

Ultraviolet Exposure to Energy Intake Synthesis of Vitamin D

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EMBRACING
SOCIETY 5.0
WITH HUMANITY

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Embracing Society 5.0 with Humanity

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***Embracing Society 5.0
with Humanity***

Embracing Society 5.0 with Humanity

Society 5.0 is a concept presented by the Japanese as a core concept of their economic system. They believed that technology should not surpass the intelligent of men. As such, in society 5.0 the Japanese government would like to ensure that all technological things are designed to be a human-centered design. In fact, their ministry of education in 2018 has also been readily prepared the future generation through a change in their education system. For example, the minister explains that in Japan, or many parts of the world, university entrance are divided into two main concentrations, which are science and social science. The minister thought of changing the system, as society 5.0 is about creating a technology that is human centered. For instance, they gave an example on designer babies. If, people from hard science learn about philosophy, ethics, and humanities, they won't face such ethical concern when developing a product. This is what is being envision by the Japanese government for their younger generation. Collaboration between science and social science is necessary to build a better environment for our future children. Another example is the companies in Japan, such as Hitachi and Fujitsu has already been implementing this 5.0 by designing product that relied fully on technology but puts human at its center (Hitachi, 2017).

Likewise, it is currently a hot topic in Indonesia. Indonesia as a country with the 4th largest population in the world has not been implemented this concept. Our country is still on the industry 4.0. Yet, with the rising interest in AI, Blockchain, NFT, number of unicorn start-up. and all recent technological changes, our country are ready to compete with any other countries in Southeast Asia. Society 5.0 is coming, and we need to embrace it. To prepare with the society 5.0, It is not only the technological side. It is necessary for us to have a strong principle at hearts that based on our belief system. We, as an Indonesian have known to be religious that most of us believed in God. We also commonly practice our religion and tend to be kind to people because we know God would love our good deeds. I personally think that this will help us to move forward and live together with advanced technology.

Technology begets a very important leap in human's life journey. It is important to keep valued of the benefit but it's more important to look out for the human itself. As its purpose is smarter than us, to help us, it will be very ideal if we embrace the technology using our ability to be kind.

Malang, 21 Maret 2022

Diah Karmiyati

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Ultraviolet Exposure to Energy Intake Synthesis of Vitamin D

Emillia Devi Dwi Rianti

Introduction

In early 2020, the novel coronavirus was identified, and the World Health Organization (WHO) officially stated that the disease that causes pneumonia is the SARS-CoV-2 (Severe acute respiratory syndrome coronavirus). (Corona Virus Disease 2019), due to the coronavirus that emerged at the end of December 2019 [1]. The spread of the Covid-19 virus is increasing until all countries in the world and WHO announce that Covid-19 is a pandemic disease. Indonesia is one of the countries that has been confirmed to have spread Covid-19 virus, the virus belongs to the betacoronavirus genus and has similarities to SARS. The immune response can determine the severity of Covid-19 infection, the severity factor of viral infection is the cytopathic effect of the virus and the ability to defeat the immune response. The spread of coronavirus starts from transmission animal to human and spread from human to human man. The spread that occurs in humans can be seen from the tests carried out with changes in the lungs, and the average number of lymphocytes and platelets shows lower results and is accompanied by hypoxemia.[2]

Infections caused by Covid-19 can result in death, according to the Centers for Disease Control and Prevention (CDC) which recommends that vitamin D can reduce infections from Covid-19. Respiratory tract infections, diabetes, cardiovascular and autoimmune disease are diseases of vitamin D3 deficiency [3]. Increased synthesis of vitamin D through fortification, vitamin D supplementation and through sun exposure can increase serum 25(OH)D. The relationship with the condition of sun exposure in summer, there is an increase in serum 25(OH)D compared to winter. Serum 25(OH)D above 30 ng/ml is found in areas near the equator that are exposed to sunlight. Decreased efficiency of calcium and phosphorus distribution which can increase parathyroid hormone (PTH) is caused by vitamin D deficiency. Vitamin D deficiency can increase the risk of insulin resistance [4].

The most important preventive measure for Covid-19 can be seen with macro and micronutrient status, this is related to two directions, namely between diet, nutrition, infection and the immune system. Vitamin D is a micronutrient that is very important for the

body's defense against pathogens. Effects against respiratory infections can be achieved with vitamin D protection, because serum vitamin D can provide very adequate supplementation against respiratory infections. The recognized antiviral, immunomodulatory and cardiometabolic effects of Vitamin D help fight Covid-19. Vitamin D in research can reduce the apoptosis of type II alveolar epithelial cells (pneumoocytes), stimulate surfactant synthesis in cells preventing severe lung injury such as ARDS [5]. Vitamin D may also have endothelial cell function, induction effects, autophagy (targeting intracellular pathogens), regulation of innate cytokines (eg, IL-1 β), as well as inhibition of pro-inflammatory cytokine production. Vitamin D supplementation based on clinical trials is reported to reduce the incidence of acute respiratory infections, the severity of the respiratory tract [6].

The benefits of vitamin D are useful for the body, this vitamin is obtained in the body and outside the body. Vitamin D is also known as sunshine, and starts from 7-dehydroxylase located in the epidermis and dermis which is transformed into active vitamin D caused by UV radiation B rays from the body. Vitamin D which is synthesized with the help of the sun becomes the main supply for the body, in the form of vitamin D will last longer than food sources [7]. The form of vitamin D has 2 forms, namely D2 (ergocalciferol) and vitamin D3 (cholecalciferol), for vitamin D3 produced by the body can also be obtained from supplements. Both vitamin D is synthesized from ultraviolet (UV) radiation, UV B light which is radiation can convert 7-dehydrocholesterol in the skin into active vitamin D. Vitamin D can be converted by the liver to 25-hydroxyvitamin D3 (25(OH)D3) and in the kidney to calcitriol (1,25(OH)2D3). Vitamin D in its activation is assisted by magnesium, then vitamin D together with minerals regulates phosphate and calcium for bone growth [8].

The wavelength range of ultraviolet (UV) light has a range of 400 nano meters to 100 nano meters, and in the X-ray and visible light ranges. Ultraviolet based on the wavelength is divided into three, namely; ultraviolet A or what is called black light which has a wavelength of about 380 nano meters to 315 nano meters, for ultraviolet B it is called a medium wave with a wavelength between 315 nano meters to 280 nano meters, and ultraviolet C or light waves. short wave which has a wavelength between 280 nano meters to 100 nano meters. Ultraviolet or UV light is an electromagnetic wave, and is solar radiation that reaches the earth's surface at a wavelength of 100 nm to 1 mn. Sunlight that has UV consists of UV A rays with a

wavelength (320-400nm) which reaches the earth's surface more than 90% and penetrates into the skin in the dermis (deep) layer of the skin, UV B with a wavelength (290-320) and 5% Among all UV, some are absorbed by the stratum corneum or the outermost layer of the skin and some are absorbed by the stratum corneum, some of which penetrate the dermis of the skin. The wavelength of ultraviolet C is 200 to 290 nm, but the radiation cannot reach the earth's surface [9].

The synthesis of vitamin D is influenced by the area of the body exposed to sunlight, the lower the solar energy, the lower the sun's exposure to the skin area, so the lower the risk of sun exposure. Vitamin D production of 10 g(400 IU) time required to reach based on MED is appropriate for Fitzpatrick type III, total area of exposure for skin is 600 cm² worth 1/3 of that. Minimal Erythema Dose (MED) has the understanding that it is used as a reference to find out how long it takes to sunbathe with a dose of UVB with the aim of obtaining the most optimal results in producing vitamin D, and reducing side effects that can be detrimental. If the alignment is doubled, then the area of the alignment is one thousand two hundred cm², and the time required is half of the time required by the skin area. The length of time required under short conditions is defined as the reduced risk of overexposure and maximum benefit [10].

Discussion

Currently, developing countries with one of them Indonesia is the fourth most populous country in the world. The condition of the high population in conditions when the coronavirus hit other countries, and quick steps were taken to escape and get out of the condition of the increasing number of Covid-19 sufferers by issuing travel restrictions from Hubei province, which is the center of the overall spread of Covid-19. A new disease that has not yet been identified spreading in humans is Coronavirus Disease 2019 (COVID-19). The beginning of transmission through animals to humans, with the corona virus being zoonotic and the condition based on transmission between animals and humans is unclear and uncertain.

Transmission that occurs between humans and humans, this virus is transmitted through coughing or sneezing (droplets), people who are close and in close contact with sufferers are at risk of contracting this disease. Based on the Indonesian Ministry of Health in 2020, people who treat Covid-19 patients can be infected. Infection with the Covid-19 virus has an impact on death, and based on

observations it can occur in patients who are elderly, have a history of diabetes, heart disease, and other chronic diseases. So there is an assumption based on differences in the strength of the body's immune system, so that in adulthood there will be a stronger immune system than the elderly. Death from the virus is generally a 'self-limiting disease' by relying on the patient's body's defense strength. The occurrence of a cytokine storm condition triggers a pathogenic immune response that results in multiple organ failure and death in Covid-19 cases.

Foreign substances that can enter the body can be restrained by the body's immune system or immune system. This form of attack can come from within the body or from outside the body. The cells of the host body that are attacked by the virus so that the body is infected by the virus that survives by multiplying or replicating in the host cell [11]. Then the immune system can be increased or suppressed, by giving immunomodulators which are compounds that are able to interact with the immune system so that they can increase or decrease immune response. Dosage or timing of certain compounds can decrease or increase the immune response. The condition of the Covid-19 pandemic requires immunostimulants to increase the body's ability to ward off viral infections. One of them is by increasing immunity by using vitamin D, it is explained that there is a positive relationship between vitamin D and Covid-19 infection. Epidemiological studies explain that low plasma vitamin D levels can lead to the occurrence or severity of viral infection in the human respiratory system, and demonstrate the important role of vitamin D in the prevention or treatment of respiratory tract infections.

Research has shown that 7-dehydroxylase is the origin of vitamin D, which is located in the epidermis and dermis layer which becomes vitamin D from the transformation process. It also explains that active vitamin D is caused by UVB radiation from the body. Ultraviolet (UV) radiation comes from the sun or the sun, by emitting various kinds of light, both visible and invisible. Visible sunlight is the light emitted with a wavelength of more than 400 nm, while the invisible sunlight has a wavelength ranging from 10 - 400 nm). Most of the rays that reach the earth's surface are infrared (56%), followed by visible light (39%), ultraviolet (UV): UVA (almost 5%) and UVB (0.1%). Ultraviolet (UV) light has a wavelength between 400 nm-100 nm and is located in the spectrum of X-rays and visible light. The use of ultraviolet light is based on the explanation that vitamins D2 and D3 are synthesized from UV light, with the process of changing 7-

dehydrocholesterol in the skin from exposure to UV B radiation, resulting in active vitamin D. Then vitamin D is converted by the liver to 25-hydroxyvitamin D₃ (25(OH)D₃) and in the kidney it is converted to calcitriol (1,25(OH)₂D₃) [9].

Control comes from the occurrence of processes and functions of lymphocyte cells derived from vitamin D, with this role it can regulate the occurrence of T cells so that vitamin D supports the activity of antibacterial and antiviral immunity. The levels of pro-inflammatory cytokines and the effectiveness of the immune response to infection are significantly reduced, which is due to vitamin D deficiency [12]. The occurrence of vitamin D₃ produced by 7-dehydrocholesterol in the skin, with the help of ultraviolet light or sunlight will be converted into pre vitamin D.

Then pre vitamin D undergoes thermal isomerization or further ultraviolet light irradiation to become vitamin D₃. So the use of ultraviolet in immune enhancement is needed to suppress the virus. With a wavelength of 290-320 nm from the use or utilization of sunlight by 5% obtained from UV B. The study looked at the effect of exposure to ultraviolet blight sourced from sunlight on the concentration of vitamin D (25(OH)D). The sun or the sun at UV B occurs at a time range from 07.00 am to 11.00 am, after 11.00 to 14.00 the intensity is relatively stable and high, then at 14.00 to 16.00 it decreases again like at 07.00. The time used at 09.00 is right for heating and it is done three times a week. 0.9.00 was used, because the intensity achieved was 0.6 MED/hour so that the exposure time was 25 minutes (1/4 x 1 MED/0.6 MED x 60 minutes)[13].

Conclusion

Ultraviolet (UVB) with a wavelength of 290-320 nm from 5% sunlight with an exposure time of 07.00 to 11.00 (1/4 x 1 MED/ 0.6 MED x 60 minutes) can produce vitamin D₃ which is obtained from 7-dehydrocholesterol in skin.

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EMBRACING SOCIETY 5.0 WITH HUMANITY

Society 5.0 is a concept presented by the Japanese as a core concept of their economic system. They believed that technology should not surpass the intelligent of men. As such, in society 5.0 the Japanese government would like to ensure that all technological things are designed to be a human-centered design. In fact, their ministry of education in 2018 has also been readily prepared the future generation through a change in their education system. For example, the minister explains that in Japan, or many parts of the world, university entrance are divided into two main concentrations, which are science and social science. The minister thought of changing the system, as society 5.0 is about creating a technology that is human centered. For instance, they gave an example on designer babies. If people from hard science learn about philosophy, ethics, and humanities, they won't face such ethical concern when developing a product. This is what is being envision by the Japanese government for their younger generation. Collaboration between science and social science is necessary to build a better environment for our future children. Another example is the companies in Japan, such as Hitachi and Fujitsu has already been implementing this 5.0 by designing product that relied fully on technology but puts human at its center (Hitachi, 2017).

Likewise, it is currently a hot topic in Indonesia. Indonesia as a country with the 4th largest population in the world has not been implemented this concept. Our country is still on the industry 4.0. Yet, with the rising interest in AI, Blockchain, NFT, number of unicorn start-up, and all recent technological changes, our country are ready to compete with any other countries in Southeast Asia. Society 5.0 is coming, and we need to embrace it. To prepare with the society 5.0, It is not only the technological side. It is necessary for us to have a strong principle at hearts that based on our belief system. We, as an Indonesian have known to be religious that most of us believed in God. We also commonly practice our religion and tend to be kind to people because we know God would love our good deeds. I personally think that this will help us to move forward and live together with advanced technology.

Technology begets a very important leap in human's life journey. It is important to keep valued of the benefit but it's more important to look out for the human itself. As its purpose is smarter than us, to help us, it will be very ideal if we embrace the technology using our ability to be kind.

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