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## Vitamin D: A Passing Fad or Viable Therapy for COVID-19?

Ms. King:

Is vitamin D a passing fad or a viable therapy for COVID-19? It's a hot topic being discussed around the world and tried by many of your patients, which is why today, we'll be taking a look at its validity amid the COVID-19 pandemic and beyond.

Welcome to *Nutrition Edge* on ReachMD. I'm dietitian Kathy King, and my guest today is Dr. Teresa Pangan, a registered dietitian, health counselor, and keynote speaker with 32 years of clinical and entrepreneurial experience. She's going to discuss with us the possible benefits and precautions of using supplemental doses of vitamin D to fight or prevent COVID-19 infections.

Teresa, welcome to our program.

Dr. Pangan:

Thank you for having me, Kathy.

Ms. King:

Teresa, to start, can you explain how vitamin D is currently being utilized around the world, both before the global pandemic hit and during it?

Dr. Pangan:

Well, to answer this, let's take a look at what we found during COVID-19 around the world for vitamin D, and it will give us a glimpse into what was being done before the pandemic. Lower latitude and typically the sunny countries, such as Spain, Northern Italy, they had low mean blood concentrations of 25-hydroxy vitamin D and high rates of vitamin D deficiency during COVID, and they have experienced the highest infection and death rates in Europe and around the world. So these countries don't fortify foods, they don't recommend supplementation, and they tend to prefer the shade, and they also have skin pigmentation that decreases vitamin D synthesis. Now, if we go to the northern latitude countries like Norway, Finland, Sweden, they receive a lot less of this UVB that is needed to convert vitamin D, and they had much higher mean 25-hydroxy vitamin D concentrations, low levels of deficiency, and lower infection and death rates, and we think that's due to widespread fortification of their foods, high levels of consuming fatty fish and cod liver oil, and they strongly recommend supplementation. These are practices in the countries well before COVID.

Researchers and public officials are torn right now. We have strong circumstantial evidence regarding the potential positive effect of vitamin D, but we don't have the gold standard yet. We don't have randomized controlled trial evidence. We're in unusual times being a pandemic, so many countries are now recommending supplementation.

Now, UK, before the pandemic, they advised October to March to take a supplement, and right now the Public Health in England is recommending 400 IU of vitamin D. And they are looking at those recommendations closely as we find out more information and they

might change. The other UK entities are following similar advice for the lockdown period.

Now, in the US, we don't have any recommendations for supplementation of vitamin D. Institute of Medicine recommends 1 year to 70, 600 IU, over 70, 800, and Berkeley Wellness recommends 800 to 1,000 IU, so those are some of the things that are going on around the globe.

Ms. King:

And, Teresa, what are some of the possible therapeutic benefits of vitamin D, especially amid the COVID-19 pandemic? And physiologically, how does it work?

Dr. Pangan:

So vitamin D is produced in the skin from the UVB sunlight exposure, and then it's transported to the liver and then the kidney where it's changed into an active hormone. And some people really think vitamin D should be called a hormone because a lot of its role has to do with this hormone role. So it increases calcium transport from food in the gut and ensures calcium is adequate to help keep our bones strong. We think of rickets, osteoporosis, and this is commonly what we think of with vitamin D, but it has roles way beyond this. We have vitamin D receptors in the brain, heart, stomach, pancreas, skin, gonads, activated T and B lymphocytes in the immune system and 28 other tissues, so you can see vitamin D plays a really important role in our whole body, and that kind of complicates the picture too when we start talking about levels.

Now, for coronavirus, the physiology is really 2-fold principally. We first have where the vitamin D supports production of antimicrobial peptides in the respiratory epithelium, so that has to do with the infection taking hold and development, so vitamin D is really important in that. Then, secondly, vitamin D has the ability to suppress the adaptive immune system. Recall we have 2 immune system responses. We have the innate and adaptive. Innate is the first one that kicks in with the virus, and vitamin D regulates cytokine levels through the modulating response of macrophages, their secretion of these kind of yucky stuff, lysosomal enzymes, acid phosphatase and hydrogen peroxide, and it's these secretions that lead to inflammation that injures the lining of the lungs leading to pneumonia and increasing our concentrations of anti-inflammatory cytokines.

So, if you have read up on vitamin D in COVID, you've probably heard about this cytokine storm. Now, this is a hyperinflammatory condition caused by an overactive immune system, and this cytokine storm severely damages the lungs, and it leads to this acute respiratory distress syndrome, and that's what kills a majority of COVID-19 patients, not the destruction of the lungs by the virus itself. It's the complications from the misdirected fire from the immune system, our own cells doing it on our own cells that is deadly, and vitamin D is really important in modulating so that the cytokine storm doesn't occur, so you can see its really, really important role in our immune response.

Ms. King:

On the flipside, are there any risks or limitations patients should be aware of before trying to use vitamin D as a way to prevent COVID-19 infection?

Dr. Pangan:

Well, first, I want to be really clear. Vitamin D is not going to prevent the virus in any way. You prevent the virus through washing of hands, not touching your face and safe social distancing. That's how you prevent COVID-19. So vitamin D isn't going to prevent that. What it does is it helps with quick recovery, the prevention of the more dangerous cytokine storm.

Yes, there is toxicity when we get too much vitamin D, so there is something we want to look for. It's rare. It's something you'd have to be supplementing for a longer period of time on extremely high levels, but it will appear as nausea, vomiting, poor appetite, constipation, weakness, and weight loss, and it also damages the kidneys. The higher levels are 4,000 IU and above that you can get into some of this for long-term, but it's not something that we're seeing a lot of.

Ms. King:

Are there human studies that show success in using vitamin D against viruses like COVID-19 or to prevent infection, and if so, what does the research show?

Dr. Pangan:

Great question. We want to go to the evidence and look at that, and right now there is no clinical trial that we have the results from dealing with vitamin D in COVID-19. Now, if we look at studies that are underway, there are 8 studies registered under ClinicalTrials.gov that are evaluating vitamin D's role in preventing or easing COVID-19, so we're optimistic that we're going to have studies.

Now, if we look at the literature for other studies that have been done, we do have strong evidence for supplementation of vitamin D helping with upper respiratory tract infections, especially acute respiratory distress syndrome, ARDS. Other things, the evidence is less consistent, things like common colds and flu, but we do have strong evidence for this ARDS, so there is some association there that is giving us reason to think that we're going to see positive results with COVID and vitamin D, but we don't have the research yet.

Ms. King:

For those just tuning in, you're listening to *Nutrition Edge* on ReachMD. I'm Kathy King, and today I'm speaking with dietitian Dr. Teresa Pangan about popular diet therapy of taking supplemental vitamin D during the COVID-19 pandemic and beyond.

So, Teresa, now that we've talked about how vitamin D is being tried as a protector against COVID-19 and other viruses, let's switch gears a bit and focus on some best practices. How much vitamin D should we be consuming on a daily basis? Are there nutritional sources of vitamin D that help us meet this recommendation, and are the supplements the only way to get there?

Dr. Pangan:

Great question. So, first off, for adults the recommendation is 600 IU, international units, of vitamin D each day—now, 800 if you're over the age of 70. That's from sunlight, diet, and supplements. Now, men and women on average don't exceed 288 IU a day from food. Fatty fish, mushrooms are the only plant source, egg yolk, and then fortified foods—like a lot of our dairy products here in the US are fortified with vitamin D. So, this is why it's really difficult to meet our requirements, especially if we're isolated in lockdown so we're not getting that sunlight.

There are factors that are going to affect how much we get from the sunlight, factors like pigment in your skin, age. The older you are, we know that we don't metabolize as well. We still don't know quite why, but we know it doesn't happen from the sunlight, the conversion as much. How much clothing we're wearing out in the sun, even pollution can affect it, the time of year. You've got that 37-degree latitude north or south of the equator where if you're above that 37-latitude mark, then you only have certain windows throughout the year that you're going to get these UVB rays that actually will convert in your body—and then obesity and sunscreen. All those things factor into decreasing the amount of vitamin D that we make from the sunlight so really important that we think this through.

Ms. King:

I think this is very important during this discussion. About 45 years ago in the US, medicine and politicians with nutritionists' concurrence started what has been described as reductionist nutrition or nutritionism—in other words, taking an individual nutrient out of healthy food and recognizing its powers, like a pill. Has this been a positive move or not?

Dr. Pangan:

Great question in this context. So, you know, I don't like thinking of taking a vitamin as a supplement in any way similar to taking it in food. Food is your symphony. There's so much that happens in your body and your body is complex, so I agree with avoiding the reductionist practice. However, here we go with vitamin D. Things are a little different, and I'm willing to make an exception here. Now, here is what I'm going to recommend: Eat mushrooms. Every time you're at the store grab the mushrooms. Lots of them. Eat fatty

fish twice a week like recommended. Make sure your dairy products are fortified. Get out for 10–30 minutes in the middle of the day in the sun, especially in these summer months. And our bodies are amazing at converting it no matter how old we are or what our skin pigment is or what we're wearing, so do those things. And then I'm going to go easier on looking at supplementing with vitamin D because our bodies aren't going to get enough from the food and the sun right now, so during these times, yes, supplements are going to be a necessary part of getting enough so that we are well-equipped for COVID-19, so I'm going to make an exception.

Ms. King:

Staying in line with that thought, which type of supplements are recommended?

Dr. Pangan:

This is really important because there are different forms of vitamin D in the supplement market, and there's D2 and D3. You want to go with D3 because studies show it's more effective at raising blood levels. You want to take it with food ideally because you want a little bit of fat to absorb it. It's a fat-soluble vitamin. And then the other consideration is, for obese patients, it's actually better the D3 to have a form called calcidiol. That's c-a-l-c-i-d-i-o-l. The other form of D3 is cholecalciferol. And we want this calcidiol because it's less liposoluble, which we find in obese patients. They end up storing less of vitamin D in their adipose tissue when they take it in this form and more is available in their serum, so that's another consideration. And the last thing is you want to make sure it's USP-verified because in the US we don't have anybody overseeing supplements, so it can be tough to know if you're buying what you think you're buying. And we have research to show a lot of times it's not what you think is in the bottle, so USP verification is really important, so those are some things to look for when you're selecting a supplement.

Ms. King:

And, Teresa, finally, if you're testing blood levels of vitamin D, what's the recommended range to stay within?

Dr. Pangan:

Typically it's going to be 50-125 nmol/L for the recommended range to not be considered insufficient or deficient.

Ms. King:

Well, that's, unfortunately, all the time we have for today, so I want to thank you, Teresa, for sharing your insights on vitamin D. It was great having you on the program.

Dr. Pangan:

Thank you.

Ms. King:

I'm Kathy King, and you've been listening to *Nutrition Edge* on ReachMD. To access this and other episodes in our series, visit [ReachMD.com/NutritionEdge](https://ReachMD.com/NutritionEdge) where you can Be Part of the Knowledge. Thanks for listening.