

# Vitamin D consumption During Covid 19 lockdown

Sowmiya Vela C<sup>1</sup>, Abirami.S.P<sup>2</sup>

<sup>1</sup>*U.G. Student, Department of food science, M.O.P Vaishnav College for Women, Chennai, India*

<sup>2</sup>*Assistant Professor, Department of Food Science, M.O.P Vaishnav College for Women, Chennai, India*

**Abstract - Aim:** To evaluate vitamin D consumption during covid 19 lockdown. **Objective:** To assess the symptoms of vitamin D deficiency appeared during the lockdown period. To assess the intake of vitamin D rich foods and exposure of sunlight. **Materials and methods:** This study was done by online survey method through google forms questionnaire. The questionnaire was randomly circulated to people via social media. The target sample given was 50 and the sample achieved was 60. **Result:** Vitamin D deficiency symptoms appeared often for most of the sample during covid 19 lockdown. Consumption of vitamin D rich foods also may not reach the daily vitamin D requirement. **Conclusion:** It is advisable to take vitamin D supplements for those who are vitamin D deficient with doctor's or registered dieticians' prescription. Requirements can also be met by increasing the consumption of vitamin D rich foods or fortified foods to meet adequate vitamin D.

**Index Terms - Covid 19, Depression, Immune system, Sunlight, Vitamin D.**

## I.INTRODUCTION

Vitamin D is a fat-soluble vitamin that is critical to have a healthy bone and a good immune system for better health and less disease. Vitamin D is important for stimulating innate immunity. It also activates both antibacterial peptides (CAMP and defensin  $\beta$ 2 expression) capable of destroying the microbe cell membrane [1]. Vitamin D reduces the risk of viral infection (such as common cold) in different ways: physical barrier, cellular natural immunity and adaptive immunity [2], [3]. Vitamin D has a role in development of depressive symptom [4]. A high prevalence (50-90%) of vitamin D deficiency along with low dietary calcium intake has been documented in the Indian population [5].

Vitamin D causes rickets in children and osteopenia, osteoporosis and fractures it is also associated with the increased risk of cancers, autoimmune disease, hypertension and infectious disease [6]. Vitamin D

deficiency occurs in all ages in India irrespective of their age sex and geography. The main reason for this is their increased indoor lifestyle and decrease in their exposure of sunlight, increased pollution which may prevent the synthesis of vitamin D in the sun by UV rays, low intake of vitamin D and calcium rich foods, increased skin pigmentation, cultural practices such as burqa or purdah system [7]. Initially, vitamin D deficiency does not show much symptoms, but acute deficiency may cause muscle cramps, backache, fatigue, depression and sleep disorders. Vitamin D deficiency can risk our bone health and immune system especially during this covid 19 lockdown as we mostly stay indoors. The best time for exposing to sunlight is at noon (between 10:00 AM to 3:00 PM) for at least 15-20 minutes to get an optimal vitamin D [8]. Plasma concentration of vitamin D increases with physical activity especially in outdoors [9]. Some of the vitamin D rich foods are salmon, sardines, tuna, milk and milk products, egg and vitamin D fortified foods. Tests used for vitamin D deficiency in the body is 25 hydroxy vitamin D blood test. Normal range of vitamin D for a normal person is from 20-50 nanograms/millilitre and a level less than 20 is considered as vitamin D deficiency [10].

## II.MATERIALS AND METHODS

This study is done to know the consumption level of vitamin D during lockdown. This is a prospective observational study and random sampling technique was used. The study was done online through google form questionnaire. Sample included adolescent (10-19 years of age) and adults (20 and above) of both the genders around Tamil Nadu. Children below 10 years of age and sample who are not willing to participate are excluded. Questionnaire contained questions which asked the people about their symptoms that is associated with vitamin D deficiency like feeling lethargic, discomfort in joints or muscle that they had

experienced during the lockdown, how often they get sick or infected, how long they expose to sunlight. Questionnaire also involved the consumption of vitamin D by the people during lockdown. Target sample size is 50 and the sample achieved is 60.

### III.RESULT

The study is based on the calculation of approximate vitamin D levels during lockdown. It is done by comparing the symptoms of vitamin D deficiency and consumption of vitamin D rich foods during the lockdown period. The study has sample size of 60 in which 53% of female and 47% of male sample. The mean ( $\pm$  SD) value of age is  $22 \pm 9.3$ .

62% of sample is not taking any vitamin D supplements. 50% of the sample feels extra tired and lethargic than usual at times even if they do lesser physical work.

16.7% of sample did not experience new pain or discomfort in joints and muscles during lockdown and 31.7% get pain and discomfort sometimes, 38.3% experience new pain or discomfort most often and 13.3% always experience discomfort in in joints and muscles.

On the sweating pattern, 18.3% of samples does not get excessive sweating or sweating in the forehead or hands or change in the sweat pattern or in the amount of sweating that is experienced during lockdown, 30% of same experience sweat sometimes, 38.3% experience most often and other 13.3% of sample sweats always.

While observing the feeling of unexpected weakness (even if they sleep well) during lockdown, 20% of the sample say they never felt weakness, 26.7% of sample feels weakness sometimes, 41.7% feels weakness most often and 11.7% of sample feels weakness always.

18.3% of sample have never experienced muscle cramps during lockdown whereas 33.3% experience sometimes, 35% experience most often also 13.3% experience always.

On experiencing the joint pain during the lockdown, 15% had never experienced, 41.7% of sample experienced joint pain sometimes, 28.3% experience joint pain often and 15% always had joint pain.

While looking on the immune levels 20% of sample are never getting sick or infected during lockdown, whereas 36.7% of sample were falling sick sometimes, 30% were falling sick most often and 13.3% were always feeling sick.

Mushroom is considered to be rich in vitamin D,28% of sample consumes mushroom once or twice a month, 18% never consume and 38% consumes often (twice or thrice a week).

On exposure of sunlight, 20% of sample expose to sunlight less than 10 minutes, 30% of sample expose 10-20 minutes, 35% expose to sunlight more than 21-30 minutes and 15% expose more than 30 minutes.

While looking at consumption of vitamin D rich food it was observed that 20% of sample never have eggs during lockdown, 42% will eat often (twice or thrice a week), 23% eat once or twice a month and 15% eats daily. 17% of sample take milk and milk products daily during the lockdown, 35% of sample takes often (twice or thrice a week) 28% takes once or twice a month and 20% never takes. For eating fishes like salmon, sardines, tuna, mackerel, anchovies during lockdown, 15% of sample never eat, 28% eat once or twice a month, 40% eats often (twice or thrice a week). On consuming vitamin D fortified foods, 27% of sample consumes vitamin D fortified foods once or twice a month, 33% consumes often (twice or thrice a week), 22% never consumes and 18% consumes daily.

Table I. Table Showing Intake of Vitamin D and Vitamin D Deficiency Symptoms of Respondents (n=60)

| Vitamin D Deficiency Symptoms  | Intake of Vitamin D as Suggested by Physician |      | Chi-square value | P value |
|--|---|------|------------------|---------|
|  | Yes   | No   |                  |         |
| Feeling Extra Tired and Lethargic than Usual                                 | 1.52  | 3.00 | 16.282           | 0.003** |
| New Pain or Discomfort in Joint or Muscle Experienced during Lockdown        | 1.87  | 2.86 | 20.674           | 0.007** |
| Excessive Sweating or Change in Sweating Pattern Experienced during Lockdown | 1.74  | 2.92 | 16.324           | 0.005** |
| Unexpected Weakness during Lockdown  | 1.87  | 2.81 | 13.954           | 0.002** |
| Muscle Cramps Experienced during Lockdown                                    | 1.78  | 2.84 | 35.015           | 0.008** |

|  |      |      |        |         |
|--|------|------|--------|---------|
| Joint Pain Experienced during Lockdown         | 1.74 | 2.76 | 15.719 | 0.001** |
| Often Getting Sick or Infected during Lockdown | 1.78 | 2.84 | 19.106 | 0.003** |
| Mood Swing during Lockdown                     | 1.80 | 2.76 | 22.751 | 0.004** |

Note: \*\* Denotes significant at 1% level.

Table II. Table Showing Exposure to Sunlight and Vitamin D Deficiency Symptoms of Respondents (n=60)

| Vitamin D Deficiency Symptoms  | Exposure to Sunlight |                 |                 |                      | Chi-square value | P value |
|--|----------------------|-----------------|-----------------|----------------------|------------------|---------|
|  | Less than 10 Minutes | 11 – 20 Minutes | 21 – 30 Minutes | More than 30 Minutes |                  |         |
| Feeling Extra Tired and Lethargic than Usual                                 | 3.25                 | 2.72            | 2.05            | 1.67                 | 9.086            | 0.002** |
| New Pain or Discomfort in Joint or Muscle Experienced during Lockdown        | 3.25                 | 2.72            | 2.10            | 1.89                 | 7.365            | 0.001** |
| Excessive Sweating or Change in Sweating Pattern Experienced during Lockdown | 3.25                 | 2.72            | 2.10            | 1.78                 | 7.876            | 0.003** |
| Unexpected Weakness during Lockdown  | 3.33                 | 2.50            | 2.19            | 1.78                 | 7.322            | 0.002** |
| Muscle Cramps Experienced during Lockdown                                    | 3.42                 | 2.67            | 2.00            | 1.67                 | 13.172           | 0.001** |
| Joint Pain Experienced during Lockdown                                       | 3.33                 | 2.67            | 2.00            | 1.78                 | 10.724           | 0.001** |
| Often Getting Sick or Infected during Lockdown                               | 3.42                 | 2.67            | 1.95            | 1.33                 | 20.251           | 0.003** |
| Mood Swing during Lockdown   | 3.25                 | 2.89            | 1.95            | 1.56                 | 17.429           | 0.002** |

Table III. Relationship between Intake of Vitamin D food and Energetic and Active Level Felt by Respondents (n=60)

| Variables                     | Whole Egg | Milk & Milk Products | Sea Food | Mushroom | Forfeited Food with Vitamin D | Energetic & Active Level |
|-------------------------------|-----------|----------------------|----------|----------|-------------------------------|--------------------------|
| Whole Egg                     | 1         | 0.858**              | 0.856**  | 0.874**  | 0.878**                       | 0.921**                  |
| Milk & Milk Products          | 0.858**   | 1                    | 0.833**  | 0.844**  | 0.845**                       | 0.988**                  |
| Sea Food                      | 0.856**   | 0.833**              | 1        | 0.819**  | 0.804**                       | 0.976**                  |
| Mushroom                      | 0.874**   | 0.844**              | 0.819**  | 1        | 0.867**                       | 0.956**                  |
| Forfeited Food with Vitamin D | 0.878**   | 0.845**              | 0.804**  | 0.867**  | 1                             | 0.994**                  |
| Energetic & Active Level      | 0.924**   | 0.988**              | 0.976**  | 0.956**  | 0.994**                       | 1                        |

Note: \*\* Denotes correlation is significant at 1% level.

In Table I, since P value is less than 0.001, it is concluded that there is a significant difference between intake of Vitamin D and Vitamin D Deficiency of Respondents. Based on mean rank, it is clearly proven that the respondents who consume vitamin D have low level of Vitamin D deficiency than the respondents who do not consume vitamin D as suggested by physician. Thus, it is concluded that if

the consumption of vitamin D increases, the Vitamin D deficiency will decrease.

In Table II, Since P value is less than 0.001, it is concluded that there is a significant difference between frequency of exposure to sunlight and Vitamin D Deficiency of Respondents. Based on mean rank, it is clearly proven that the respondents who exposure to sunlight for more than 30 minutes have

low level of Vitamin D deficiency than the respondents who exposure to sunlight less than 10 minutes. Thus, it is concluded that if the frequency of exposure to sunlight increases, the Vitamin D deficiency will decrease.

In Table III, since the P value is less than 0.01, it is concluded that the respondents' intake of food namely whole egg (0.924), milk and milk products (0.988), sea food (0.976), mushroom (0.956) and forfeited food with vitamin D (0.994) have a positive and strong relationship with their energetic and active level of them. This implies that as the level of intake of Vitamin D food by respondents' increases, their level energy and active also increases. It is also noted that there is a pair wise positive relationship between whole egg and milk and milk products (0.858), whole egg and sea food (0.856), whole egg and mushroom (0.874), whole egg and forfeited food with vitamin D (0.878). Furthermore, there exists a pair wise positive relationship between milk and milk products and sea food (0.833), milk and milk products and mushroom (0.844), milk and milk products and forfeited food with vitamin D (0.845), sea food and mushroom (0.819), sea food and forfeited food with vitamin D (0.804), mushroom and forfeited food with vitamin D (0.867).

#### IV.CONCLUSION

Vitamin D is a fat-soluble vitamin which is required for the bone health and immune system. By comparing the symptoms of vitamin D deficiency and consumption of vitamin D rich foods through the google form questionnaire, we can conclude that most of the people feel lethargic or extra tired often during lockdown and some people had mood swings which may be the initial stage of vitamin D deficiency symptoms. However, 35% of the sample expose to sunlight 21-30 minutes which is enough to get the optimum amount of vitamin D from sunlight. Vitamin D deficiency symptoms often appear in majority of the sample which may be a small sign of getting vitamin D deficiency during lockdown and the consumption of vitamin D rich foods also may not reach the daily vitamin D requirement. Therefore, it is advisable to take vitamin D supplements for those who are vitamin D deficient with doctor's or registered dieticians' prescription. Requirements can also be met by increasing the consumption of vitamin D rich foods or fortified foods to meet adequate vitamin D.

#### V. LIMITATION

This study is done with samples only in Tamil Nadu. The research is done through online questionnaire forms. The study included samples of all ages (except children below 10 years of age), but most of the samples answered are from 20-30 years of age.

#### ACKNOWLEDGMENT

Heartfelt thanks to Abirami.S.P and department of food science for helping out this research. No sponsorship involved

#### REFERENCES

- [1] S.B attault, S.J. Whiting, S.L. Peltier, Sadrin, G. Gerber, J.M.Maixent; Vitamin D metabolism, functions and needs: from science to healthy chains; 20 July 2012.
- [2] Nurshad Ali; Role of vitamin D in preventing of covid 19 infection, progression and severity; Journal of infection and public health; 20 june, 2020.
- [3] Mariengela Rondaneli, Alessandra Miccono, Silvia Lamburghini, Milena Anna Faliva, Gabriella Peroni, Mara Nichetti, Simone Perna; Self-care for common colds: The pivotal role of vitamin D, vitamin C, Zinc and echinacea in Three Main Immune Interactive Clusters (physical barriers, innate and adaptive immunity) involved during an episode of common colds-practical advice on dosages and on the time to take these nutrients/ botanicals in order to prevent or treat common colds; 29 april,2018.
- [4] Gillian Ceolin, Giulia Pipolo Rdrigues Mano, Natalia Schmitt Hames, Luciano da Conceicao Antunes, Elisa Brietzke, Deborah kurrle Rieger, Julia Dubois Moreira; Vitamin D, depressive symptoms, and covid 19 pandemic; Front. Neurosci; 13 May 2021.
- [5] Preeti kamboj, Supriya Dwivedi, GS Toteja; Prevalence of hypovitaminosis D India and way forward; 28 september 2018.
- [6] Michael F Holick, Tai C Chen; Vitamin D deficiency: a worldwide problem with health consequences; The American Journal of Clinical Nutrition, volume 87 issue 4, pages 1080 S-1086S; 1 April 2008.

- [7] P Aparna, S Muthathal, Baridalyne Nongkynrih, Sanjeev Kumar Gupta; Vitamin D deficiency in India; Journal of Family Medicine and Primary Care; 2018 March- April.
- [8] Johan Moan, Arne Dahlback, Alina Carmen porojnicu; “At what time should one go out in the sun ?” ; Pubmed; 2008.
- [9] Marcos Rassi Fernandes, Waldivino dos Reis Barreto Junior; Associated between physical activity and vitamin D: A narrative literature review; Pubmed; 2017.
- [10]Michael F. Holick; Vitamin D status: measurement, interpretation and clinical application; Annals of epidemiology; 10 March 2008.