

# Vitamin D Deficiency

## Introduction

- When I signed up for a fact sheet, I chose Vitamin D deficiency because it was something I knew nothing about and I wanted to learn more. Before writing this fact sheet I was oblivious to the existence of a Vitamin D. I had never heard any controversy over Vitamin D deficiencies. Being that so, my curiosity drew me towards this topic.

## Section 1: Background and Problem Statement

- **Web site #1 Name:** Vitamin D Council
- **Web address:** <http://www.vitamindcouncil.org/>
- **Background Information:**
  - Health People 2010 did not have my topic, so instead I used the Vitamin D Council site. The skin has a high natural production of Vitamin D when exposed to rays of sunlight (ultraviolet B). When exposed to 20-30 minutes of sunlight, the skin can produce 5,000 IU (international units). Technically Vitamin D is not a “vitamin” but a secosteroid hormone that targets over 2,000 genes (10% of the human genome). Vitamin D deficiency is a major factor in the pathology of at least 17 varieties of cancer as well as stroke, heart disease, and hypertension.
- **Web site #2 Name:** Mayo Clinic
- **Web address:** [http://www.mayoclinic.com/health/vitamin-d/NS\\_patient-vitamind](http://www.mayoclinic.com/health/vitamin-d/NS_patient-vitamind)
- **Background Information:**
  - There are two forms of Vitamin D: ergocalciferol (D2, synthesized by plants), cholecalciferol (D3, synthesized by humans). Vitamin D3 is synthesized by humans when exposed to ultraviolet rays from sunlight. It is used to maintain normal blood levels of calcium and phosphorus. Vitamin D aids in the absorption of calcium, forming strong bones, and protects against osteoporosis, hypertension cancer, and several autoimmune diseases. Rickets and Osteomalacia are classic Vitamin D Deficiency diseases. Occurring mainly in children, Rickets causes skeletal deformities. Osteomalacia, on the other hand, affects adults and causes muscular weakness and weak bones. There is a large group of people who are at a high risk of Vitamin D Deficiency, including the elderly, obese, exclusively breastfed infants, and those with limited sun exposure.
- **Web site #3 Name:** WebMD

- **Web address:** <http://www.webmd.com/diet/vitamin-d-deficiency>
- **Background Information:**
  - People who are sensitive to the sun, have milk or dairy allergies, or have a vegetarian diet may be at risk for Vitamin D Deficiency. Vitamin D is also called the sunshine vitamin. It is produced in response to sunlight. It also occurs naturally in some foods, such as fish, fish liver oils, egg yolks, and fortified dairy and grain products. Vitamin D is essential for strong bones. It is often associated with rickets, which is when bone tissues don't mineralize properly causing soft bones and skeletal deformities.

## Section 2: Research

- **Web site #1 Name:** PubMed
- **Web address:** <http://www.ncbi.nlm.nih.gov/pubmed/20352623>
- **Summary of the research:**
  - Vitamin D deficiency is common among patients with myocardial diseases. This is because intake of dietary and sun induced vitamin D is insufficient. It has shown that children suffering from rickets and severe heart failure could be successfully treated with supplements of Vitamin D on the heart suggest that deficiencies might be a casual factor for myocardial diseases. In some trials, it was rare that Vitamin D was used to treat myocardial diseases. Yet, the knowledge of the beneficial effects of Vitamin D on myocardial diseases and overall health strongly support the use of Vitamin D.
- **Web site #2 Name:** American Academy of Pediatrics (Scirus)
- **Web address:** <http://aappolicy.aappublications.org/cgi/content/full/pediatrics;111/4/908>
- **Summary of the research:**
  - Rickets has been continually reported in infants with inadequate Vitamin D intake. The disease is an extreme case of Vitamin D deficiency. Children are recommended to have 200 IU per day. Vitamin D can be found in food and also in sunlight. The skin synthesizes Vitamin D from ultraviolet B rays of light from the sun. Individuals with darker skin have decreased Vitamin D synthesis along with the use of sun screens. Breastfed infants who do not have adequate sun exposure or take Vitamin D supplements are at high risk for developing Vitamin D deficiency or rickets. Human breast milk contains a Vitamin D concentration of 25 IU/L or less. Therefore the recommended amount of Vitamin D cannot be met with breast milk alone. Infants should begin Vitamin D supplementation within the first two months of life. Additional research is required to discover the required amount of sun exposure for an infant.

The best way to supplement Vitamin D into the diet of an infant is to introduce them to a formula. All formulas sold in the U.S. have at least 400 IU/L.

To best prevent rickets and Vitamin D deficiencies, infants should have adequate sunlight exposure along with Vitamin D supplements.

- **Web site #3 Name:** Office of Dietary Supplements (Intute)
- **Web address:** <http://ods.od.nih.gov/factsheets/vitamind.asp#h5>
- **Summary of the research:**
  - Vitamin D deficiency can occur when usual intake levels are lower than recommended, exposure to sunlight is limited, the kidneys cannot convert Vitamin D to its active form, or absorption of Vitamin D from the digestive tract is inadequate. Deficiencies in Vitamin D are associated with milk allergies, lactose intolerance, and strict vegetarianism.

Two classic Vitamin D deficiency diseases are Rickets and Osteomalacia. Rickets is most commonly associated with children. It causes the failure of bone tissue to mineralize properly, resulting in soft bones and skeletal deformities. Rickets is common in children with low sun exposure. It is more prevalent among immigrants from Asia, Africa, and the Middle East. This could be due to the genetic differences in Vitamin D and the sun exposure.

Osteomalacia is a Vitamin D deficiency disease in adults. Symptoms include bone pain and muscle weakness, but these signs can go undetected during initial stages.

### Section 3: Statistics

- **Web site #1 Name:** Center for Disease Control and Prevention
- **Web address:** [http://www.cdc.gov/breastfeeding/recommendations/vitamin\\_D.htm](http://www.cdc.gov/breastfeeding/recommendations/vitamin_D.htm)
- **Summary of the statistics:**
  - Breastfeeding is the recommended method of feeding an infant due to the nutrients it provides. Unfortunately, breast milk does not provide an adequate amount of Vitamin D. In this case, infants can be given Vitamin D supplements and can synthesize the nutrient from sunlight. Due to cases at rickets, a Vitamin D deficiency diseases, researches decided to take a closer look at whether breastfed infants were getting enough Vitamin D.

After researching the effects of sunlight in 2003, scientists discovered that all infants should have a minimum intake of 200 IU (international units) of Vitamin D per day. Then in 2008, the recommended intake was increased to 400 IU per day. Breast milk only contains 25 IU per liter, meaning Vitamin D supplementation is needed in order to provide the necessary amount. Doctors recommend taking supplement or drinking formula. If there is a rare case of extreme Vitamin D deficiency, doctors can prescribe a preparation of high concentrated Vitamin D.

- **Web site #2 Name:** Center for Disease Control and Prevention
- **Web address:** [http://www.cdc.gov/nutritionreport/part\\_2b.html](http://www.cdc.gov/nutritionreport/part_2b.html)
- **Summary of the statistics:**
  - Demineralization of the skeleton is a common characteristic of Vitamin D deficiency. It is common that this deficiency causes bone deformities in children and adults. Besides aiding bone health, Vitamin D also helps muscle strength, reduces cancer and type 2 diabetes, but these effects are still being reviewed. A study was done to discover the adequate amounts of Vitamin D are. The experiment consisted of 3 racial groups, Mexican American, Non-Hispanic Blacks, and Non-Hispanic Whites. All of the test subjects were 60 years of age or older. It was found that Non-Hispanic Blacks have the lowest amount of Vitamin D. This is due to their dark skin.
- **Web site #3:** PubMed
- **Web address:** <http://www.ncbi.nlm.nih.gov/pubmed/19892232>
- **Summary of the statistics:**
  - Bronchiolitis is the leading cause of hospitalization for children younger than one year old. Children diagnosed with severe bronchiolitis will later develop wheezing or asthma, although it is unclear which patients will. The lack of Vitamin D is found as an emerging risk factor for respiratory infection and wheezing. This research shows that Vitamin D could be useful in the treatment of respiratory infections.

## Section 4: Consumer Information

- **Web site #1 Name:** American Academy of Pediatrics
- **Web address:** <http://www.aap.org/family/vitdpatients.htm>
- **Summary of the information:**
  - Vitamin D is essential to the body development of infants. They are usually introduced to formula because breast milk does not contain enough Vitamin D for proper bone and skeletal development.

Sunlight can also provide Vitamin D. Although, sunscreen should be used in moderation as it prevents the skin from producing Vitamin D.

- **Web site #2 Name:** Medicine Plus
- **Web address:** <http://www.nlm.nih.gov/medlineplus/ency/article/000344.htm>
- **Summary of the information:**
  - Rickets is the most common Vitamin D deficiency in children. This is because breast milk does not provide an adequate amount of Vitamin D. Children are more susceptible to deficiencies because of their need for Vitamin D due to bone and skeletal development. Infants should be turned on to formula after a few weeks in order to receive the right amount of Vitamin D. Contrary to some mother's beliefs, baby formula is a healthier choice over breast milk.
  
- **Web site #3 Name:** Medicine Plus
- **Web address:** [http://www.nlm.nih.gov/medlineplus/news/fullstory\\_96958.html](http://www.nlm.nih.gov/medlineplus/news/fullstory_96958.html)
- **Summary of the information:**
  - Minority children and children in low income homes are at a higher risk for Vitamin D deficiency. Their darker skin acts as a sun block and prevents the body from producing Vitamin D. Since Vitamin D is not in many foods, supplements should be given to children with low Vitamin D levels.

## Section 5: Solutions to the Problem (or Issue)

- **Web site #1 Name:** Vitamin D Council
- **Web address:** <http://www.vitaminDCouncil.org/treatment.shtml>
- **Summary of the information:**
  - To prevent Vitamin D deficiencies, children and adults should be sure to get the adequate amount of Vitamin D. Scientists predicts that the future required Vitamin D amount will be 1000 IU/day. To meet this requirement Vitamin D supplements can be purchased over the counter. Children can be fed formulas with a high Vitamin D concentration.
  
- **Web site #2 Name:** Pub Med
- **Web address:** <http://www.ncbi.nlm.nih.gov/pubmed/18076342>
- **Summary of the information:**

In recent tests, a daily intake of 1100 IU over a 4 year period reduces the incidents of non-skin cancers. Some Vitamin D deficiency treatments only treat bone issues. Some authors believe that sunlight (ultraviolet B) is the best source of Vitamin D. Although some treatments have risks, the benefits far outweigh them.
  
- **Web site #3 Name:** Fighting Fatigue

- **Web address:** <http://www.fightingfatigue.org/?p=1220>
- **Summary of the information:**
  - Without sun exposure, 4,000 IU/day of Vitamin D must be taken. That is equivalent to 40 glasses of milk a day. Instead, 20 minutes of sun exposure can produce 20,000 IU of Vitamin D, much more than the required amount. Therefore the best way to get the adequate amount of Vitamin D is regulated sun exposure.

**Conclusions:**

While writing this fact sheet I learned much about Vitamin D deficiencies. I learned that lack of sunlight and daily intake of Vitamin D can cause Rickets and Osteomalacia in children and adults respectively. I also learned that the skin synthesized sunlight into Vitamin D. Another interesting fact is that dark skin can act as a barrier, and prevent the skin from making Vitamin D. I hope that whoever reads this will learn that Vitamin D deficiencies can be easily avoided by either taking supplements or having daily regulated sun exposure.

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