130 - THE BENEFITS OF VITAMIN D FOR THE POPULATION: A CURRENT REVIEW

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INTRODUCTION

The activity of vitamin D3 or cholecalciferol in metabolic processes has been researched since the 17th century, and was awarded the Nobel Prize in 1938. It is well known for its role in the development and maintenance of bone tissue, as well as the maintenance of normal homeostasis of calcium and phosphor. However, recent evidence suggests the involvement of this vitamin in several vital cellular processes, such as cell differentiation and proliferation, hormonal secretion, as well as in the immune system and in several chronic non-transmissible diseases. (SCHUCH, GARCIA and MARTINI, 2009)

Vitamin D deficiency is a common finding in our adult population, due to a combination of factors such as decreased intake and absorption, limited exposure to sunlight, time of year, latitude, skin pigmentation, medications, age and use of sunscreens, which are situations that influence skin production. (BANDEIRA et al, 2006; BURKIEWICZ et al, 2012)

The aim of this study was to investigate new researches concerning the benefits obtained through vitamin D for the general population.

METHODOLOGY

This study was built through the collection of data found in the literature between 2005 and 2016. Bibliographic research was carried out through national and international physical and on-line books, scientific articles presented in Scielo, Lilacs and Pubmed databases.

PHYSIOLOGY AND METABOLISM OF VITAMIN D

Vitamin D, or cholecalciferol, is a steroid hormone which main function is to regulate calcium homeostasis, bone formation and re-absorption through its interaction with the parathyroid, kidneys and intestines. (Marques et al, 2010)

In most individuals, cutaneous synthesis is the main source of vitamin D, followed by the supplements and dietary sources, which can only contribute at a small portion of the daily needs. After the dermal synthesis through exposure to ultraviolet B radiation, ie. the 7-dehydrocholesterol presented in the dermis and epidermis, is changed into vitamin D3. Thus this non-metabolically active form is transported to the liver, bound to the binding protein thereof (BPD). In the liver, the first hydroxylation occurs for 25 (OH) D or calcidiol, which will be secreted into the plasma and stored in adipose tissue. To become active, 25 (OH) D is metabolized by the enzyme 25-hydroxyvitamin D 1 alpha-hydroxylase (CYP27B1) in the kidney, in order to form 1,25 (OH) 2 D3 or calcitriol. The production of this metabolite is mainly controlled by the concentration of parathyroid hormone (PTH), serum calcium and phosphorus. Calcitriol is a very potent hormone that circulates in concentrations about 1000 times lower than its precursor, calcidiol (SCHUCH, GARCIA and MARTINI, 2009, PEDROSA AND CASTRO, 2005).

Castro (2011) stated that there are two variables are needed for this process of vitamin D activation to begin:

1. It is necessary for the individual to receive direct sunlight, specifically ultraviolet B (UVB) radiation at wavelengths between 290 and 315 nanometers. As a result of the axis position, in which the Earth translates around the sun, the more a place is away from the Equator, the greater the thickness of the atmospheric layer the sunlight must cross is, which causes attenuation at various wavelengths, among them, the UVB radiation. This angle of sunlight incidence on the Earth (zenite solar) also changes throughout the seasons, being higher in the winter months, when the amount of UVB rays that reach the Earth's surface is smaller. Thus, the amount of UVB rays that reach the individuals' skin is an inverse function of latitude and is lower in the winter months.

2. The amount of melanin in the individual's skin is another variable that is involved in this initial stage of vitamin D activation. This pigment also competes for the photon of UVB radiation at wavelengths between 290 and 315 nm, decreasing the availability of photons to the photolysis of 7-DHC.

GENERAL RECOMMENDATIONS FOR THE SUPPLEMENTATION OF VITAMIN D

According to Holick (2010), in 1995 there was little relevant research on vitamin D recommendations; most literature published in the 1940s and 1950s showed that 100 IU of vitamin D would prevent rickets in children and therefore it was thought that by doubling the vitamin D dose (200 IU) would be an effective and safe way of preventing childhood rickets. However, rickets is the most extreme manifestation of vitamin D deficiency. Before 1997, when the Institute of Medicine of the United States (IOM) published new recommendations, the suggestion was 200 IU for everyone, and determined that there was not enough evidence to establish any recommendation for a daily dose of vitamin D. However, many experts now agree that both children and adults need a minimum of 1,000 IU of vitamin D per day (and preferably 2,000 IU) to maintain 25-vitamin D, which is considered healthy, that is, above 30 nanograms per milliliter of blood.

Pludowski et al (2013) state that a panel of experts from Central Europe have drafted new vitamin D recommendations for Central Europeans. The panel, led by Dr. Paweł Płudowski, from the Children's Health Memorial Institute, includes more than 30 international researchers, scientists and doctors, many of whom are from Poland. And, evidence of low vitamin D status led the panel to set new recommendations. The intention is that those guidelines would be adopted and used by central European governments, organizations, doctors and public health groups:

General recommendations:
Infants 0-6 months: 400 IU / day;
Children 6-12 months: 400-600 IU / day;
Children / Adolescents: 600-1,000 IU / day;
Adults: 800-2,000 IU / day;

Pregnant women: 1,500-2,000 IU / day;

Recommendations for people at risk:
Premature infants: 400-800 IU / day;
Obese children: 1,200-2,000 IU / day;
Obese adults: 1,600-4,000 IU / day;
Night workers: 1,000-2,000 IU / day;

UPDATES: BENEFITS OF VITAMIN D SUPPLEMENTATION

Vitamin D controls more than 200 genes both directly or indirectly, including those responsible for regulating cell proliferation, differentiation, apoptosis, and angiogenesis. It is known that several extra-bone effects of vitamin D - such as those in local control (regulation of cells in various tissues and in the epidermis) - are done through the performance of growth factors and cytokines. (BURKIEVCZ et al, 2012)

Pludowski et al. (2013) reviewed evidence of the vitamin D health benefits as one of the results of a Vitamin D Conference involving more than 500 people in Warsaw, Poland, held in October 2012. The evidence analyzed was mainly from observational studies. They found that "Adequate vitamin D status appears to be protective against musculoskeletal diseases (muscle weakness, falls, fractures), infectious diseases, autoimmune diseases, cardiovascular diseases, type 1 and type 2 diabetes mellitus, various types of cancer , neurocognitive dysfunctions and mental illnesses, as well as other diseases, infertility, adverse pregnancy and birth outcomes. Vitamin D deficiency / insufficiency is associated with all-cause mortality. "This work served as the basis for the recommendation of serum 25 (OH) D levels of at least 30 ng / ml (75 nmol / l) for Central and Eastern Europe.

IMMUNOMODULATORY EFFECT OF CALCITRIOL

From a study conducted by Nashold et al (2015), a dose of calcitriol plus vitamin D3 (calcitriol / + D) as a treatment of demyelinating disease in experimental autoimmune encephalomyelitis (EAE). The proof that deficits via receptor calcitriol-vitamin D may promote MS, and data show calcitriol improvement of autoimmune T-cell apoptosis. Considering only vitamin D3 was ineffective, calcitriol / D + increased Transiently central nervous system (CNS) Helios (+) FoxP3 (+) T cells and sustainably decreased CNS T cells, pathology and neurological deficits in rats with EAE. Calcitriol / + D, which was more effective than methylprednisolone, has the potential to reverse demyelinating inflammatory disease safely and economically (NASHOLD, 2015).

DIABETES TYPE 1

A study conducted in Finland has shaken the medical community by confirming what many doctors believed to be the relationship between vitamin D and diabetes. The study tracked more than 12,000 babies born in 1966. There was a nearly 80% reduction in the risk of diabetes occurrence for infants who received 2,000 IU of vitamin D supplementation during the first year of life, when compared to infants who did not received the supplement. Lead researcher Dr. Eliana Hypponen has followed the medical records of these children for 31 years. Children with vitamin D deficiency and rickets had a 2.4-fold increased risk of developing type 1 diabetes. In 2008, the Garland brothers participated in a team of researchers who looked at the global pattern of diabetes according to latitude and the strength of solar UVB radiation. The results confirmed the geographical trend of diabetes. Individuals living in sunny climates tend to have a lower risk of type 1 diabetes. On the other hand, the incidence of diabetes in regions with limited sunlight is greater. The disease is very rare in equatorial regions. In addition, the researchers confirmed that children who had unsatisfactory vitamin D levels or whose mothers had vitamin D deficiency were more likely to develop type 1 diabetes (HOLICK, 2012).

In a study carried out by Lopes (2012), 146 patients were evaluated, 59 with diabetes. Serum levels of vitamin D were analyzed by antibody-based radioimmunoassay with specificity for 25-hydroxyvitamin D. The results showed that patients with heart failure who had diabetes and vitamin D deficiency, had worse functional capacity and lower muscle strength than those without diabetes and without vitamin D deficiency.

Another study, carried out by Mohammadian et al (2015), glycemic changes and serum vitamin D levels were evaluated after the supplementation of 300,000 IU of Vitamin D3 in children with DM1. The results showed significant improvements in glycated hemoglobin (HbA1c) and serum levels of vitamin D, concluding that the serum elevation of vitamin D showed improvements in the glycemic control of children with DM1.

CANCER

The identification of the vitamin D receptor (VDR) in the vast majority of cells, and the recognition that some cells are capable of producing active forms of vitamin D have shown evidence of the influence of this vitamin on the pathogenesis of other chronic diseases, as well as osteometabolic diseases, such as Diabetes, cardiovascular diseases, autoimmune diseases, infectious diseases and cancer. Vitamin D exerts direct or indirect actions on more than 200 genes involved in cell cycle regulation, differentiation, apoptosis and angiogenesis, promoting or inhibiting the proliferation of normal or neoplastic cells.

The identification of VDR expression in most cells and the discovery that some cells also have enzymatic mechanisms to produce active forms of vitamin D have shown evidence of the influence of this vitamin in the pathogenesis of some neoplasms (BONETI AND FAGUNDES, 2013).

MULTIPLE SCLEROSIS

Multiple sclerosis (MS) is an autoimmune disease, mediated by T lymphocytes, of uncertain etiology. Although genetic susceptibility may be involved, epidemiological studies suggest environmental influence because the development of MS correlates strongly with the ascending latitude of both the northern and southern hemispheres. Migratory studies show that the risk can be modified at an early age from both low to high and high to low prevalence rates. Exposure to the sun in early childhood is associated with reduced risk of developing Multiple Sclerosis (KULIE, TERESA, 2009).

Some studies have demonstrated the association of vitamin deficiency in MS patients and their role not only in decreasing relapse rates, but also in preventing their occurrence. In white individuals, the risk of MS decreases significantly (by up to 40%) in those with high vitamin D intake, in addition to preventing the onset of allergic autoimmune encephalitis and slowing the progression of disease. The same benefit was not evident in the Hispanic black population (MARQUES ET AL, 2010).

A study carried out by DeLuca et al. (2013) analyzed data from 225 articles, about the role of vitamin D in reducing the risk of nervous system diseases: Alzheimer's disease, amyotrophic lateral sclerosis, autism, multiple sclerosis, parkinson's

disease and schizophrenia. The strongest evidence is for multiple sclerosis. They noted that evidence from many types of studies finds that vitamin D plays a crucial role in cell proliferation and differentiation, neurotrophism, neuroprotection, neurotransmission, and neuroplasticity. Given the importance and the devastation of neurological diseases, more research on the role of vitamin D in reducing the risk of such diseases is justified.

VITILIGO

Vitiligo is a common pigmentary disease caused by the destruction of functional melanocytes, and vitamin D, which is also an essential hormone synthesized in the skin, and is responsible for the pigmentation of the skin. Based on this relationship, low levels of vitamin D have been observed in patients with vitiligo and consequently melanocyte inhibitory effects. And because vitamin D and calcium regulates bone metabolism, it controls cell proliferation and differentiation, and exerts immuno-regulatory activities. Vitamin D produces significant results when used in combination with phototherapy and exposure to ultraviolet rays, decreasing the expression of various cytokines that cause vitiligo. (ALGHAMDI, 2013)

CONCLUSION

Vitamin D deficiency is prevalent on all continents, and is more observed in black skins than in white ones, due to the greater pigmentation of the skin that acts as a filter for UV rays, in obese individuals, due to the lower bioavailability of vitamin D by adipose tissue, in higher latitude regions, as they are less sunny during most of the year, in the seasons that present lower incidence of solar rays, such as autumn and winter, in people who have cultural habits such as diet low in vitamin D, and wear clothes that cover most of the body, and the use of sunscreen in the whole body and all day.

From a study published last year, a daily recommendation of vitamin D for an adult is between 800 to 4,000 IU per day, having in mind that through diet we reach only 10% of our daily needs, the other 90% we should be got through sun exposure and supplementation of vitamin D.

Among the benefits that current studies point out, is the use of vitamin D as an adjunct to the health and well-being of the population, as well as: skin healing, bone health, systemic arterial hypertension, type I diabetes, cancer, multiple sclerosis , psoriasis, rheumatoid arthritis, epilepsy in the elderly, vitiligo and also the immunomodulatory effect guaranteeing the strengthening of the immune system.

It is important that more studies are carried out involving the care and needs of vitamin D supplementation and safe sun exposure.

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THE BENEFITS OF VITAMIN D FOR THE POPULATION: A CURRENT REVIEW

ABSTRACT

Vitamin D deficiency is a common finding in our adult population, due to a combination of factors such as decreased intake and absorption, limited exposure to sun light, time of year, latitude, skin pigmentation, medications, age, and the use of sunscreens. The aim of this study was to investigate the benefits that vitamin D provides to the health of the population, through the analysis of current publications, such as: scientific articles, books, national and international thesis. Among the benefits that current studies point out, are the use of vitamin D as an adjunct to the health and well-being of the population, as well as: skin

healing, bone health, systemic arterial hypertension, type I diabetes, cancer, multiple sclerosis, psoriasis, rheumatoid arthritis, epilepsy in the elderly, vitiligo and also the immune modulatory effect guaranteeing the strengthening of the immune system.
Keywords: Vitamin D; Hypovitaminosis D; Heliotherapy; Supplementation.

LES AVANTAGES DE LA VITAMINE D DE LA POPULATION: UN COURANT D'EXAMEN

RÉSUMÉ

La carence en vitamine D est une conséquence courante chez notre population adulte, en raison d'une combinaison de facteurs tels que la diminution de l'absorption et de l'absorption, l'exposition limitée à la lumière solaire, la période de l'année, la latitude, la pigmentation de la peau, les médicaments, l'âge et l'utilisation des écrans solaires. Le but de ce travail était d'étudier, à travers les publications actuelles telles que: articles scientifiques, livres, thèses nationales et internationales, les avantages que la vitamine D apporte à la santé de la population. Parmi les avantages que les études actuelles soulignent sont l'utilisation de la vitamine D comme un complément à la santé et le bien-être de la population, ainsi que: la guérison de la peau, la santé osseuse, l'hypertension artérielle systémique, le diabète de type I, le cancer, la sclérose en plaques , Le psoriasis, la polyarthrite rhumatoïde, l'épilepsie chez les personnes âgées, le vitiligo ainsi que l'effet immunomodulateur garantissant le renforcement du système immunitaire.
Mots-clés: Vitamine D; Hypovitaminose D; Héliothérapie; Supplémentation.

LA VITAMINA D QUE VENTAJAS DE LA POBLACIÓN: UNA REVISIÓN ACTUAL

RESUMEN

La falta de vitamina D es un hallazgo frecuente en nuestra población adulta, debido a una combinación de factores tales como la reducción de la ingesta y absorción, la exposición limitada a la luz solar, estación, la latitud, la pigmentación de la piel, la medicina, la edad y el uso de protectores solares. El objetivo de este estudio fue investigar los beneficios nacionales e internacionales que la vitamina D proporciona la salud de la población, usando publicaciones actuales, tales como artículos científicos, libros, y tesis. Entre los beneficios que los estudios actuales muestran, nos encontramos con el uso de la vitamina D como el apoyo a la salud y el bienestar de la población, así como la curación de la piel, la salud ósea, la hipertensión, la diabetes de tipo I, el cáncer, la esclerosis múltiple , psoriasis, artritis reumatoide, la epilepsia en personas de edad avanzada, vitiligo y también asegurar efecto inmuno modulador fortalecimiento del sistema inmunológico.
PALABRAS CLAVE: Vitamina D; Deficiencia de Vitamina D; Helioterapia; Suplementación.

OS BENEFÍCIOS DA VITAMINA D PARA A POPULAÇÃO: UMA REVISÃO ATUAL

RESUMO

A falta de vitamina D é um achado comum em nossa população adulta, devido à combinação de alguns fatores, tais como a diminuição da sua ingestão e absorção, exposição limitada à luz solar, época do ano, latitude, pigmentação da pele, medicamentos, idade e uso de filtros solares. O objetivo deste trabalho foi investigar, através de publicações atuais como: artigos científicos, livros, teses sendo estas nacionais e internacionais, os benefícios que a vitamina D proporciona à saúde da população. Dentre os benefícios que os estudos atuais apontam, encontramos o uso da vitamina D como coadjuvante na saúde e bem-estar da população, bem como: cicatrização de pele, saúde dos ossos, hipertensão arterial sistêmica, diabetes do tipo I, câncer, esclerose múltipla, psoríase, artrite reumatóide, epilepsia em idosos, vitiligo e também o efeito imuno modulador garantindo o fortalecimento do sistema imune.
PALAVRAS-CHAVE: Vitamina D; Hipovitaminose D; Helioterapia; Suplementação.