychosis). The form of disorders of the soul of the other, namely postpartum depression and kill themselves (suicide). Disorders mental emotional or distress psychological is a state that indicates a person is experiencing change and psychological.

Peptides bioactive shows such as opioids and inhibit the activity of the enzyme prolyl endopeptidase (PEP, EC 3.4.21.26) that play a role important in the treatment of disorders of the mental because work on the system nerve central (CNS) and can give the effect of a positive on motivation, behavior, stress, control the intake of food or the perception of a sense of pain (Martinez-Alvarez, 2013). The enzyme PEP allegedly involved in the process of metabolism of hormones and neuropeptides are small such as oxytocin, neurotensin, arginine vasopressin, substance P, angiotensin, and bradykinin which affect the behavior of the social, emotional, memory, and stress (Momeni *et al.*, 2005). According to Khlebnikova *et al.*

(2012), inhibition of PEP can inhibit the degradation of neuropeptides, and based on research Moraines *et al.* (2002) proven to relieve the symptoms of behavioral depression or reduce the impairment of memory in rats. Hayes *et al.* (2015) stated that the inhibition of PEP using peptide bioactive potentially used in the treatment of disorders of the mental because peptide inhibitor of PEP proved capable of blocking peptide that crosses the blood-brain

Prevention of Mental Health Problems with Bioactive Peptides from Animal Protein Sources

Consume peptides bioactive has been proven to provide improved neuroprotective and cognitive with the effect of increasing attention, because of its ability to affect the cognitive and health mental in vitro and in vivo (Wang *et al.* 2021). Wang *et al.* (2018) reported that the use of the milk which has a peptide bioactive with sequence NIPPLIQTPVVVPPFLQPE as much as 2.4 mg/day increase the score total, score attention, and the score memory delayed the participants in the test RBANS; as much as 0.05, 50 and 500 nM/kg can improve the performance of the behavior. Administration of bovine β -lactotensin (with acidic amino acids sequence HIRL) using oral with a dose of 60 nmol/rat or 300-500 mg/kg enhance the consolidation of memory of rats in the test avoidance of inhibition of the type of step. The activity enhancement of the memory of the β -laktotensin is inhibited by antagonists of receptor dopamine D2 raclopride but not by antagonists of receptors of the D1 SCH23390. For together, β -laktotensin can enhance the consolidation of memory through the activation of receptors of the dopamine D2 (Ohinata *et al.*, 2007). Here are presented the results of research

peptide bioactive from the source of the health problems.
protein animal in preventing mental

Table 1. Peptide Bioactive from The Animal Protein Sources

The source of the protein	Bioactivity	Sequence Peptide to	The protein (Da)	Reference
Bovine brain (38-55 Glial fibrillary acidic)	PEP-Inhibitory	MPPPLPARVDFSLAGALN	-	Ohmori et al. (1994)
Bovine blood (Hemoglobin)	Opioid	YPWT	-	Brantl et al. (1986)
Bovine blood (Hemoglobin)	Opioid	LVVYPWTQRF, VVYPWTQRF	-	Piot et al. (1992)
Bovine and porcine (serum albumin)	PEP-Inhibitory	PPL	69,293 69,692	Lafarga et al. (2015)
Bovine and porcine (Hemoglobin subunit alpha)	PEP-Inhibitory	LPP	15,184 15,039	Lafarga et al. (2015)
Bovine and porcine (Myosin-2)	PEP-Inhibitory	APPH	223,319 223,150	Lafarga et al. (2015)
Bovine and porcine (Actin, alpha skeletal muscle)	PEP-Inhibitory	IPP	42,051 42,051	Lafarga et al. (2015)
Bovine (Collagen alpha-1 (I) chain)	PEP-Inhibitory	PPG	138,938	Lafarga et al. (2015)
Bovine (Collagen alpha-1 (I) chain)	PEP-Inhibitory	PPG	129,064	Lafarga et al. (2015)
Yogurt Like product with a starter of Lactobacillus helveticus CPN4	Opioid	YP	-	Chaudhary et al. (2021)
Raw Ewe's milk, Manchego cheese (Lactococcus lactis subsp. lactis (80%) and Leuconostoc mesenteroides subsp. dextransicum (20%))	Opioid	FP	-	Chaudhary et al. (2021)
WSE of commercial manchego cheese (ewe's milk)	Opioid	PFP	-	Chaudhary et al. (2021)
Water-soluble Extract (WSE) of commercial mahon cheese (cow milk)	Opioid	PQ	-	Chaudhary et al. (2021)
WSE of commercial mahon cheese (cow milk)	Opioid	PK	-	Chaudhary et al. (2021)

According to Tyagi et al. (2020), a variety of results of a meta-analysis that reported the utilization of bioactive peptides in clinical use animals try at system nervous (analgesia, antinosisseptif, and enhancement of memory), the function of the channel digestion

(the increase in the time of transit of the gut, the appetite to eat, and the emphasis consumption of fat are high), as well as eliminates a sense of pain and reduction of stress. Peptide opioids have been found in the 1970s and have very potential as a material functional for health.

Peptide opioid that is derived from the food shows the effects of anxiolytic and anti-stress which is beneficial in maintaining health. Piot (1997) reported that the product side of processed meat such as blood also is a source that is very good to produce peptides that showed activity such as opioids are known as Morfin, resulting from hemoglobin.

The method of fermentation and hydrolysis enzymatic proteins have been used in the area to release the bioactivity of the peptide is bioactive. Acidic amino acids of a variety of proteins of vegetable and animal can be a potential major source for the production of peptides bioactive. The effect depends on the stability in blood, binding, and the ability to cross the blood to the brain. Activity relative to opioid-dependent on his affinity to the receptors μ , δ , and κ and peptide opioids from a protein of animal tends to cling especially on the receptors μ . Most large research opioids from food focused on the preparation of the network which is much used, namely the vas deferens of mice and ileum of pigs, a unique receptor μ and δ his (Tyagi et al., 2020). During decades past, some peptide opioids such as LVVYPWT, LVVYPWTQRF, and LVVYPWTQQR were released of LVV-Hemorphin-4,6,7. The third peptide opioids are identified with YPWT the same in sequence with the property that is relatively stable, which may play a bioactive content with binding receptors opioids in the system, cardiovascular and brain (Collinder et al., 2005)

CONCLUSION

Peptides are bioactive, which comes from the proteins of animal potential in the prevention of problems health mental. Still a lot of opportunities in the business of exploration of the source of the protein of animal origin in addition of bovine, yogurt, and fresh milk in the yield of the product peptide bioactive for commercial.

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