PROCEEDING
5th International Conference of Health Polytechnic of Jambi 2025
icon@poltekkesjambi.ac.id
http://journal.poltekkesjambi.ac.id/index.php/ICoHPJ
doi.org/10.35910/icohpj.v5i0

VITAMIN D IS RICH IN BENEFITS THAT ARE A PRIORITY IN THE DISEASE: LITERATURE REVIEW

Nayaka Alghany Ismu Arif[1], Alliya Rizkia Syam Nirwana[1], Dona Muin[2,3*]
[1]Islamic Schol Nurul Ilmi, Jambi, Indonesia
[2]Department of Pharmacy, Polytechnic Ministry of Health, Jambi Province, Indonesia
[3]PUI-PK Polytechnic Ministry of Health Jambi Province, Indonesia
Corresponding author: donamuin@yahoo.com

ABSTRACT

***Background**: Research on literature studies that explain the importance of vitamin D as an important factor supporting prevention, control, and even maintenance to survive the Disease attack.*
***Methods**: In this study, the authors conducted a literature review to gather various valid results regarding the importance of vitamin D in our lives, especially to prevent the major threats that occur with infection with the disease virus. In this study, the authors reviewed articles published from 2008 to 2021 through the electronic databases used to identify relevant research, namely Science Direct, PubMed, and Google Scholar, which were restricted to publications from 2008 to 2021. The electronic search database found 60 articles. while only 17 studies were used as articles for the research objectives.*
***Results**: From this study, the authors collected research data regarding the benefits of vitamin D as a major supporting factor in the healing of diseaseinfection including avoid the occurrence of cytokine storms and not only that, the authors also revealed threat events that occur if the body is deficient in vitamin D which causes the threat to the cardiovascular system, lungs, kidneys, even heart, rheumatoid arthritis, and even excess Vitamin D causes effects including hypercalcemia.*
***Conclusion**: The use of vitamin D as the main therapy to support prevention, healing, and health maintenance to protect against Disease infection is very feasible so that quality of life during and after the Disease can be maintained.*

***Keywords**: Vitamin D, disease, therapy, literature*

INTRODUCTION

Vitamin D, also known as calciferol, is a group of fat-soluble pro-hormone vitamins. To make it easier to understand, the author explains lightly that in the body, this vitamin have the ability to act as a formative of good bone and tooth structure. However, current attention is far from discussing the benefits of vitamin D for bones also teeth, because now it is also known that vitamin D is a fat-soluble vitamin, which means that vitamin D can last for a long time in our body. There are two main types of vitamin D, namely vitamin D2 and vitamin D3. Vitamin D2 (ergocalciferol) comes from plants and can be found in several types of mushrooms. Meanwhile, vitamin D3 (cholecalciferol) is found in fish, fish oil, egg yolks, and sunlight. Vitamin D itself can be formed naturally when the skin is exposed to direct sunlight. Vitamin D3 is produced non-enzymatically when the cholesterol precursor 7-dehydrocholesterol is exposed to UV-B from sunlight; that is, all cholesterol-synthesizing species, including humans, can make vitamin D3 (Carlberg & Velleuer, 2021). The discussion of vitamin D in this study is not only about the benefits but also includes things that can happen if the body has a deficiency or even an excess of vitamin D. Vitamin D3 is produced non-enzymatically, when cholesterol precursor 7-dehydrocholesterol is exposed to UV-B from sunlight, that is, all species that synthesize cholesterol, including humans, can make vitamin D3.

METHOD

A reference review is carried out to explore relevant research.

2.1. Study Identification

Three electronic data media, namely PUBMED, Science Direct, and Google Scholar, were first searched in October 2021. The search terms used are summarized in Table 1. The Additional articles were identified through reference tracking.

Table 1. Summarize Database Search

No	Database	Search Term
1	PUBMED	Vitamin D, Vitamin D and immune
2	Science Direct	Vitamin D, Disease
3	Google Scholar	Vitamin D, Vitamin D, and Disease

2.2. Data Extraction

Data were extracted independently by a study using a form of data extraction including research details to obtain relevant studies regarding the ability of vitamin D in the treatment against the disease virus.

RESULTS AND DISCUSSION

A review of the literature review to obtain a discussion of research that is relevant to the needs of the importance of vitamin D as an important factor supporting prevention, overcoming, and even maintenance to survive the Disease attack is very feasible to do. It is known that infection and transmission of the Disease can pose a major threat to the quality of human life, aggravated by the increasing number of variant mutations of the virus, forcing us to always fortify ourselves with good immunity, even though vaccines remain a priority.

3.1 Characteristic studies

Several articles show that research on vitamin D is not only related to the benefits of this vitamin as a protective factor for the body but also discusses the events that will arise if the body experiences a deficiency or even excess vitamin D. In this article, the author tries to narrow the discussion by tracing the results. Research can be the basis for considering the importance of vitamin D for our bodies. The studies reviewed were from Australia, Bahrain, Cairo, California, China, Finland, India, Iran, Israel, London, Iowa, San Diego, Texas, and Turkey. Some of these studies conducted several experiments and assessed data validity. However, not all have described their research in detail. For this reason, the researcher extracted the articles by first determining the inclusion criteria through the title, extraction, and full text as described in Table 2.

Table 2. Characteristics of Studies

No	Author/Year	City/Country	Research Design	Results
1	Aibana, O., dkk/2019	Texas, United Kingdom	Cohort Study	Functions of vitamin D to reduce the risk of TB disease.
2	Ali Rm, et al /2018	Cairo University, Egypt	Original Study	Reduction of renal disease or ischemia severity as a cause of reperfusion in mice treated with Vitamin D and pioglitazone
3	Amirkhiz, et al./2021	Zabol University of Medical Sciences, Zabol, Iran	Cross-sectional Study	Hypertensive obese patients who have low vitamin D levels may be at risk of high hs-CRP
4	Hatice Aygun/2020	Tokat, Turkey	Letter Communication	Vitamin D is an immunomodulatory hormone that can reduce the threat of inflammation and infection and has a fairly good safety profile; besides that, it also protects and saves from damage caused by exposure to the coronavirus

No	Author/Year	City/Country	Research Design	Results
5	Booeshaghi A & Pachter L./2020	California, United States	Original Study	Vitamin D decreases ACE expression in rat lung
6	Butler, et al /2021	Royal College of Surgeons in Ireland, Bahrain, Adliya, Bahrain	Cross-sectional Study	Vitamin D deficiency increases cardiovascular risk and susceptibility to infectious agents, such as disease
7	Carlberg, C., & Velleuer, E./2021	Finland	Literatur review	Effects of vitamin D on the epigenome and transcriptome of stromal and tumor cells, interindividual variation in vitamin D response and its relationship to cancer prevention and possible therapy.
8	Fraser/2021	Australia	Theoretical article	The sun's UV rays induce vitamin D formation in the skin, and surveys have shown that vitamin D status is determined primarily by this method. The amount of vitamin D produced in the skin is far more than that which can be obtained from natural foods
9	Hansdottir S, et all (2008).	Lowa City	Original article	Inactive vitamin D becomes active, altering immune function in the lungs
10	Jiang JS, et all (2020)	California, United States of America	Original research	Neonatal hyperoxia increases pulmonary expression of 8-hydroxy-2'-deoxyguanosine (8-OHG). Neonatal hyperoxia reduces lung expression of superoxide dismutase (SOD1. Cathelicidin reverses hyperoxia-induced changes in 8-OHdG and SOD1 expression. Cathelicidin evades the threat of hyperoxia-induced impaired alveolar and vascular development. Cathelicidin reduces hyperoxia-induced lung injury by inhibiting oxidative stress.
11	Lin, M., et al (2016)	Hubei China	Original research	Calcitriol reduces proteinuria in diabetic rats without affecting calcium-phosphorus metabolism. The levels of ACE and ACE2 were significantly increased in diabetic rats compared to control rats.
12	Mohareb, et al (2020)	San, Diego	Original article	Inhibition of RAS may reduce the effects of the toxic over-accumulation of angiotensin II that induces acute respiratory distress syndrome and fulminant myocarditis.
13	Peterson CA &Heffernan ME. (2008).	London	Original article	Serum 25(OH)D status was inversely related to TNF- concentrations in healthy women, which may partly explain this role of vitamin K in the prevention and healing of inflammatory diseases.
14	Sinaci, S., et al (2021).	Ankara, Turkey	Original article	Low vitamin D levels in pregnant women with disease. There is a significant difference in terms of the severity of the disease. Maintenance of adequate vitamin D levels could be

No	Author/Year	City/Country	Research Design	Results
				useful as an approach to the prevention of aggressive inflammation caused by this novel coronavirus in pregnant women.
15	Talmor Y, et al (2008)	Israel	Original article	Inhibitory effect of calcitriol on pro-inflammatory parameters: adhesion molecule, RAGE, and IL-6.
16	Ul Afshan, F., et al (2021)	India	Original article	Vitamin D is a mainstay in avoiding various threats caused by the coronavirus
17	Yanrong L, et al (2006).	China	Original article	Higher ACE2 in young adults compared to older age groups may contribute to the predominance of SARS

Furthermore, the data were independently extracted by researchers using a form of data extraction, including research details showing that research on vitamin D is not only related to this vitamin as a protective barrier factor for the body, but also discusses events that will occur if the body experiences a deficiency or even excess vitamin D.

3.2 Vitamin D deficiency and excess

Currently, vitamin D is a topic of discussion and priority for use and research regarding its ability to protect the body, including against disease-causing viruses. This vitamin, which is rich in benefits can be based on many studies. However, vitamin D deficiency also causes many risks that will arise (Amirkhizi et al., 2021) revealed that Vitamin D has a good role in cardiovascular disease in adults, where the threat of cardiovascular disease complications will occur if the body is deficient in vitamin D.

In addition, low vitamin D status is a precipitating risk, especially for colon, prostate, breast, and leukocyte cancers (Carlberg & Velleuer, 2021). Vitamin D deficiency is a negative endocrine modulator of the renin-angiotensin system (RAS), and PCOS women are often vitamin D deficient, leading to RAS overactivation in PCOS. Decreased plasma ACE2 levels were seen in vitamin D deficiency in non-PCOS controls, which may predispose these vitamin D-deficient subjects to increased cardiovascular risk and susceptibility to infectious agents, such as disease, where this is a risk factor (Butler et al., 2021).

In kidney disease and diabetes, the role of vitamin D is also great because it has been revealed that vitamin D has been shown to inhibit the expression of ACE2 in the kidneys. diabetes and protect the kidneys (Ali RM et al., 2018; Aygun, 2020; Lin M et al., 2016).

However, continuous intake of large amounts of vitamin D can cause hypercalcemia toxicity (Aibana et al., 2019; Fraser, 2021) explained through their research that vitamin D can be used as a threat predictor factor for TB disease by showing that the threat of TB disease is highest among HIV-positive people with severe vitamin D deficiency.

3.3 Benefits of vitamin D

The rich benefits that vitamin D has for the human body are something that deserves to be discussed. Besides being interesting in research, its current use is a breakthrough that was not previously thought to be a supporting solution in the prevention and control of the disease virus.

In cancer therapy, rapidly growing immune system cells, as well as malignant tumor cells, depend on comparable genes and pathways, some of which are modulated by vitamin D. Therefore, vitamin D has anti-cancer effects either directly through controlling the differentiation, proliferation, and apoptosis of neoplastic cells and indirectly through the regulation of immune cells that are

included in the malignant tumor microenvironment. This paper describes the effectiveness of vitamin D on the epigenome and transcriptome of stromal cells and tumors, inter-individual variation in vitamin D responsiveness, and its relationship to cancer prevention and possible therapy (Carlberg & Velleuer, 2021).

In the role of vitamin D during the disease endemic, several studies have shown that it is clear that new findings from vitamin D suggest that together with the regulation of cell growth, the neuroprotective effect of vitamin D can regulate immune responses and modulate the cytokine Interleukin-6 (IL-6). which works to induce inhibitory factors carried out by progesterone (PIBF), considering that IL-6 levels are very high in disease patients which can lead to an increase in excess complications in patients. Vitamin D can be an inhibitor of the angiotensin-converting enzyme (ACEII), which is the way the Disease enters cells. Most of the research results explain the ability of Vitamin D in preventing the occurrence of disease complications, including in patients with comorbid conditions, neurological manifestations, and immunological aspects, making vitamin D the best choice as supportive therapy for the healing of Disease infection. Incorporating Vitamin D as an adjunct therapy in the management of disease can help stop the infection and reduce the threat of infectious disease (Ul Afshan et al., 2021). In a study conducted by Yanrong et al. (2006), the presence of vitamin D is very important for patients with cardiovascular disease, especially in the elderly and men. The increase in ASCII expression is very thin in the elderly and men; this is, of course, likely to lead to the possibility of severe complications in disease infection in male patients and the elderly (Booeshaghi A & Pachter L, 2020; Jiang JS et al., n.d.; Yanrong L et al., 2006). Even so, vitamin D supplementation has been shown to reduce the threat of ARDS, myocarditis, or heart injury in patients infected with the Disease(Mohareb AM et al., 2020).

Research on the ability to complete vitamin D as a supporting effort in fighting the Disease has also found that sufficient amounts of vitamin D in pregnant women are very useful in helping with active vitamin D in preventing bad inflammation for pregnant women who experience the Disease attack (Sinaci et al., 2021). Supplying an amount of vitamin D to pregnant women can help protect pregnant women in defending against the disease virus. For this reason, it is recommended to consume vitamin D or to activate vitamin D in the body of pregnant women.

In the threat of complications leading to the lungs, vitamin D was promoted as a factor that can reduce the threat after infection with the disease virus, infection with the ability of vitamin D to induce the production of cathelicidin and defensins, which can reduce the survival and replication of viruses, including the Disease(Aygun, 2020; Hansdottir S et al., 2008; Jiang JS et al., 2008.).

In severe complications, the presence of vitamin D cannot be taken lightly; the ability of vitamin D to prevent cytokine storms when infected with the Disease has been widely demonstrated (Aygun, 2020; Peterson CA & Heffernan ME, 2008; Talmor Y et al., 2008).

CONCLUSION

Thus, in addition to excess vitamin D, which is at risk of hypercalcemia, Vitamin D deficiency can increase the threat of diseases, including cardiovascular disease, lung, kidney, and even cancer. Vitamin D deficiency also poses a threat of expanding the area infected with the disease virus. In other words, decreasing serum vitamin D levels can improve clinical outcomes in patients with Disease infection, and increasing serum vitamin D levels can improve clinical outcomes in patients. For that reason, in healing using vitamin D as the main therapy, supporting

treatment can increase the success of the treatment to fight the Disease infection.

ACKNOWLEDGMENT

The author is very grateful for the compilation of this literature review. This literature review is supported by the Department of Pharmacy library, Polytechnic Ministry of Health, Jambi Province, Indonesia.

CONFLICT OF INTEREST

The authors declare that there are no competing or potential conflicts of interest.

REFERENCES

Aibana, O., Huang, C.-C., Aboud, S., Arnedo-Pena, A., Becerra, M. C., Bellido-Blasco, J. B., Bhosale, R., Calderon, R., Chiang, S., Contreras, C., Davaasambuu, G., Fawzi, W. W., Franke, M. F., Galea, J. T., Garcia-Ferrer, D., Gil-Fortuño, M., Gomila-Sard, B., Gupta, A., Gupte, N., … Murray, M. B. (2019). Vitamin D status and risk of incident tuberculosis disease: A nested case-control study, systematic review, and individual-participant data meta-analysis. *PLOS Medicine*, *16*(9), e1002907. https://doi.org/10.1371/journal.pmed.1002907

Ali RM, El-Abhar HS, Helmy MW, & Al-Shorbagy MY. (2018). Role of Wnt4/β-catenin, Ang II/TGFβ, ACE2, NF-κB, and IL-18 in 2019 Novel Coronavirus in Wuhan, China. *Lancet, 395(10223)*, 497–506.

Amirkhizi, F., Pishdadian, A., Asghari, S., & Hamedi-Shahraki, S. (2021). Vitamin D status is favorably associated with the cardiovascular risk factors in adults with obesity. *Clinical Nutrition ESPEN*. https://doi.org/10.1016/j.clnesp.2021.10.003

Aygun, H. (2020). Vitamin D can prevent disease infection-induced multiple organ damage. *Naunyn-Schmiedeberg's Archives of Pharmacology, (2020) 393:1157 1160*. https://doi.org/10.1007/s00210-020-01911-4 (2020) 393:1157–1160

Booeshaghi A & Pachter L. (2020). *Decrease in ACE2 mRNA Expression in Aged Mouse Lung*. https://doi.org/10.1101/2020.04.02.021451

Butler, A. E., Moin, A. S. M., Sathyapalan, T., & Atkin, S. L. (2021). Vitamin D association with the renin angiotensin system in polycystic ovary syndrome. *The Journal of Steroid Biochemistry and Molecular Biology*, *214*, 105965. https://doi.org/10.1016/j.jsbmb.2021.105965

Carlberg, C., & Velleuer, E. (2021). Vitamin D and the risk for cancer: A molecular analysis. *Biochemical Pharmacology*, 114735. https://doi.org/10.1016/j.bcp.2021.114735

Fraser, D. R. (2021). Vitamin D toxicity is related to its physiological and unphysiological supply. *Trends in Endocrinology & Metabolism*, *32*(11), 929–940. https://doi.org/10.1016/j.tem.2021.08.006

Hansdottir S, Monick MM, Hinde SL, Lovan N, Look DC, & Hunninghake GW. (2008). Respiratory epithelial cells convert inactive vitamin D to its active form: Potential effects on host defense. *J Immunol, 181: 7090–7099.*

Jiang JS, Chou HC, & Chen CM. (n.d.). Cathelicidin attenuates hyperoxia-induced lung injury by inhibiting oxidative stress in newborn rats. Free

Rad Biol Med 150:23 29. *Free Rad Biol Med, 150:23 29*, 2020.

Lin M, Wu X, Shui H, Li Y, Li M, He L, Zhao T, & Gao P. (2016). Calcitriol Regulates Angiotensin-Converting Enzyme and Angiotensin-Converting-Enzyme 2 in Diabetic Kidney Disease. *Mol Biol Rep, 43(5):397–406.*

Mohareb AM, Cohen JB, Brown TS, Harhay MO, & Hanff TC. (2020). Is there an association between disease mortality and the renin-angiotensin system–a call for epidemiologic investigations. *Clin Infect Dis Ciaa329*. https://doi.org/10.1093/cid/ciaa329

Peterson CA & Heffernan ME. (2008). Serum Tumor Necrosis Factor-Alpha Concentrations are Negatively Correlated with Serum 25(OH)D Concentrations in healthy women. *J Inflamm (Lond)*, 5:10.

Sinaci, S., Ocal, D. F., Yucel Yetiskin, D. F., Uyan Hendem, D., Buyuk, G. N., Goncu Ayhan, S., Tanacan, A., Ozgu-Erdinc, A. S., Moraloglu Tekin, O., & Sahin, D. (2021). Impact of vitamin D on the course of disease during pregnancy: A case control study. *The Journal of Steroid Biochemistry and Molecular Biology*, *213*, 105964. https://doi.org/10.1016/j.jsbmb.2021.105964

Talmor Y, Bernheim J, Klein O, Green J, & Rashid G. (2008). Calcitriol Blunts Pro-Atherosclerotic Parameters Through NFkappaB and p38 in Vitro. *Eur J Clin Invest, 38:548 554*.

Ul Afshan, F., Nissar, B., Chowdri, N. A., & Ganai, B. A. (2021). Relevance of vitamin D3 in infectious disease. *Gene Reports*, *24*, 101270. https://doi.org/10.1016/j.genrep.2021.101270

Yanrong L, Furong Z, Xingxiang W, Junzhu C, & Xudong X. (2006). Age and Gender-Related Differences of ACE2 Expression in Rat Lung. *Life Sci, 78(19)*, 2166–2171.