Vitamin D Deficiency and Autism

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Abstract
Autism is neurodevelopmental disorders characterized by impaired social skills, repetitive behaviors, speech and nonverbal communication, in addition to unique strengths and differences. There were different reasons for induced autism which include genetics and environmental factors. Many vitamins may play important role in induced autism. The major vitamin is vitamin D. Deficiency of vitamin D influence on the development of autism. The main method in treatment of autism the treatment with vitamin D supplements.

Keywords: Autism; Vitamin D; Vitamin D deficiency

Vitamin D

Definition of Vitamin D
Vitamin D is one of the most important vitamins is a fat-soluble steroids which is responsible for increase the rate of absorption of calcium, iron, magnesium, phosphate, and zinc in intestine. Most important vitamin D types are Cholecalciferol (vitD3) and Ergocalciferol (vit D2) [14] (Figure 1).

Vitamin D is made in the skin from cholesterol through a chemical reaction that is dependent on exposure to the sun. Vitamin D presents in their forms in inactive source; activation process of vitamin D requires some of enzymes which present in liver and kidney In view of that the Dietary Reference of vitamin D Intake assumes no synthesis occurs and all of a person’s vitamin D is obtain from food. Vitamin D has a significant role in calcium homeostasis and metabolism. Its discovery was due to effort to find the dietary substance lacking in rickets (the childhood form of osteomalacia) [15].

A diet deficient in vitamin D in conjunction with inadequate sun exposure causes osteomalacia (or rickets when it occurs in children), which is a softening of the bones. In the developed world, this is a rare disease. A review article of 2016 reported that while there is increase rate of diabetes mellitus through vitamin D deficienc [16-18].

Dietary sources of vitamin D
Although vitamin D is not present naturally in most foods, it is commonly added into some manufactured foods, as fruit juices and fruit juice drinks, beverages, cheese and cheese products [19,20]. Value of Vitamin D in foods is reduced by cooking, such as by boiling, frying or baking. Boiled, fried and baked foods retained 69–89% of original Vitamin D (Table 1) [21,22].

Mechanism of vitamin D in autism
Each cell has receptors for vitamin D. These receptors responsible for regulating the expression of gene associated with the development, growth and function of various body tissues, such as bone, muscle, skin, hair, nails, teeth, blood vessels, and immune system. If a cell does not receive sufficient vitamin D, the receptors will not function properly, which may lead to health problems. Vitamin D receptors are found in different tissues and organs, and are especially abundant in brain, muscle, bone, liver, skin, and kidney. Vitamin D receptors are involved in the regulation of calcium and phosphorus homeostasis, the development and function of immune system, and the regulation of gene expression.

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for control gene [23] Oxidative stress may be leads to early cell death. Some research reports indicated that vitamin D reduces oxidative stress. Environmental factors may cause DNA mutations and this increased risk for autism. Vitamin D play important role in protection of DNA from damage, if it occur vitamin D repair it once the damage occur. In addition to Vitamin D may also reduce the risk of autism through its effect on immune system through, increasing T-regulatory cells, Protecting the and by up- regulating glutathione, which also chelates heavy metals [24] (Vitamin D action mechanism Figure 2).

**Conclusion**

Vitamin D may play important role in protection from autism risk through inhibit oxidative stress and regulation of immunological process. So it's necessary for pregnant women to take vitamin D supplemental during pregnancy stage to protect their infant from the risk of autism.

**References**


**Table 1:** Vitamin D values in food.

<table>
<thead>
<tr>
<th>Vitamin D2</th>
<th>Vitamin D3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant-based milks and yogurts</td>
<td>Fish liver oils</td>
</tr>
<tr>
<td>Mushrooms</td>
<td>Salmon</td>
</tr>
<tr>
<td>Plants</td>
<td>Mackerel</td>
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<td></td>
<td>Cooked egg</td>
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**Figure 1:** Vitamin D structure.

**Figure 2:** Vitamin D action mechanism.


