International Journal of Environment, Agriculture and Biotechnology
Vol-9, Issue-2; Mar-Apr, 2024
Peer-Reviewed International Journal
Journal Home Page Available: https://ijeab.com/
Journal DOI: 10.22161/ijeab

Intake of immunity boosters by Covid -19 patients of Bikaner city

Rekha Yadav*, Mamta Singh, Raveena, Partibha and Neha Bajal

Department of Foods and Nutrition, I.C. College of Community Science, Chaudhary Charan Singh Haryana Agricultural University, Hisar (Haryana), India
*Corresponding author: rekhayadav99@hau.ac.in

Received: 11 Jan 2024; Received in revised form: 18 Feb 2024; Accepted: 25 Feb 2024; Available online: 07 Mar 2024

Abstract— *Corona virus disease 2019 (COVID-19) is an acute and contagious disease characterized by pneumonia and acute respiratory distress syndrome, which is caused by a novel corona virus (2019-nCoV). Three hundred post Covid-19 adult (19-39 years) patients were selected for present study comprising 150 males and 150 females. Subjects were selected after procuring the list of patients from Prince Bijay Singh Memorial and Shri Ram Hospital, Bikaner (Rajasthan) by purposive/ convenient random sampling on the basis of their willingness to cooperate during the study. The study had been carried out from January to June 2021. Majority of subjects consumed immunity boosters such as chyawanprash (74.0%), homemade decoction (84.3%), golden milk (78.7%) and citrus fruits (100%). Majority of subjects (74.0%) were aware about the meaning of immunity boosters. Majority (80.0%) of subjects were doing yoga daily. Almost equal number of subjects irrespective of gender drunk warm water whole day, it may be due to the reason that guidelines given by WHO has strongly recommended to drink warm water daily. In present investigation data unfurls that all patients (100%) consuming turmeric as immunity booster spices followed by 64.3 % cinnamon, 18.7% garlic and 5.3% coriander. Majority of subject's (74.0%) consumed chyawanprash, while 26.0 percent did not consume. During pandemic the consumption of turmeric milk found high as it is good antibiotic; also have positive effect on immunity.*

Keywords— ***Immunity boosters, immunity, , pandemic, antibiotic.***

I. INTRODUCTION

The Coronavirus disease 2019 (COVID-19) is an acute and contagious disease characterized by pneumonia and acute respiratory distress syndrome (ARDS). The pandemic caused by a novel coronavirus (2019-nCoV) recently reclassified and named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) which belongs to the family of *Coronaviridae*. The first coronavirus that caused severe disease was severe acute respiratory syndrome (SARS), which originated in Foshan, China, and resulted in the 2002, SARS-CoV pandemic. The second was the coronavirus-caused Middle East respiratory syndrome (MERS), which originated from the Arabian Peninsula in 2012. SARS-CoV-2 is the third coronavirus that caused severe disease in humans to spread globally in the past 2 decades (Wiersinga *et al.*, 2020). Coronaviruses are large, enveloped, single-stranded RNA viruses found in humans and other mammals, such as dogs, cats, chicken, cattle, pigs, and birds. The first human coronavirus was identified in 1960 and to date seven human coronaviruses have been recognized. CoVs are divided into four genera: alpha, beta, gamma and delta-CoV. CoVs currently known to cause diseases in humans belong to the alpha or the beta-CoV. The average incubation period of SARS-CoV-2 is 5–6 days, but it can be up to 14 days. The routes from human to human of SARS-CoV-2 transmission can be direct, droplet inhalation, contact, through saliva, and via fecal–oral routes (Khan *et al*., 2020). Human-to-human transmission of SARS-CoV-2 occurs mainly between family members, including relatives and friends who intimately contacted with patients or incubation carriers (Guo *et al*., 2020).

The clinical outcomes of Covid-19 can vary from asymptomatic to a mild to severe state. Common symptoms of Covid-19 include headache, breathlessness, fever, cough, fatigue, dyspnea, diarrhea, and even conjunctivitis, occasionally leading to severe SARS-like viral pneumonia, acute respiratory distress syndrome (ARDS), multi-organ dysfunction, and even death (Balasubramanian and Ramalingam, 2020). Asymptomatic patients have infection (SARS-CoV-2) but never show any signs and symptoms while pre asymptomatic patients have no symptoms but when detected they were positive for SARS-CoV-2 and later develop symptoms. Older people and people with pre-existing medical conditions such as diabetes and heart disease are more vulnerable to the virus to become seriously ill (Syangatan *et al*., 2020).

Mrityunjaya *et al.* (2020) suggested that many nutritional supplements from various spices, herbs, fruits, roots, and vegetables can reduce the risk or severity of a wide range of viral infections by boosting the immune response, particularly among people with inadequate dietary sources and also by their anti-inflammatory, free radical scavenging, and viricidal functions. These nutrients can be repurposed in mitigating the pathological effects induced by the SARS-CoV-2 infection. Therefore, the use of natural compounds may provide alternative prophylactic and therapeutic support along with the therapy for Covid-19.

The immune system is indeed complex and is to a great extent impacted by the environment around us. Strengthening the immune system is the best protection against infectious diseases and a secret to good health. Counseling regarding immunity boosters is mandatory to make people aware and protect themselves from attack of virus by following certain habits like eating nutritious food, proper hygiene and sanitation, regular exercise, maintenance of emotional and mental health and usage of spices as well as herbal decoctions. However, a healthy lifestyle can help naturally build up your immune system to make your defense as strong as possible and prevent people to Covid-19.

II. REVIEW OF LITERATURE

Cinatl *et al.* (2003)**;** Chen *et al.* (2004) and Brush *et al. (*2006) reported that other anti-viral components like glycyrrhizin from liquorice have been known to show some activity against Corona virus and SARS, revealing the significance of glycyrrhizin to be used as trial drug in Covid-19 affected patients, in order to develop it as a potent cure drug. Similarly Carrasco *et al. (*2009); Kim and Lee (2009) and Bui *et al.* (2019) reported that the decoction of ginger, cloves and black peeper have been recommended to the healthy as well as Covid-19 infected person as it provides support in the humoral and cell mediated responses and also lowers the air way hyper responsiveness and nasal congestions. Apart from this, muti-vitamins intake within human body can wash away the sickness forces through recruiting the immune soldiers Combs *et al.* 2016. An *in-vitro* study by Lin *et al.* (2017) depicted the role of resveratrol from grape seeds against Corona viruses. Nevertheless, other plants like oregano, garlic, ginger, lemon, broccoli, mint, *tulsi*, fennel, thyme, cinnamon, star anise etc. should be tested in the different forms so as to form an effective drug to fight against Covid-19. It was further affirmed that Vitamin D was potent in reducing the hazards associated with viral pandemic.

According to Majumdar *et al*. (2020) **"**The global healthcare system is facing many challenges during the pandemic outbreak of Covid-19. India has a treasury of some indigenous medicines like Ayurveda, Unani and Siddha. Ayurveda is a classical medicinal system initiated in India from 2000 years ago. Ayurvedic can stimulate the immune-modulators within human body and enhance the immunity system. Ayurveda and yoga may support the patients of Covid-19 with improvement of quality of standard care". Recently in India, it was suggested by the Ministry of AYUSH, to drink *Kadha* as a booster of immunity and lowering the tenderness caused during Covid-19 catastrophe. A *Kadha* is an extract prepared from less juicy or dry ingredients like spices and herbs. The Ministry of AYUSH with its conventional acquaintance has an extensive custom of maintenance of nation's health and its participation has augmented manifolds in this Covid-19 pandemic crisis (AYUSH Advisory, 2020). All ayurvedic healthcare professional generally recommend classical ayurveda medicine, however AYUSH-64 a novel formulation prepared by CCRAS provides resistance against malaria and other fevers.

According to Ding *et al.* (2018) and Adem *et al.* (2020) Polyphenols are known to increase the immune to cells to foreign infestations and in response permits cellular accumulation of different types of polyphenols through varied receptors. This subsequently triggers signaling pathways and initiate immune responses. The natural polyphenols were identified as potent Covid-19 protease inhibitors. Similarly Lewis *et al.*, (2019) and Petric (2020) reported that diet comprising of multi-vitamins wield immune modulatory possessions on numerous immune cells such as monocytes, neutrophils, lymphocytes, NK cells and dendritic cells that bump up the immunity against pathogens**.** In the same way Sarfraz *et al.*, (2020) stated that dietary minerals are essential immunity mediators should be incorporated into the diet i.e. different fruits, spices and vegetables are abundant with immuno-

stimulators that in turn fortify the innate as well as adaptive immune responses against viral elements**.**

Pal *(*2020) also revealed that zinc one of the anti-inflammatory and anti-oxidant micro-nutrient found in food with well-established role in immunity is currently being used in some clinical trials against Covid-19**.** Likewise Arshad *et al.* (2020) stated that Covid-19 is affected people with low immunity response. Plant-based foods increased the intestinal beneficial bacteria which are helpful and make up of 85 per cent of the immune system. By the use of plenty of water, minerals like magnesium and zinc, micronutrients, herbs, food rich in vitamins C, D & E and better life style can promote the health and can overcome this infection. In the same way Jayawardena *et al.* (2020) reported that scientific expedition of escalating immune system through appropriate sleep, judicious exercise, stress-free environment, proper nutritive foods, water intake and consumption of fresh and healthy fruits and vegetables would anticipate the citizenry to cope with corona virus battle via naturally vaccinating their systems. While Yasmin *et al.* (2020) revealed that high dose of Vitamin D reduced the hazard of several chronic ailments such as cardiovascular diseases, diabetes mellitus, hypertension, cancer and respiratory tract infection. Similarly Joachimiak (2021) reported the current estimates of 40 per cent to 70 per cent individuals worldwide will become infected over the course of this pandemic in the absence of strong mitigation efforts. Zinc should be included as part of preventative supplementation for Covid-19 and in general for support of immune health. Zinc supplementation should also be considered in the context of zinc deficiency acquired during a viral infection and host immune response. Healthy individuals with a robust immune system have clearly a better starting point for the difficult Covid-19 viral infection with expected positive effects on clinical outcomes such as shortening the duration of even just the sub-severe cases.

III. MATERIALS AND METHOD:

Locale of the study

The list of patients after seeking prior permission and having discussion with the respective hospital authorities was procured from Prince Bijay Singh Memorial and Shri Ram Hospital, Bikaner (Rajasthan). After that researcher visited respondents residential site and most of the patients belongs to the east & West Bikaner.

Selection of sample

Researcher visited hospital for subject selection after obtaining authorized consent from the respective hospital authorities. The post Covid-19 adult patients were selected for the present investigation. Three hundred both male and female were selected by purposive/ convenient random sampling on the basis of their willingness to cooperate during the study.

Development of interview schedule for data collection

A structured interview schedule with sufficient number of items prepared short, crisp, scientifically structured, validated, easy-to-use and applicable for each group was developed to collect the data from the subjects. The schedule approved by the experts before implementing on the subjects. The pretested interview schedule consists following section:

General information of the subjects

This section included gathering of general information about the subjects regarding their name, age, gender, category, religion, educational qualification, type of activity, family type etc.

Age: The chronological age of the respondents at the time of data collection was recorded.

Gender: It refers to the range of characteristics pertaining to and differentiating between male and female.

Religion: The categories framed as Hindu, Muslim, Sikh, Christian and Jain.

Category: Caste referred to the class or distinct hereditary order of society. Information regarding caste of the respondents recorded fewer than four categories: General, Other Backward class, Schedule Caste and Schedule Tribes.

Educational Qualification: The term education was operational zed as the level of school education perused by the respondents. Level of education assessed in terms of Literate, Primary, Middle, High school, Graduate (Bachelor degree) and above (Post graduate and Doctorate).

Type of activity: The quality or state of being active was assessed in terms of sedentary, moderate and heavy.

Family Type: Nuclear family consists husband wife and their children and any other members of unit which are living with them. Joint family often includes multiple generations in the family. Three to four generations stay together under a single roof Rayangoudar (2009).

RESULTS AND DISCUSSION :

Distribution of subjects according to their demographic profile

General information

General information of three hundred Covid-19 patients (150 males and 150 females) aged 19-39 years selected randomly from Bikaner district of Rajasthan

collected thorough a pre-tested interview schedule which is narrated below.

Category

The table 1 illustrates that majority of the subjects (59.0%) belonged to general category followed by 24.7 per cent from OBC category, 9.7 per cent from schedule caste and 6.7 per cent of them belonged to Schedule tribes. Gender-wise data shows that the percentage of females (62.0%) in general category recorded higher as compared to males (56.0%) and equal percentage noted in case of schedule tribes (6.7%).

Religion

Information regarding religion of the subjects explicated that majority of them Hindu (94.3%) followed by Jain, Muslim, Sikh and Christian (2.3%), (2.0%), (1.0%) and (0.3%) respectively (Table 1).

Table 1: Distribution of subjects according to their demographic profile

Parameters	Males n=150(50)	Females n=150 (50)	Total N=300(100)
Category			
General	84 (56.0)	93 (62.0)	177 (59.0)
Other Backward Class	42 (28.0)	32 (21.3)	74 (24.7)
Schedule Caste	14 (9.3)	15(10.0)	29 (9.7)
Schedule Tribes	10 (6.7)	10(6.7)	20 (6.7)
Religion			
Hindu	140 (93.3)	143 (95.3)	283 (94.3)
Muslim	2 (1.3)	4 (2.7)	6 (2.0)
Sikh	3 (2.0)	0 (0)	3 (1.0)
Christian	1 (0.7)	0 (0)	1 (0.3)
Jain	4 (2.7)	3 (2.0)	7 (2.3)
Educational qualification			
Primary	0 (0)	0 (0)	0 (0)
Middle	2 (1.3)	3 (2.0)	5 (1.7)
High School	23 (15.3)	17 (11.3)	40 (13.3)
Graduate	84 (54.8)	100 (66.7)	182 (60.7)
Above	43(28.7)	30 (20.0)	73(24.3)
Type of activity			
Sedentary	150 (100)	150 (100)	300(100)
Moderate	0 (0)	0 (0)	0(0)
Heavy	0 (0)	0 (0)	0(0)
Family type			
Nuclear	110 (73.3)	118 (78.7)	228 (76.0)
Joint	40 (26.7)	32 (21.3)	72(24.0)

Note- Figures in parenthesis indicates percentage of subjects

International Journal of Environment, Agriculture and Biotechnology
Vol-9, Issue-2; Mar-Apr, 2024
Peer-Reviewed International Journal
Journal Home Page Available: https://ijeab.com/
Journal DOI: 10.22161/ijeab

Educational Qualification

Subjects inquired about their academic qualifications. Table 1 unfurls that majority of the subjects (60.7%) finished graduation followed by post-graduation and above (24.3%), studied up to high school (13.3%) and only 1.7 percent attended middle school. None of the subject found educated up to primary level. Higher percentage of females (66.7%) found educated as compared to males (54.8%) up to graduation level. Similar trend observed for middle school while opposite result found at high school and above graduation.

Type of activity

Data unfolds that all the subjects found to be engaged in sedentary activities irrespective of gender. None of the subject engaged in moderate and heavy activities (Table 1).

Family Type

Table 1 discloses the data of type of family in terms of joint and nuclear. It can be seen that most of the subjects (76.0%) belonged to nuclear family followed by joint family (40.0%).

Information related to Immunity booster

Immunity is the main mechanism of host defense against infectious agents and Covid- 19 badly affects the individuals with low immunity. Vitamins, minerals, antioxidants, probiotics, and functional foods are some immune boosters which contribute to strong immunity. Information regarding Immunity is depicted in table 2 and portrayed beneath.

Meaning of Immunity booster

Immunity boosters are the supplements which can increase our immunity. Table (2) reflects that majority of subjects (74.0%) was aware about the meaning of immunity boosters. None of the subjects found unaware about the immunity booster, reason may be due to wide awareness campaign done by government and other agencies on print and electronic media. It also plays a significant role in pandemic for faster recovery and reduces the severity. Irrespective of gender almost equal number of subjects had proper knowledge of immunity booster.

Meditation yogasan and pranayama

Stress is one of the leading killers of immunity. Meditation yog asana and pranayama lead to a positive state of mind that promotes better health and immunity (Bushell *et al.*, 2020). The data in table (2) unfurls that majority (80.0%) of subjects were doing yoga daily. Only 20.7 percent males and 18.3 percent females did not doing mediation and pranayama.

Intake of warm water

Drinking warm water daily may keep our digestive system intact, help in improving blood circulation and reduce stress level. Ninety one percent of the subjects in the present study drunk warm water throughout the day. Almost equal number of subjects irrespective of gender drunk warm water whole day, it may be due to the reason that guidelines given by WHO has strongly recommended to drink warm water daily [Table 2].

Spices

Herbs and species are well known to boost immunity. It was observed that nations with lower consumption of species per capita showed greater number of Covid-19 cases per million populations. In present investigation data unfurls that all patients (100%) consuming turmeric as immunity booster spices followed by 64.3 % cinnamon, 18.7% garlic and 5.3% coriander. While 43.0 percent consumed other spices such as cumin, ginger, *munkka, kalimirch* and *tulsi.* None of the female subjects consumed coriander as a immunity booster [Table 2]

Ayush Ministry *kadha*

Ayush ministry has suggested measures which may help the public to remain healthy in pandemic times. The ministry recommended decoction made out using from *tulsi*, *dalchini*, *kalimirch*, *shunthi*, *Munkka*, jaggery and fresh lemon juice to be consumed once or twice a day which have a positive effect on the respiratory system. Data reflects that majority of subjects (88.3%) consumed ayush ministry *kadha.* Irrespective of gender almost equal number of subjects consumed kadha. It has been suggested that decoction kills the virus in respiratory itself and protects individuals to suffer with severity [Table 2].

Intake of *Chyawanprash*

Chyawanprash is a household remedy in north india. It is formulated by processing medicinal herbs and their extracts, including the prime ingredient *amla* (Indian gooseberry), which is the world's richest source of vitamin C subsequent mixture with honey and addition of aromatic herb powders (clove, cardamom, and cinnamon). It has positive effect on immune system. Majority of subject's (74.0%) consumed c*hyawanprash*, while 26.0 percent did not consume. Higher percentage of males (78.7%) than females (69.3%) used *chyawanprash* in Covid-19 period [Table 2].

Ayush Ministry guidelines

Ministry of Ayush recommended guideline to stop spread of Covid-19 virus. The ministry has given some measures of boosting immunity which included ayurvedic spices to be added in their diet to enhance immunity, using oil therapy for mouth and nose and steam inhalation. Most of the subjects (87.7%) following Ayush ministry guideline only 12.7 percent did not aware about these measures which are taken by government. More male (97.3%) subjects followed Ayush ministry guidelines than females (77.3%) [Table 2].

Homemade *kadha*

Homemade *kadha* is easily available source to improve immunity. Consuming herbal drinks and taking proper rest have helped Covid -19 patients survive from the deadly viral disease. Results unfurl that in present study most of the subjects (84.3%) consumed *kadha* prepared at home. Subjects convinced with the fact that immunity-boosting *kadha* is a life saviour and has helped them get through Covid -19 and also decrease the risk of severity [Table 2].

Golden milk or turmeric milk

India is a leading producer and exporter of turmeric in the world. Ninety percent of the total produce is consumed internally and only a small portion exported. During pandemic the consumption of turmeric milk found high as it is good antibiotic; also have positive effect on immunity. The results of present investigation demonstrated that 78.7 percent of subjects consumed turmeric milk daily followed by only 21.3 percent not consuming [Table 2].

Vitamin C

Vitamin C acts as antioxidant by combine with and scavenge many types of oxidizing free radicals and also used in healing wounds. To combat this pandemic, administration of high dose of ascorbic acid, in addition to standard conventional supportive treatments, has been shown to be a safe and effective therapy for severe cases of respiratory viral infection (Hong *et al*., 2020). Interestingly, result of present investigation showed that all (100%) the subjects consume vitamin c by including citrus fruits in their diet while some taking supplement of vitamin c. Use of vitamin c for Covid-19 patients is useful tool to fight against Covid-19 [Table 2].

Results about intake of immunity boosters revealed that majority of subjects found aware about meaning of immunity booster and most of them follow measures to boost immunity. The results of present study is alignment with the study conducted by Gautam *et al*., 2020 concluded that herbs such as *Tulsi, Marich, Sunthi, Dalchini* are the most commonly used and easily available spices in home and can be effective in immuno-regulation for controlling viral infections like Covid-19. Similarly another study conducted by Singh *et al*., 2021 that majority of subjects (71.8%) are taking *kadha* for combating infection and boosting immunity. Most of the subjects (86.1%) thought that there is no side effect of kadha while 13.9% think vice versa. A total of 93.6 percent of people used spices for treating coronavirus or other viral infection as well as boosting immunity. However in present findings, consumption of spices, warm water, chyawanprash, golden milk, citrus fruits, homemade and ayush ministry decoction found as immunity boosters. Hence, it can be concluded that use of immunity boosters may reduce the risk of severity of the disease and helps in faster recovery.

Table 2: Distribution of subjects according to information related to immunity boosters

S.No.	Parameters	Male n=150(50.0)	Female n=150(50.0)	Total N=300(100)
1.	**Immunity boosters**			
	Helps in increase immunity	16(10.7)	18(12.0)	34 (11.3)
	Protect against disease	25(16.7)	19(12.7)	44 (14.7)
	Both	109(72.6)	113(75.3)	222(74.0)
	Don,t know	0(0)	0(0)	0(0)
2.	**Yogasana, pranayama and meditation**			
	Yes	119 (79.3)	121(80.7)	240(80.0)
	No	31(20.7)	28(18.3)	60(20.0)
3.	**Warm water**			
	Yes	138(92.0)	135(90.0)	273(91.0)
	No	12(8.0)	15(10.0)	27(9.0)
4.	**Spices most used for immunity booster**			

	Turmeric	150(100)	150(100)	300(100)
	Garlic	30(20.0)	26(17.3)	56(18.7)
	Coriander	16(10.7)	0(0)	16(5.3)
	Cinnamon	102(68.0)	91(60.7)	193(64.3)
	Any other	83(55.3)	46(30.7)	129(43.0)
5.	**Ayush ministry *kadha***			
	Yes	136(90.6)	129(86.0)	265(88.3)
	No	14(9.3)	21(14.0)	35(11.7)
6.	**Intake of *chyawanprash***			
	Yes	118(78.7)	104(69.3)	222(74.0)
	No	32(21.3)	46(30.7)	78(26.0)
7.	**Ayush ministry guideline**			
	Yes	146(97.3)	116(77.3)	262(87.3)
	No	4(2.7)	34(22.7)	38(12.7)
8.	**Homemade *kadha***			
	Yes	132(88.0)	121(80.7)	253(84.3)
	No	18(12.0)	29(19.3)	47(15.7)
10.	**Golden milk**			
	Yes	121(80.7)	115(76.7)	236(78.7)
	No	29(19.3)	35(23.3)	64(21.3)
11.	**Vitamin C**			
	Yes	150(100)	150(100)	300(100)
	No	0(0)	0(0)	0(0)

Note: Figures in parenthesis indicates percentage of subjects

IV. CONCLUSIONS

An interview schedule developed for obtaining the required information about all the subjects. While assessing general information about the subjects it was observed that majority of the subjects (59.0%) belonged to general category followed by 24.7 per cent from OBC category, 9.7 per cent from schedule caste and 6.7 per cent of them belonged to schedule tribes. Gender-wise data showed that the percentage of females (62.0%) in general category recorded higher as compared to males (56.0%) and equal percentage noted in case of schedule tribes (6.7%). Majority of them were Hindu (94.3%) followed by Jain, Muslim, Sikh and Christian i.e. percent 2.3%, 2.0%, 1.0% and 0.3% respectively. Majority of the subjects (60.7%) were graduated followed by post-graduate and above (24.3%), studied up to high school (13.3%) and only 1.7 percent attended middle school. Higher percentage of females (66.7%) was observed educated as compared to males (54.8%) up to graduation level. All the subjects found to be engaged in sedentary activities irrespective of gender. Most of the subjects (76.0%) belonged to nuclear family followed by joint family (40.0%). Immunity boosters have a significant impact in Covid-19, also in this present study various immunity boosters taken by maximum number of subjects. The results of present investigation demonstrated that 78.7 percent of subjects consumed turmeric milk daily followed by only 21.3 percent not consuming. The ministry has given some measures of boosting immunity which included ayurvedic spices to be added in their diet to enhance immunity, using oil therapy for mouth and nose and steam inhalation. Most of the subjects (87.7%) following Ayush ministry guideline only 12.7 percent did not aware about these measures which are taken by government. Use of vitamin c for Covid-19 patients is useful tool to fight against Covid-19.

ACKNOWLEDGEMENT

The authors extend their gratitude to fellow contributors and those who provided assistance in facilitating the study.

REFERENCES

[1] Adem, S., Eyupoglu, V., Sarfraz, I., Rasul, A. and Ali, M. (2020). Identification of potent Covid-19 main protease (Mpro) inhibitors from natural polyphenols: an *in-silico.*

[2] Arshad, M. S., Khan, U., Sadiq, A., Khalid, W., Hussain, M. A., Asghar, Z. and Rehana, H. (2020). Coronavirus disease (COVID-19) and immunity booster green foods: A mini review. *Food Sci. Nutri.;* 8(8):3971–3976.

[3] Balasubramanian, A. and Ramalingam, K. (2020). Novel Coronavirus: A mysterious threat from Wuhan, China–A current review. *Int. J. Resea. Pharma. Sci.*; 11(1):7-15.

[4] Brush, J., Mendenhall, E., Guggenheim, A., Chan, T., Connelly, E., Soumyanath, A., Buresh, R., Barrett, R., Zwickey, H. (2006). The effect of *Echinacea purpurea*, *Astragalus membranaceus* and *Glycyrrhiza glabra* on CD-69 expression and immune cell activation in humans. *Phytothera. Resea.;* 20(8): 687–695.

[5] Bui, T. T., Fan, Y., Piao, C. H., Van, N. T., Shin, D. U., Jung, S. Y., Hyeon, E., Song, C. H., Lee, S. Y., Shin, H. S. and Chai, O. H. (2019). *Piper Nigrum* extract improves OVA-induced nasal epithelial barrier dysfunction via activating Nrf2/HO-1 signaling. *Cellular Immuno.;* 351.

[6] Bushell, W., Castle, R., Williams, M. A., Brouwer, K. C., Tanzi, R. E., Chopra, D. and Mills, P. J. (2020). Meditation and yoga practices as potential adjunctive treatment of SARS-CoV-2 infection and COVID-19: a brief overview of key subjects. *J. of Alter. and Compl. Medi.*;26 (7): 547-556.

[7] Carrasco, F. R., Schmidt, G., Romero, A. L., Sartoretto, J. L., Caparroz, A. S. M., Bersani, A. C. A. and Cuman, R. K. N. (2009). Immunomodulatory activity of *Zingiber officinale Roscoe*, *Salvia officinalis* L. and *Syzygium aromaticum* L. essential oils: evidence for humor and cell mediated responses. *J. Phamacy. & Pharma.;* 61(7): 961–967.

[8] Chen, F., Chan, K. H., Jiang, Y., Kao, R. Y. T., Lu, H. T., Fan, K. W., Cheng, V. C. C., Tsui, W. H. W., Hung, I. F. N., Lee, T. S. W., Guan, Y. (2004). *In-vitro* susceptibility of 10 clinical isolates of SARS Corona virus to selected anti-viral compounds. *J. Clinical Virol.;* 31(1):69–75.

[9] Cinatl, J., Morgenstern, B., Bauer, G., Chandra, P., Rabenau, H., Doerr, H. W. Glycyrrhizin, (2003). An active component of liquorice roots and replication of SARS-associated Corona virus. *Lancet.*; 361(9374): 2045–2046.

[10] Combs G. F., Jr, McClung J. P. Combs, G. F., McClung, J. M. (2016). Editors. Academic press.; pp. 1–593.

[11] Ding, S., Jiang, H. and Fang, J. (2018). Regulation of immune function by polyphenols. *J. Immuno. Resea.;* doi: 10.1155/2018/1264074.

[12] Gautam, S., Gautam, A., Chhetri, S. and Bhattarai, U. (2020). Immunity against COVID-19: Potential role of Ayush Kwath. *J. of Ayurveda and Integr. Medi.; DOI: 10.1016/j.jaim.2020.08.003.*

[13] Guo, Y. R., Cao, Q. D. and Hong, Z. S. (2020). The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak – an update on the status. *Military Medi. Resea.;* 7:11.

[14] Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y., Zhang, L., Fan, G., Xu, J., Gu, X., Cheng, Z., Yu, T., Xia, J., Wei, Y., Wu, W., Xie, X., Yin, W., Li, H., Liu, M., Xiao, Y., Gao, H., Guo, L., Xie, J., Wang, G., Jiang, R., Gao, Z., Jin, Q., Wang, J. and Cao, B. (2020). Clinical features of patients infected with 2019 novel Coronavirus in Wuhan, China. *Lancet*.;395 (10223): 497-506.

[15] Jayawardena, R., Sooriyaarachchi, P., Chourdakis, M., Jeewandara, C. and Ranasinghe, P. (2020). Enhancing immunity in viral infections with special emphasis on Covid-19: a review. *Diabetes Meta. Syndr.*; 14(4):367–382.

[16] Joachimiak, M. P. (2021). Zinc against Covid-19? Symptom surveillance and deficiency risk groups. *Pub. Library of Sci. Neglected Trop. Disease, 15*(1): 8895.

[17] Khan, S., Liu, J., & Xue, M. (2020). Transmission of SARS-CoV-2, Required Developments in Research and Associated Public Health Concerns. *FrontiersMedi.*; 7: 310.

[18] Kim, S.H. and Lee, Y.C. (2009). Piperine inhibits eosinophil infiltration and airway hyper-responsiveness by suppressing T cell activity and Th2 cytokine production in the ovalbumin-induced asthma model. *J. Pharmacy Pharma.;* 61(3):353–359.

[19] Lewis, E. D., Meydani, S. N. and Wu, D. (2019). Regulatory role of vitamin E in the immune system and inflammation. *Int. Union of Biochem. And molecu. Bio. Life.;* 71(4):487–494.

[20] Lin, S. C., Ho, C. T., Chuo, W. H., Li, S., Wang, T. T., Lin, C. C. (2017). Effective inhibition of MERS-CoV infection by resveratrol. *Bio. Med. Central Infect. Disease.;* 17(1):144.

[21] Majumdar, A. D., Soni, V. M. and Munjal, N. (2020). Ayurveda and Yoga: An Immunity Booster at the Time of Covid-19 Pandemic. *Int. J. Engineering Sci*.;*3*(6).

[22] Mrityunjaya, M., Pavithra, V., Neelam, R., Janhavi, P., Halami, P. M. and Ravindra, P. V. (2020). Immune-Boosting, Antioxidant and Anti-inflammatory Food Supplements Targeting Pathogenesis of COVID-19. *Frontiers immunol.*; *11*: 570122.

[23] Pal, G. K. (2020). Yoga to combat and prevent COVID-19. *Int. J. of Clinical and Experim. Physio.*;7(2); 46-47.

[24] Petric, D. (2020). Immune system and Covid-19. *Academ.* 382(8):727–733.

[25] Rayangoudar, R. S. (2009). Knowledge of rural women about organic farming. M.H.Sc. *Thesis*, Univ. Agric. Sci. Dharwad.

[26] Sarfraz, I., Rasul, A., Hussain, G., Adem, S. and Ali, M. (2020). Natural immune boosters as first-line armours to combat viral infection-Covid-19: myth or science? *Preprints*.; 1.

[27] Syangtan, G., Bista, S., Dawadi, P., Rayamajhee, B., Shrestha, L. B., Tuladhar, R. and Joshi, D. R. (2020). Asymptomatic SARS-CoV-2 Carriers: A Systematic Review and Meta-Analysis. *Front. in Pub. Health*.; 8: 587374.

[28] Wiersinga, W. J., Rhodes, A., Cheng, A. C., Peacock, S.J. and Prescott, H. C.(2020). Pathophysiology, Transmission, Diagnosis, and Treatment of Coronavirus Disease 2019 (COVID-19): A Review. *J. of American medi. Associ.;* 324(8): 782–793.

[29] Yasmin, A. R., Chia, S. L., Looi, Q. H., Omar, A. R., Noordin, M. M. and Ideris, A. (2020). Herbal extracts as anti-viral agents. *Feed Additi.;* pp. 115–132.