

THE CORRELATION OF OMEGA 3 LEVELS WITH INTERLEUKIN-6 LEVELS IN A HEALTHY ELDERLY COMMUNITY RSMH PALEMBANG

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ABSTRACT

Ageing is associated with the geriatric syndrome, characterized by several health issues frequently associated with immunosenescence. In the elderly, immunosenescence is characterized by low-grade chronic systemic inflammation manifested as elevated levels of inflammatory molecular and cellular markers. One of the inflammatory markers is interleukin 6 (IL-6). In addition, omega-3 polyunsaturated fatty acids are a class of biologically active and anti-inflammatory fatty acids. This study aims to determine the relationship between omega-3 and interleukin-6 levels in the elderly in RSMH Palembang who are in good health. This investigation is a cross-sectional, analytic observational study. The sampling method employed was consecutive sampling. The participants in this study were members of the RSMH Palembang healthy elderly community who were 60 years of age or older. People who were malnourished, had severe illnesses like cancer or autoimmune diseases, or were taking Omega-3 supplements were not allowed in this study. As a result, 22 (55%) of 40 research subjects had low serum omega-3 levels. On the other hand, there were 35 (87.5%) samples with elevated serum IL-6 levels and 5 (12.5%) samples with normal IL-6 levels among the samples obtained. The correlation analysis showed that there was a strong negative correlation between the levels of serum omega-3 and interleukin 6 ($p = 0.005$). Omega 3 levels and interleukin-6 levels are correlated in the healthy elderly population of RSMH Palembang.

Keywords: Omega 3, Interleukin 6, healthy elderly

1. INTRODUCTION

The average life expectancy of a country's population is one of the indicators of its level of development. The results of national development have improved the community's social conditions and increased life expectancy, increasing the amount of elderly. According to the 2019 report on the global ageing population, the elderly population is growing. Globally, there were 703 million individuals aged 65 and older in 2019. The global elderly population is projected to increase by approximately 1.5 billion by 2050, or 312 million people, between 2019 and 2050.¹

According to the Indonesian Ministry of Health, Indonesia is entering a period of population ageing, characterized by an increase in life expectancy and an increase in the amount of elderly. Indonesia's elderly population increased from 18 million (7.56%) in 2010 to 25.9 million (9.7%) in 2019 and is projected to reach 48.2 million (15.77%) by the year 2035.² According to Govinda (PERGEMI, 2015), Elderly is not a disease but rather an advanced stage of a life process characterized by a decline in the body's capacity to adapt to environmental stress.

Regional Office for South-East Asia (SEARO) at the 30th Health Ministers Meeting agreed to include the Yogyakarta Declaration on Aging and Health 2012 as a priority health issue.³ Elderly is associated with the geriatric syndrome, characterized by the frequent occurrence of several health problems; these signs indicate a decline in body function in elderly, resulting from lifestyle and prior disease history. Indicators of the geriatric syndrome include diminished muscle function, muscle mass, bone mass, osteoporosis, accessible falls, weight loss, dementia, sleep deprivation, bladder disorders, delirium, diminished organ function, and immunity.⁴ At over 75 aged, muscle mass decreases by up to 0.80%-0.98% in men and 0.64%-0.70% in women annually.⁵⁻⁷

Often, ageing is accompanied by an increase in proinflammatory mediators such as interleukin 6 (IL-6), tumour necrosis factor-alpha (TNF), c-reactive protein (CRP), and interleukin-1 beta (IL-1), and a decrease in anti-inflammatory cytokines. Inflammatory conditions like interleukin 10 (IL-10).^{8,9} Low-grade inflammation associated with ageing is also known as immunosenescence or inflammageing and affects the immune system of the elderly. It can inhibit the immune response to infection, thereby increasing its susceptibility.¹⁰

Immunosenescence, or the ageing process of the immune system, refers to a decrease in immunity that makes individuals more susceptible to disease and increases morbidity and mortality. Immunosenescence is characterized by low-grade chronic systemic inflammation manifesting as elevated levels of inflammatory molecular and cellular markers. One of the inflammatory markers is interleukin-6 (IL-6).¹¹ One of IL-6's primary functions is to stimulate acute phase proteins. Acute phase proteins are

liver-made proteins produced during inflammation and metabolic stress.¹² Improving nutritional intake is one strategy that can be implemented to prevent, reduce, and postpone the decline of function in the elderly.¹³ Omega 3 polyunsaturated fatty acids are a family of biologically active, anti-inflammatory fatty acids. Omega 3 polyunsaturated fatty acids (PUFA) comprise α -linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA) (DHA). One of the mechanisms of action of omega 3 PUFAs as anti-inflammatory agents is the inhibition of NF-Kb activation, which reduces proinflammatory cytokines.¹⁴ This study seeks to determine the levels of omega-3 and interleukin-6 in the healthy elderly population at RSMH Palembang and their correlation.

2. METHOD

This research is an analytic observational study with a cross-sectional design. A consecutive sampling technique did sampling. The research subjects consisted of elderly who aged 60 years and members of the healthy elderly community of RSMH Palembang. Participants with malnutrition, acute illness including autoimmune conditions, liver disorders, kidney failure, malignancy, and taking Omega 3 supplements were excluded from this study. Then all subjects will be taken blood samples to check levels of Omega 3 and IL-6. Serum IL-6 levels were measured by ELISA method using a quantitative enzyme immunoassay in an accredited laboratory, with a normal value of 0.495-3.92 pg/ml. Serum Omega 3 levels were measured by the ELISA (Enzym Linked Immunosorbent Assay) method in an accredited laboratory with an increased limit of > 4 pg/ml and no increase of 4 pg/ml.

3. RESULT

This research was conducted at the Geriatric Internal Medicine Polyclinic, Dr Mohammad Hoesin Palembang, from November 2019 to November 2020. The population of this study was 40 subjects who met the inclusion criteria. Based on table 1, the general characteristics of the sample from 40 subjects consisting of 25 women (62.5%) and 15 men (37.5%), 22 (55%) subjects had low serum omega-3 levels and 18 (45%) normal levels. In addition, interleukin-6 levels in the sample were obtained from 35 (87.5%) samples with increased serum IL-6 levels, while 5 (12.5%) samples with normal levels.

Table 1. Subject characteristics (n: 40)

| Variables | N (%) | Mean ± SD |
|---------------|-----------|---------------|
| Gender | | |
| - Male | 15 (37.5) | |
| - Female | 25 (62.5) | |
| Omega | | |
| - Normal | 18 (45) | 4.258±1.509 |
| - Decrease | 22 (55) | |
| Interleukin 6 | | 39.734±16.762 |
| - Normal | 5 (12.5) | |
| - Increase | 35 (87.5) | |

Correlation analysis showed a significant correlation between serum omega-3 levels and interleukin-6 levels ($p < 0.005$) with a low negative correlation strength. This shows that the lower the serum omega-3 level, the higher the interleukin-6 levels.

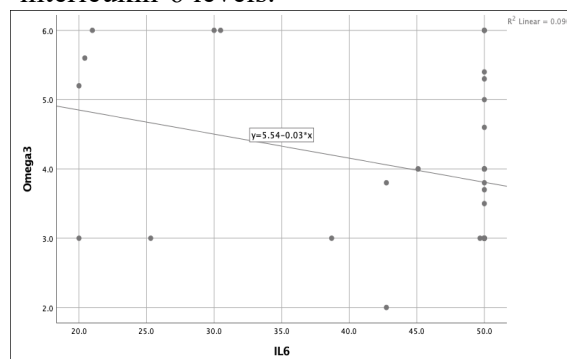


Figure 2. Analysis of the correlation between Omega-3 and IL-6 levels

4. DISCUSSION

This study investigated the correlation between omega-3 PUFAs and low-grade inflammation in healthy elderly. In research subjects, it was found that 55% of low omega-3 levels and 35% of increased interleukin-6 levels. Based on this, nutritional supplements (omega-3) can be used to reduce low-grade inflammation in the elderly. Omega-3 (n-3) is one of the two main classes of polyunsaturated fatty acids (PUFA) along with omega-6 (n-6 fatty acids). n-3 PUFAs are rich in certain foods such as flaxseed and fatty fish and dietary supplements such as fish oil. There are several different n-3 PUFAs, but most scientific research has focused on three: alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA). EPA, DHA and arachidonic acid are substrates in the synthesis of lipid mediators (e.g., eicosanoids) involved in the inflammatory process. In this process, immune mediators generated from DHA and EPA shift the immune balance to reduce inflammation.¹⁵ Meta-analysis Custodero et al. showed that probiotics and omega-3 supplements were efficacious in reducing inflammation as measured by IL-6 and CRP.¹⁶

According to Lina Tingo et al., higher doses of omega-3 may also be needed to see a positive effect in the elderly with mild chronic inflammation. However, there is a relationship between circulating ALA concentrations and inflammation.¹⁷ In an Italian study, an inverse relationship between plasma ALA and CRP was observed. However, no significant independent correlation between ALA and interleukin-6 was found, taking into account that CRP production is mainly regulated by interleukin-6.¹⁸ Several randomized controlled trials that have been conducted do not support a protective relationship

between ALA and inflammation (Geleijnse et al., 2010), suggesting that ALA does not have a significant role in protection against inflammation.¹⁹ Their unsaturated double bonds explain the anti-inflammatory properties of n-PUFAs-3 long chains. This binding can inactivate reactive oxygen species and prevent their interaction with both through inhibiting NF-Kb activation.²⁰

5. CONCLUSION

There is a negative correlation between omega-3 levels and interleukin-6 levels in the healthy elderly community of RSMH Palembang. The correlation shows that the lower the serum omega-3 level, the higher the interleukin-6 level.

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