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Nutrition and corona virus: Plan a diet in a pandemic

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Abstract

The corona virus pandemic is causing the worst ever health disaster in the recent decades. Continuously newer drugs are being tried for the same with variable success. There has been much talk about one's immunity and the corona survival. There are a lot of traditional food items which can increase the immunity with an additional benefit of some antiviral properties. Citrus fruits, sitaphal, apple papaya are among the fruits. Vegetables including broccoli, onion, garlic and green leaves are a few vegetables. Nuts, ginger, turmeric, pepper, egg yolk, shell fish, mushroom are some of the miscellaneous dietary supplements which have both properties. In a pandemic scenario, diet and nutrition can be an important supplement to pharmacy to counter viruses. We have tried to give complete menu for a day with such properties. The major hiccup may be the non-availability of certain foods. Hence, we have also suggested many alternate recipes to tackle this problem. This sample menu and their alternatives are being given for a normal adult. Needy changes should be contemplated according to age, sex, body mass index and daily physical activities.

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INTRODUCTION

Corona virus started as an acute viral respiratory illness in Wuhan state of china at the fag end of 2019. It spread as a pandemic to all the countries infecting lakhs of people killing many thousands globally. A lot of drugs have been tried in the setting of life-threatening respiratory disease and still the ideal combination remains elusive. In this deficient scientific evidence to control the pandemic, nutrition and diet should be supplemented to these patients (Adhikari *et al.*, 2020). The dietary management should be considered in terms of improving immunity and utilizing the anti-viral properties of few nutrients. Eating a low-fat, plant-based vegetarian diet may boost the immune system. Vegetarians have been shown in a few studies to have more effective white blood cells compared to non-vegetarians, because of a higher intake of vitamins and lower intake of fat (Davison *et al.*, 2016). Hence, we shall consider in this short review the food items with properties of enhanced immunity and anti-viral effects. The crux of the problem is the non-availability of many nutritious supplements due to various government measures taken to curb viral spread. We will derive a menu with easily preparable recipes to follow the same.

Foods that increase immunity and with possible anti-viral properties

Citrus fruits

Plants in the genus produce citrus fruits, includ-

ing important crops such as oranges, lemons, pomelos, and limes.Citrus fruit is one of the nature's best and easily available source of vitamin C, a key nutrient in supporting our immune system. Citrus fruits are known to have other benefits like antioxidant, anti-tumour, cardioprotective and neuroprotective effects. They have additional fibre content also. But what makes them significant is their immune boosting potential. Citrus as juice especially with sugar may not give all the benefits of the ingredients. The most important chemicals are the flavonoids (Lv *et al.*, 2015). Table 1 shows,

Other fruits

Even though almost every fruit is good for health and human immunity, it has been proved that apple, sitaphal and papaya have got antiviral effects against specific viruses (Suchitra and Parthasarathy, 2015; Konowalchuk and Speirs, 1978). Even-though extrapolation to corona virus is unscientific, the antiviral and immune boosting properties of the above said fruits is established.

Nuts and seeds

Many nuts and seeds including almonds, peanuts and ground nuts have high vitamin E levels.Vitamin E, a lipid-soluble antioxidant commonly present in the membrane of all cells including immune cells. This is supposed to prevent stress induced damage to cells. Eating almondshave been recently used to treatcommon flu symptoms. It has been suggested that almonds exhibit some antiviral actions. The peanut skin has also significant antiviral activities according to recent research (Makau *et al.*, 2018).

Green tea

Green tea botanically termed as Camellia sinensis contains a group of flavonoids called catechins. These chemicals appear to inhibit viral infections by blocking the enzymes that is important in replication. Green tea has shown to be effective in inhibiting HIV, the hepatitis B and the herpes viruses (Chacko *et al.*, 2010).

Vegetables

Broccoli and other cruciferous vegetables were proven to help boost immunity. Researchers claim that sulforaphane, a chemical found in this vegetable, switches on the antioxidant genes and enzymes in specific immune cells.This effect combats free radicals in our body and prevent the disease getting worsened. Broccoli has also been found to have anti- viral properties against influenza viruses (Antonenko *et al.*, 2013).

Garlic

Garlic has been known to have antioxidant, cardioprotective and anti-tumour effects. Allicin (chemically - allyl 2-propenethiosulfinate) is the primary bioactive chemical which is present in the aqueous extract of garlic. This chemical is also found evenin the raw garlic homogenate. When garlic is chopped, the enzyme alliinase is activated to produce allicin. Many studies have noted the anti-viral activity of garlic extracts against HIV, herpes, cytomegalo - virus and the flu viruses (Bayan *et al.*, 2014). The exact mechanism is unknown.

Turmeric

Turmeric is a herbaceous perennial plant (botanical name: Curcuma longa) belonging to the ginger family. The medicinal properties of turmeric, the source of bioactive compound curcumin, have been known for centuries; still the ability to know the exact mechanismof action and to determine the bioactive components are still not completely understood. The compound is known to have antioxidant, antibacterial, antiviral, cardioprotective and immune stimulating properties. The bioavailability of curcumin is increased by the addition of black pepper. In a study, researchers have found that the inflammatory cytokines like the mean serum IL-1β and the vascular endothelial growth factor were found to be significantly reduced by curcumin therapy (Hewlings and Kalman, 2017). This assumes significance in the wake of corona epidemic where the cytokine surge is worsening patients rather than the virus replication.

Ginger

Ginger and its products are being used to raise the function of the immune systems. The extracts of ginger have anti-inflammatory, digestive, and antitumour effects. Fresh Ginger (botanically - Zingiber Officinale) but not a dried one has been shown to have anti-viral activity A against Human Respiratory Syncytial Virus in a Human Respiratory Tract Cell Line study. Hence to extrapolate for flu and a trial of such nutrient as an additive in our diet can prove useful. The ginger extract actually stimulated the production of TNF-alpha expression by the immune system. Researchers also studied ginger along with other natural compounds in combination for inhibiting H1N1 influenza A (Mashhadi *et al.*, 2013; Chang *et al.*, 2013) and demonstrated the inhibition of viral replication.

Miscellaneous

Beta-carotene is a powerful antioxidant that can reduce inflammation and boost immune function by increasing leucocytes in the body. Excellent sources of beta-carotene include sweet potatoes, carrots, and green leafy vegetables (Grune

Table 1: Showing menu with nutritious diet plan

Time	Recipe	Remarks	Alternative
Early morning	Green tea75 ml , almonds with skin 2 pieces	Immune boosting Antiviral	Warm water with honey
Breakfast	Idly- 4/dosa 3 Onion-tomato chutney – 1-2 table spoon	carbohydrate and protein Immune booster with antiviral	Vegetable ragiuppma – 1 katori Mint chutney
Midmorning	Sprouted green gram dhal with lemon – 20 grams	Protein Immune booster	Egg white /mushroom pepper fry / Coconut water 100 ml Ground nuts – 1 small cup
Lunch	Rice – garlic sambar – 2katori Broccoli saute – 20 grams /other cruciferous vegetables /carrot curry + Curd – 150 ml	Immune boosting /antiviral Calorie intake	Shell fish soup Rice Sweet potato rasam,-2katori Carrot and green leafy vegetables – cooked – 2 cups Ginger raita
Evening	Papaya -1 and apple -1 (small)	Immune boosting /antiviral	Sitaphal 10 cusps /orange juice/grapes
Dinner	Chapathi 3 -4 + Vegetable subjee /peas masala – 1 cup	Immune boosting /antiviral	Sesame rice 2katori cups/lime sevai-2katori.
Bedtime	Turmeric milk with black pepper 150 ml	Immune boosting /antiviral	Combining garlic, ginger, lemon and honey as a single juice 150 ml

et al., 2010). Coconut water is rich in vitamins like riboflavin, niacin, thiamine and folates and it also possessesanti-viral and anti-bacterial properties (Chauhan *et al.*, 2014) that can help increase our body's immune system and increase our capacity to fight viral infections like flu.

Onions contain organosulfur compounds like quercetin and allicin (Sharma, 2019) which are associated with inhibition of viral infection. These bioactive compounds can hinder virus attachment to the host cell. They can alter transcription and translation of viral genome inside the host cell and hence also affectthe viral assembly. Inhibition of viral entry into the cell and inhibition of RNA polymerase have also been postulated as mechanism of antiviral actions of this vegetable. Tamarind leaves (Caluwé *et al.*, 2010), fruits and seeds with a multitude of uses have been also demonstrated to antiviral properties.Regular intake of probiotics allows their intimate interaction with the gut mucosa and mucosal immune system. Probiotics can modulate immune and inflammatory response in the human gut through their interaction with gut epithelial cells. It has been established about the presence of gut brain axis. The curd is a simple nutrient supplement for probiotics (Meydani and Ha, 2000). Lutein and zeaxanthin are the predominant carotenoid species found in egg yolk, although β-carotene, α-carotene, and β-cryptoxanthin are also present at lower levels. The Avidin in egg white gets destroyed on cooking and hence the bioactive chemical biotin is made available to the body (Andersen, 2015). Apart from vitamins, cardioprotective compounds, shell fish has numerous amounts of carotenoids to increase immunity (Venugopal and Gopakumar, 2017; Hosomi *et al.*, 2012). Sesame is a simple nutrient food with enough zinc as its content. Zinc has always been noted for its antibacterial and antiviral properties (Suchitra and Parthasarathy,

2020). Zinc also has a positive effect on body's defence mechanisms. Oats as a diet is useful for giving calories but also has got fibre with vitamin D. This meal can have antioxidant effects. There is not much immune boosting nor antiviral effects for oatmeal (Rasane *et al.*, 2015). It's better to avoid bread Jam in these pandemic times as the base is Maida. Whey protein (West *et al.*, 2017) even though it has got antiviral properties, it's not advisable to include it in the night. Extracts of the plants and leaves of the mint family have shown anti-viral effects (Herrmann and Kucera, 1967). Ragi usually preferred for its nutrients is not known to have anti-viral effects. The sample recipe with alternative menu will provide approximately 1800-2200 kilocalories. It changes according to the size of the ingredient, the method of cooking etc. Subtle changes can be done according to the necessity of the patients age, sex, height, weight and daily activities. The alternatives are given to switch the taste and also the problem of pandemicmay decrease the availability of any one of these nutrients.

CONCLUSIONS

Planning and taking a proper diet are necessary in tackling diseases. Nutritional supplement is necessary to effectively counter viral illness and their ill effects. Hence a diet with a combined immune boosting and antiviral effects are important.

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