

Awareness About Home Remedies As A Preventive Measure For Covid-19 - A Questionnaire Based Study

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ABSTRACT

Background: COVID-19 is an infectious disease that is caused by a newly discovered coronavirus. The infection prevention and the Control measures are associated with the Supportive Care. Various home remedies and herbal treatments for COVID-19 have been advocated in India. These remedies for covid-19, traditional practices with home made herbal extracts and other valuable herbs has helped people protect themselves from these communicable diseases including covid-19 by boosting of immune system.

Objective: This study aims to assess the awareness about home remedies as a preventive measure for COVID-19.

Materials and Methods: This survey was created in google forms and circulated among the population. Google form results (data) were collected and entered into Microsoft excel.All the statistical analysis was performed by IBM SPSS V23 software, Chi-square tests were done in correlation with gender. With p value <0.05 was considered to be statistically significant.

Results: Almost every dental student was well aware of home remedies as a preventive method for COVID-19. Association between the gender and their thought on working of home remedies as a preventive method for Covid-19, among females around 34% of them agreed and among males around 52.83% of them agreed and the rest of them disagreed. Chi Square test - p value is 0.569 (P>0.05) and hence it was not significant.

Conclusion: In this article an attempt has been made to review the use of herbal products in a proper manner and to improve the capacity of the immune system. Home remedies can be a preventive measure and we can reduce the fear and cope up with CoronaVirusDisease.

Key words: Home remedy, public health, innovative techniques, herbal products, novel method, local treatment, COVID-19.

INTRODUCTION

HumanCoronaVirus [HCoV's] has multiple respiratory disorders associated with it. It all started in Wuhan, China at december 2019 and it had spread out across the globe and this huge pandemic was declared as a deadly virus by WHO and The very first case was reported in DEC 2019, Since that time till now everyone is very anxious and looking towards the pharmaceutical Companies for a suitable vaccine and treatment drugs (1). This virus emerged in late 2019 in China and is responsible for COVID pandemic [SARS-CoV-2]. This infectious and Communicable disease has become one of the major public health Challenges in the world. Initially the first vaccine was expected to arrive in June, 2020. but now in all the official COVID-19 vaccine is available around the world (feb 2021) but there is still a lag in availability (2). The clinical and hospital Management for new Covid Cases has been limited. Local treatment is also utilised by some of the students but their numbers are very low.

In the meantime various people have shared various recipes / remedies for COVID-19, These remedies for covid-19. has been already known for several years and has been used for various diseases (3). In the past they have expected the same results for covid also, the common remedies include the use of garlic, Cinnamon, ginger, mint, Holy basil, tulsi, honey, peppermint and so on.. (4) . These have high medicinal properties and are used in our day to day routine foods also, but there is no assurity that It will work against Covid-19. Various doctors have suggested various protective strategies, some are practical and some are not. In other ways, Some are affordable and some are not (5).

WHO has announced that the virus will remain with us for many years and we must find a way to live and survive with it. The lockdown and the social distancing has its own impact and the treatment found effective also has an alternative way to get treated without drug & vaccine (6). The traditional medicines and medical plants like artemisia annua, medicinal herbal extracts are the antiviral natural products against the COVID, Traditional homemade herbal remedies also enhance the person's immunity (7). There is no compulsion that all home remedies will work for COVID, some may not. Each and every herb has its own nutrient composition. Home remedies will work as an effective method but not for all the cases. Still improvement on the health and immunity against infectious disease is noticed. Our team has extensive translate knowledge and research experience that has into high quality publications(8),(9),(10),(11),(12),(13),(14),(15),(16),(17),(18),(19),(20),(21),(22),(23),(24),(25),(26),(27). The objective of this study was to assess the awareness about home remedies taken as a preventive method for COVID 19 (28).

MATERIALS & METHODS

STUDY SETTINGS & POPULATION:

A cross-sectional survey was conducted. The survey sample data was collected from a private dental institution in chennai, all male and female of all the years participated in this study. Pros of this study is an easily available sample, online survey and cons are random sampling, lesser time and less variations in responses marked.

DATA COLLECTION

DEMOGRAPHICS:

This survey was created using google forms, and sent to all the dental students via different online portals.

A set of 13 questions were framed and mentioned as below

1.Age
2.Gender
3.Level of education
QUESTIONNAIRE:
1.How many times do you sanitise your hands? *
2-3
4-5
6-8
2.Do you think Turmeric can prevent from COVID-19?
Yes
No
3.Have you consumed "Kabasura Kudineer" ? *
Yes
No
4.Does kabasura kudineer help in boosting your immunity?
Yes
No
5.Do you know that remaining hydrated $\&$ getting plenty of rest can prevent you from getting infected? st
Yes
No
6. Have you ever tried steam inhalation as a preventive method for COVID-19?
Yes
No
7. Which home remedies are used to treat common health issues? *
Inhalation of steam
Hot lemon drink
Honey
Chicken soup

8. Ever tried peppermint as a preventive step for COVID-19? Yes No 9. Have you ever cleansed vegetables with any antibacterial elements/substance? Yes No 10. Ever tried doing yoga for building up your immune system? * Yes No 11.Do you think home remedies will work as a preventive method for COVID-19? Yes No 12.Do you have included zinc & multi-vitamins in your daily intake? * Yes No 13.Do you think vitamin-c rich food helps in boosting immunity? *

STATISTICAL ANALYSIS:

This survey was done on google forms and Google form results (data) were collected and entered into Microsoft excel. All the statistical analysis was performed by IBM SPSS V23 software, Chi-square tests was done to analyze the results, with p value <0.05 was considered to be statistically significant

RESULT:

Yes No

Over 47% of people wash their hands 2-3 times and 42.5% of people wash their hands 4-5 times and 10.4% of people wash their hands 6-8 times. Turmeric as a preventive method for 93.4% of people has answered yes and only 6.6% of people have said no. About kabasura kudineer consumption, almost everyone has consumed it like 95.3% of students participated and only 4.7% of them have not. 90% of people think that kabasura kudineer helps in boosting our immunity against COVID. Over 84.9% of them tried peppermint for preventive steps and 13.2% of them have not tried it. 89% of people think that doing yoga will improve their health conditions.

In (Figure 1), the pie chart represents the response of the number of times that people sanitise their hands. 47.17% of them answered 2-3 times; 42.45% of them answered 4-5 times and 10.3% of them said 6-8 times. This proves that the majority of the dental participants over 47% sanitise their hands for 2-3 times. In (Figure 2), the pie chart represents the response of peppermint consumption as a preventive method for

COVID-19, almost 86.7% of them have tried peppermint as a preventive step for COVID-19 and 13% of them have not tried it. It can be seen That majority of the participants 86% have tried peppermint for prevention. In (Figure 3) the pie chart represents the response of kabasura kudineer helping in boosting our immunity, over 90.57% of the students have agreed that it helps in building immunity and 9.43% of them were against it. It can be noted that the majority of the dental participants over 90% have agreed that kabasura kudineer helps in building immunity. In (Figure 4) the This pie chart represents the response of turmeric usage in prevention of COVID-19, almost 93.4% of students think that turmeric can prevent from Covid-19 & 6.6% of them think turmeric cannot prevent from Covid-19, majority of the participants 93% thinks that turmeric can prevent them from coronavirus disease

In (Figure 5) the bar graph represents the association between the gender and their thought on working of home remedies as a preventive method for Covid-19, in females around 34% of them said yes and 3.7% of them said no; in males around 52.83% of them answered yes and 8.49% of them answered no. This graph suggests that people think that home remedies will work as a preventive method. Chi Square test - p value - (P>0.05) and hence it was not significant. In (Figure 6) the bar graph represents the association between the gender and their kabasura kudineer consumption, in females about 34.91% have consumed and in males around 60% of them have consumed and others have not consumed it. This bar graph suggests that almost everyone has consumed kabasura kudineer for building up their immunity. Chi Square test - p value (P>0.05) and hence it was not significant.

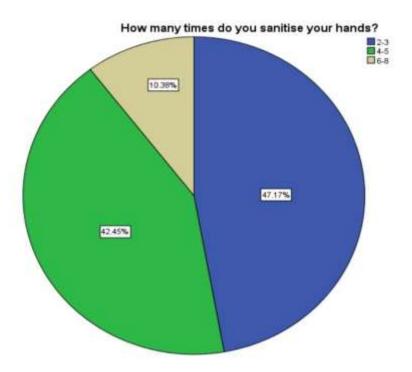


Fig 1: This pie chart represents the response of the number of times that people sanitise their hands. 47.17% of them answered 2-3 times denoted by blue colour; 42.45% of them answered 4-5 times denoted

by green colour and 10.3% of them said 6-8 times denoted by sandal colour. The majority of the dental participants over 47% sanitise their hands for 2-3 times

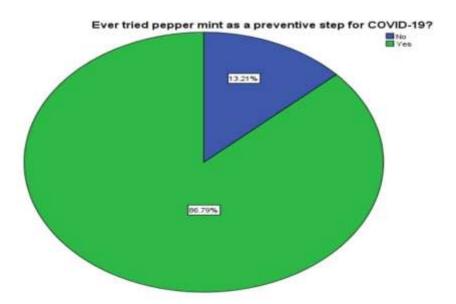


Fig 2: This pie chart represents the response of peppermint consumption as a preventive method for COVID-19, almost 86.7% of them have tried peppermint as a preventive step for COVID-19 it is denoted by green colour and 13% of them have not tried it denoted by blue colour. The majority of the participants 86% have tried peppermint for prevention

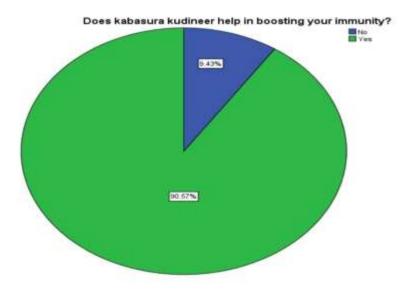


Fig 3: This pie chart represents the response of kabasura kudineer helping in boosting our immunity, over 90.57% of the students have agreed that it helps in building immunity denoted by green colour and 9.43% of them were against it denoted by blue colour. The majority of the participants over 90% have agreed that kabasura kudineer helps in building immunity.

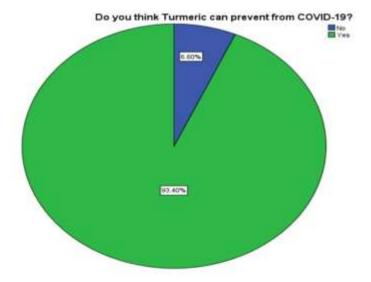


Fig 4: This pie chart represents the response of turmeric usage in prevention of COVID-19, almost 93.4% of students thinks that turmeric can prevent from Covid-19 denoted by green colour & 6.6% of them thinks turmeric cannot prevent from Covid-19 denoted by blue colour. The majority of the participants 93% thinks that turmeric can prevent them from coronavirus disease.

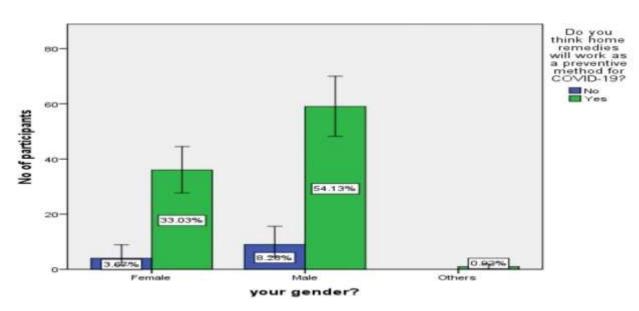


Fig 5: This bar graph represents the association between the gender and their thought on working of home remedies as a preventive method for Covid-19, x-axis represents gender and y-axis represents the percentage of the respondents, green colour denotes yes and blue colour denotes no, in females around 34% of them said "yes" and 3.7% of them said "no"; in males around 52.83% of them answered yes and 8.49% of them answered no. This graph suggests that the majority of people think that home remedies will work as a preventive method. Chi Square test - p value = 0.737 - (P>0.05) and hence it was statistically not significant.

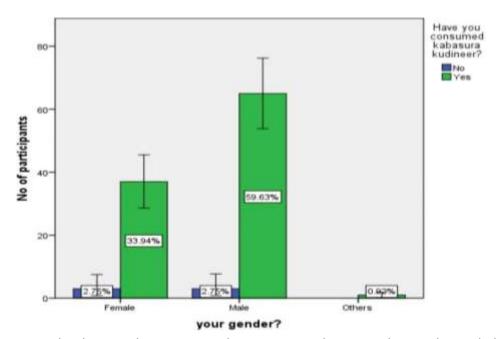


Fig 6: This bar graph represents the association between the gender and their kabasura kudineer consumption, x-axis represents gender and y-axis represents the percentage of the respondents, green colour denotes "yes" and blue colour denotes "no", in females about 34.91% have consumed and in males around 60% of them have consumed and others have not consumed it. This bar graph suggests that almost everyone has consumed kabasura kudineer for building up their immunity. Chi Square test - p value = 0.569 - (P>0.05) and hence it was not significant.

DISCUSSION

Since the outbreak of COVID 19 is extremely expanding exponentially and spreading beyond the borders, it has been classified as a pandemic outbreak in March 2020. It has created havoc & dismay among all the nations (29). This viral infection has made us stressed and worried about this huge pandemic - restlessness, confusion, and fear among the people increased several folds day by day during the lockdown (30,31). It was a significant finding in our study that they can not only protect themselves against the distance but also help others to study away from the infection by creating awareness for it. The results suggested that health organisations (87%) and professionals (57.9%) are able to communicate effectively with the participants in convincing and making them understand the pattern. (3)

Our study has revealed that the people with a higher educational background were more aware of the symptoms and its complications on Covid-19 and its respective home remedies. (32) This article represents the significant home remedies that are used for other curable diseases also, Home remedies such as peppermint, ginger, kabasura kudineer, using masks & hand sanitizer are commonly noted among dental students. Home remedies: *Piper nigrum L* (black pepper) and *Ocimum sanctum L* (holy basil) as a powdered combination thrice daily are used and *Nigella sativa* (black cumin) seeds are taken every morning to boost our immunity. *Zingiber officinale roscoe* (ginger) were taken several times daily to reduce high blood pressure and green tea was also taken regularly.

Clean and disinfect frequently touched objects and surfaces using a regular household cleaning spray or wipe, in our studies almost every one of them has cleaned the vegetables they bought right after they bring it to their home. (Moran, 2020) drinking herbal tea made by *Tulsi*, *Dalchini* (cinnamomum), black pepper, and dry ginger twice a day will improve your health status and it will work as a home remedy against Covid-19. A similar level of awareness was reported in recent studies in China and UAE. Previously MERS-CoV was a major global concern after it was first identified in 2012 (33). Limitations of this study were low case study on home remedies, random sampling, lesser time limit.. The data collected are highly confidential. Future studies with large sample sizes should be conducted for more reliable results and to make the context evident and in case of another pandemic we can be ready with one more alternative.

CONCLUSION

COVID-19 has become a deadly disaster and has disrupted the daily life and economic stability of billions of people throughout the world. As far now there has been a discovery of the vaccine but still side effects are noticeable and people have a fear of vaccination because of it. From our study it was clear that there is a well established knowledge and awareness regarding the home remedies among the participants. Thus home remedies do play an important role in the prevention and control of covid-19.

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CONFLICT OF INTEREST:

There is no Conflict of interest.

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REFERENCES:

- 1. Mair CE, Liu R, Atanasov AG, Schmidtke M, Dirsch VM, Rollinger JM. Antiviral and anti-proliferative in vitro activities of piperamides from black pepper. Planta Med [Internet]. 2016 Dec 14;81(S 01):S1–381. Available from: http://www.thieme-connect.de/DOI/DOI?10.1055/s-0036-1596830
- 2. Mao Q-Q, Xu X-Y, Cao S-Y, Gan R-Y, Corke H, Beta T, et al. Bioactive Compounds and Bioactivities of Ginger (Roscoe). Foods [Internet]. 2019 May 30;8(6). Available from: http://dx.doi.org/10.3390/foods8060185
- 3. Lim YX, Ng YL, Tam JP, Liu DX. Human Coronaviruses: A Review of Virus-Host Interactions. Diseases [Internet]. 2016 Jul 25;4(3). Available from: http://dx.doi.org/10.3390/diseases4030026
- 4. Raza K. Computational Intelligence Methods in COVID-19: Surveillance, Prevention, Prediction and Diagnosis [Internet]. Springer Nature; Available from: https://books.google.com/books/about/Computational_Intelligence_Methods_in_CO.html?hl=&id= vmsDEAAAQBAJ
- 5. Xiong H-L, Cao J-L, Shen C-G, Ma J, Qiao X-Y, Shi T-S, et al. Several FDA-Approved Drugs Effectively Inhibit SARS-CoV-2 Infection in vitro. Front Pharmacol [Internet]. 2020;11:609592. Available from: http://dx.doi.org/10.3389/fphar.2020.609592
- Kuang Z, Li X, Cai J, Chen Y, Qiu X, Ni X, et al. Calling for improved quality in the registration of traditional Chinese medicine during the public health emergency: a survey of trial registries for COVID-19, H1N1, and SARS. Trials [Internet]. 2021 Mar 5;22(1):188. Available from: http://dx.doi.org/10.1186/s13063-021-05113-y
- 7. Hayran C, Anik L. Well-Being and Fear of Missing Out (FOMO) on Digital Content in the Time of COVID-19: A Correlational Analysis among University Students. Int J Environ Res Public Health [Internet]. 2021 Feb 18;18(4). Available from: http://dx.doi.org/10.3390/ijerph18041974
- 8. Princeton B, Santhakumar P, Prathap L. Awareness on Preventive Measures taken by Health Care Professionals Attending COVID-19 Patients among Dental Students. Eur J Dent [Internet]. 2020 Dec;14(S 01):S105–9. Available from: http://dx.doi.org/10.1055/s-0040-1721296
- 9. Mathew MG, Samuel SR, Soni AJ, Roopa KB. Evaluation of adhesion of Streptococcus mutans, plaque accumulation on zirconia and stainless steel crowns, and surrounding gingival inflammation in primary molars: randomized controlled trial. Clin Oral Investig [Internet]. 2020 Sep;24(9):3275–80. Available from: http://dx.doi.org/10.1007/s00784-020-03204-9
- 10. Sridharan G, Ramani P, Patankar S, Vijayaraghavan R. Evaluation of salivary metabolomics in oral leukoplakia and oral squamous cell carcinoma. J Oral Pathol Med [Internet]. 2019 Apr;48(4):299–306. Available from: http://dx.doi.org/10.1111/jop.12835
- 11. R H, Hannah R, Ramani P, Ramanathan A, Jancy MR, Gheena S, et al. CYP2 C9 polymorphism among patients with oral squamous cell carcinoma and its role in altering the metabolism of benzo[a]pyrene

- [Internet]. Vol. 130, Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology. 2020. p. 306–12. Available from: http://dx.doi.org/10.1016/j.oooo.2020.06.021
- 12. Antony JVM, Ramani P, Ramasubramanian A, Sukumaran G. Particle size penetration rate and effects of smoke and smokeless tobacco products An invitro analysis. Heliyon [Internet]. 2021 Mar 1;7(3):e06455. Available from: https://www.sciencedirect.com/science/article/pii/S2405844021005600
- 13. Sarode SC, Gondivkar S, Sarode GS, Gadbail A, Yuwanati M. Hybrid oral potentially malignant disorder: A neglected fact in oral submucous fibrosis. Oral Oncol [Internet]. 2021 Jun 16;105390. Available from: http://dx.doi.org/10.1016/j.oraloncology.2021.105390
- 14. Hannah R, Ramani P, WM Tilakaratne, Sukumaran G, Ramasubramanian A, Krishnan RP. Author response for "Critical appraisal of different triggering pathways for the pathobiology of pemphigus vulgaris—A review" [Internet]. Wiley; 2021. Available from: https://publons.com/publon/47643844
- 15. Chandrasekar R, Chandrasekhar S, Sundari KKS, Ravi P. Development and validation of a formula for objective assessment of cervical vertebral bone age. Prog Orthod [Internet]. 2020 Oct 12;21(1):38. Available from: http://dx.doi.org/10.1186/s40510-020-00338-0
- 16. Subramanyam D, Gurunathan D, Gaayathri R, Vishnu Priya V. Comparative evaluation of salivary malondialdehyde levels as a marker of lipid peroxidation in early childhood caries. Eur J Dent [Internet]. 2018 Jan;12(1):67–70. Available from: http://dx.doi.org/10.4103/ejd.ejd_266_17
- 17. Jeevanandan G, Thomas E. Volumetric analysis of hand, reciprocating and rotary instrumentation techniques in primary molars using spiral computed tomography: An in vitro comparative study. Eur J Dent [Internet]. 2018 Jan;12(1):21–6. Available from: http://dx.doi.org/10.4103/ejd.ejd_247_17
- 18. Ponnulakshmi R, Shyamaladevi B, Vijayalakshmi P, Selvaraj J. In silico and in vivo analysis to identify the antidiabetic activity of beta sitosterol in adipose tissue of high fat diet and sucrose induced type-2 diabetic experimental rats. Toxicol Mech Methods [Internet]. 2019 May;29(4):276–90. Available from: http://dx.doi.org/10.1080/15376516.2018.1545815
- 19. Sundaram R, Nandhakumar E, Haseena Banu H. Hesperidin, a citrus flavonoid ameliorates hyperglycemia by regulating key enzymes of carbohydrate metabolism in streptozotocin-induced diabetic rats. Toxicol Mech Methods [Internet]. 2019 Nov;29(9):644–53. Available from: http://dx.doi.org/10.1080/15376516.2019.1646370
- 20. Alsawalha M, Rao CV, Al-Subaie AM, Haque SKM, Veeraraghavan VP, Surapaneni KM. Novel mathematical modelling of Saudi Arabian natural diatomite clay. Mater Res Express [Internet]. 2019 Sep 4 [cited 2021 Aug 10];6(10):105531. Available from: https://iopscience.iop.org/article/10.1088/2053-1591/ab2f9b/meta
- 21. Yu J, Li M, Zhan D, Shi C, Fang L, Ban C, et al. Inhibitory effects of triterpenoid betulin on inflammatory

mediators inducible nitric oxide synthase, cyclooxygenase-2, tumor necrosis factor-alpha, interleukin-6, and proliferating cell nuclear antigen in 1, 2-dimethylhydrazine-induced rat colon carcinogenesis. Pharmacogn Mag [Internet]. 2020;16(72):836. Available from: https://www.phcog.com/article.asp?issn=0973-1296;year=2020;volume=16;issue=72;spage=836;epage=842;aulast=Yu

- 22. Shree KH, Hema Shree K, Ramani P, Herald Sherlin, Sukumaran G, Jeyaraj G, et al. Saliva as a Diagnostic Tool in Oral Squamous Cell Carcinoma a Systematic Review with Meta Analysis [Internet]. Vol. 25, Pathology & Oncology Research. 2019. p. 447–53. Available from: http://dx.doi.org/10.1007/s12253-019-00588-2
- 23. Zafar A, Sherlin HJ, Jayaraj G, Ramani P, Don KR, Santhanam A. Diagnostic utility of touch imprint cytology for intraoperative assessment of surgical margins and sentinel lymph nodes in oral squamous cell carcinoma patients using four different cytological stains. Diagn Cytopathol [Internet]. 2020 Feb;48(2):101–10. Available from: http://dx.doi.org/10.1002/dc.24329
- 24. Karunagaran M, Murali P, Palaniappan V, Sivapathasundharam B. Expression and distribution pattern of podoplanin in oral submucous fibrosis with varying degrees of dysplasia an immunohistochemical study [Internet]. Vol. 42, Journal of Histotechnology. 2019. p. 80–6. Available from: http://dx.doi.org/10.1080/01478885.2019.1594543
- 25. Sarode SC, Gondivkar S, Gadbail A, Sarode GS, Yuwanati M. Oral submucous fibrosis and heterogeneity in outcome measures: a critical viewpoint. Future Oncol [Internet]. 2021 Jun;17(17):2123–6. Available from: http://dx.doi.org/10.2217/fon-2021-0287
- 26. Raj Preeth D, Saravanan S, Shairam M, Selvakumar N, Selestin Raja I, Dhanasekaran A, et al. Bioactive Zinc(II) complex incorporated PCL/gelatin electrospun nanofiber enhanced bone tissue regeneration. Eur J Pharm Sci [Internet]. 2021 May 1;160:105768. Available from: http://dx.doi.org/10.1016/j.ejps.2021.105768
- 27. Prithiviraj N, Yang GE, Thangavelu L, Yan J. Anticancer Compounds From Starfish Regenerating Tissues and Their Antioxidant Properties on Human Oral Epidermoid Carcinoma KB Cells. In: PANCREAS. LIPPINCOTT WILLIAMS & WILKINS TWO COMMERCE SQ, 2001 MARKET ST, PHILADELPHIA ...; 2020. p. 155–6.
- 28. Xia S, Zhong Z, Gao B, Vong CT, Lin X, Cai J, et al. The important herbal pair for the treatment of COVID-19 and its possible mechanisms. Chin Med [Internet]. 2021 Mar 3;16(1):25. Available from: http://dx.doi.org/10.1186/s13020-021-00427-0
- 29. Zaki AM, van Boheemen S, Bestebroer TM, Osterhaus ADME, Fouchier RAM. Isolation of a novel coronavirus from a man with pneumonia in Saudi Arabia. N Engl J Med [Internet]. 2012 Nov 8;367(19):1814–20. Available from: http://dx.doi.org/10.1056/NEJMoa1211721
- 30. McKenzie K, McNall A, Noone S, Branch A, Murray G, Sherring M, et al. The use of an implementation

- science theoretical framework to inform the development of a region wide Positive Behavioural Support Workforce Development approach. J Appl Res Intellect Disabil [Internet]. 2020 Dec 6; Available from: http://dx.doi.org/10.1111/jar.12847
- 31. Jones L, Ditzel-Finn L, Potts J, Moosajee M. Exacerbation of visual hallucinations in Charles Bonnet syndrome due to the social implications of COVID-19. BMJ Open Ophthalmol [Internet]. 2021 Feb 11;6(1):e000670. Available from: http://dx.doi.org/10.1136/bmjophth-2020-000670
- 32. Tudor MA, Filimon Benea A, Bratosin S. COVID-19 Pandemic Lockdown and Religious Mediatization of Social Sustainability. A Case Study of Romania. Int J Environ Res Public Health [Internet]. 2021 Feb 25;18(5). Available from: http://dx.doi.org/10.3390/ijerph18052287
- 33. Grasselli G, Tonetti T, Protti A, Langer T, Girardis M, Bellani G, et al. Pathophysiology of COVID-19-associated acute respiratory distress syndrome: a multicentre prospective observational study. Lancet Respir Med [Internet]. 2020 Dec;8(12):1201–8. Available from: http://dx.doi.org/10.1016/S2213-2600(20)30370-2