



Plant Archives

Journal homepage: <http://www.plantarchives.org>
 DOI Url : <https://doi.org/10.51470/PLANTARCHIVES.2022.v22.no1.045>

PUBLIC AWARENESS ABOUT THE USAGE OF MEDICINAL HERBS FOUND IN THE KITCHEN AND THEIR POTENTIAL AGAINST COVID-19 DISEASE

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(Date of Receiving : 21-01-2022; Date of Acceptance : 22-03-2022)

ABSTRACT

For the past two years, the globe has been in deep despair as a result of the fast spread of the new Coronavirus, SARS CoV-2, and several of its variations such as Delta, Omicron, and others. This pandemic has caused widespread rumours and misconceptions, wreaking havoc on the worldwide health-care system. Due to the periodic outbreaks of this infectious disease, along with the administration of effective antiviral vaccines and adherence to mandatory government protocols, every human being's recourse has been to strengthen their immunity to resist this infectious disease using kitchen ingredients like herbs and spices with medicinal properties and other home remedies. The results showed that there was a significant rise in the usage of kitchen pharmacy and the application of traditional knowledge, compared to the pre-pandemic times, owing to its immunity boosting properties. Along with increase in usage of kitchen pharmacy, there was also a surge observed in usage of ayurveda, other home remedies and yoga, in comparison with allopathy. The statistical analysis showed that 40.9% of the respondents showed marked recovery after the continual usage of home remedies.

Keywords : COVID-19, Home remedies, Immunity boosting, Ingredients, Kitchen pharmacy, Medicinal

Introduction

With COVID-19 continuing to spread across the Indian subcontinent and the World, it was observed that the disease can affect any individual irrespective of their age group. The outbreak of a respiratory illness, known as COVID-19 or Corona virus disease, is an infectious disease caused by SARS CoV-2 virus and its several variants that has severely affected the global population like, Delta-B.1.617.2, Delta plus, Lambda, Omicron-B.1.1.529, etc. (Yadav *et al.*, 2021a; Yadav *et al.*, 2021b). The outbreak didn't take much time to quickly spread around the world. Because of the virus's greater infectivity rate there has been a significant spike in the mortality rates all across the world, and the entire world is battling the virus and trying to boost immunity (Banerjee *et al.*, 2020). As a peculiar and complicated pathogen, the virus has the ability to transmit infection between species and cause a variety of ailments. COVID-19, due to its human-to-human transmission, has become a health emergency of global concern (Singh *et al.*, 2020). COVID-19 recognition starts with common symptoms such as common cold, cough, fever, headache, body ache, etc. As per the traditional culture in India, several fruits, vegetables, spices, and herbs easily available in our kitchen have been known to exhibit therapeutic properties. These medicinal plants can be incorporated in our day to day lives and are helpful for boosting immunity and providing the best nutrition to fight

against corona virus as well as other infections (Radhika *et al.*, 2021). Several vaccines with varying efficiency have been developed as a cure for the virus, such as Pfizer, Moderna, Sputnik V, Covaxin, Covishield, Novavax, Sinopharm, etc. (Sapkal *et al.*, 2021).

Our bodies are largely powered by the fuel of a well-balanced diet that includes all of the necessary herbs and spices with medicinal properties required to improve our immunity and help us recover from the effects of numerous hazardous viruses and bacteria. Apart from the daily products there are a few others, such as arjunkichaal, chironji, pippli, fig, lemongrass, jaggery, bottle guard juice, chia seeds, aloe vera, khus-khus, and so on, that when combined, transform our kitchen into a much-needed pharmacy (Shareef 2020).

Kitchen ingredients contain many medicinally important active phytochemicals, such as curcumin (turmeric), gingerol (ginger), quinine, iso-quinoline alkaloids- emetine, allicin (garlic) (Galanakis *et al.*, 2020), having antimicrobial, antiviral, anti-inflammatory, and immunostimulatory properties. These phytochemicals are presumed to have the ability to boost the immune system and hence are considered to be effective against prevention and treatment of COVID-19 symptoms as well (Radhika *et al.*, 2021). Widely produced drugs that are currently in use, owe their origin to traditional folk medicine (Azam *et al.*, 2020).

Herbal medications, food, and exercise constitute a well-balanced home-made medicine front. Herbal tinctures and combinations have been used for headaches, digestive disorders, immunity, and wounds for millennia. If we have various therapeutic ingredients in our kitchen, such as clove, garlic, cinnamon, turmeric, etc., we can undoubtedly investigate their areas of benefit to live a healthy life (Srivastava *et al.*, 2020). Plant-derived products have been shown to reduce oxidative stress and boost antibody production, which enhance consumer's immunity (Davison *et al.*, 2016). This survey was undertaken with the aim of determining the effective use and preference for medicinal plants found in the kitchen (home remedies) during this global pandemic, COVID-19. As a result, the focus of this research is on the importance of ordinary household components having medicinal properties in enhancing human immunity and promoting traditional knowledge.

Materials and Method

The survey was conducted online via Google forms comprising of 25 questions. Questions were centred on the surge in COVID-19 cases; comparative analysis of usage of kitchen pharmacy (food ingredients with immunomodulatory properties) with allopathy, homeopathy and ayurveda; its significance; and extent of improvement in the health of respondents after administration of the useful kitchen ingredients for boosting immunity. The identity of the respondents was kept confidential. This questionnaire-based survey was conducted from January 2021 to May 2021. A total of 372 responses were received with majority of the respondents hailing from Delhi-NCR. People belonging from Lucknow, Bhubaneswar, Mumbai, Meerut, Jharkhand, Gwalior, Guwahati, Chennai, Kozhikode, Patna etc. also attempted the survey.

The questionnaire was divided into 3 segments- the first segment focused on the personal details of the respondents, the second on the increased usage of kitchen pharmacy and comparative analysis with other medications during COVID-19 pandemic, and the third focused on the specific ingredients utilised and conclusive responses on the effectiveness.

The questionnaire had few open-ended questions and few multiple-choice questions with a pre-set answer, offering an easy choice of answering to the respondents as per their convenience and directly amounting to the significant foundation of the questionnaire. The survey was widely promulgated through various social media platforms for a wider outreach and a greater database for the efficacy of the results determined through the survey. Apart from the multiple-choice questions, the open-ended answers helped in improving the results and in efficiently enhancing the interpretations. Results obtained provided an in-depth understanding of the significance of kitchen pharmacy and their utilisation in boosting the immunity.

Data analysis was primarily done using Microsoft excel, consisting of pie-charts as well as bar graphs, to provide precise results for the paper.

The statistics showed a participation of 87.4% females and 12.6% males. The respondents were aged below 20 (47.3%), 20-40 (41.7%), 41-60(8.9%), and above 60(2.1%), with 86.8% residing in cities and 13.2% living in rural areas. The various occupational areas of the respondents were found to be students (78.5%), private sector (6.7%), public sector (8.3%), home maker (1.6%), teaching (3.1%) and retired persons (1.8%) (Table-1).

Result and Discussion

Many medicinal plants have been shown to be effective for treatment of COVID-19 (Lim *et al.*, 2021; Maurya *et al.*, 2022). Kitchen pharmacy is full of ingredients with medicinal properties that can be used to boost immunity and combat infections. Its use can be one of the most cost-effective and sustainable methods for instilling health-related habits.

Perspective and awareness on kitchen pharmacy

With no concrete cure for this deadly virus, most of the people turned towards the age-old traditional methods of curing diseases. Immunity boosting kitchen ingredients have become an integral part of most people's lives, thanks to their increasing popularity and the need of the hour for a sustainable balanced life. Most of these practices and uses of kitchen ingredients in curing diseases have been passed down through generations in most of the families, but with the increasing reach of the internet, these uses have been accessible to people worldwide at a button's click (Ansari, 2020). It is important to keep our immunity strong, so that even if we are infected with the virus, it doesn't have a severe impact on our body.

According to the poll only 27.2% of the respondents were fully aware about the immunity boosting benefits of kitchen ingredients, while 68.3% were partly aware and 4.5% being completely unaware (Figure-1a) of these benefits. It can also be concluded that the internet is the main source of awareness for about 71.5% of the respondent's traditional culture being the second (Figure-1b).

Newspapers and magazines have become a daily source of awareness. WhatsApp, which has become an important part of everybody's daily routine, has also played an important role in making people aware of the palliating effects of immunity boosting kitchen ingredients, be it people in urban areas or even rural areas. But the information shared on WhatsApp is not always verified, so before using the given remedies, one must always be sure of the verity of the facts given. Similar is the case with the information being available on the internet for public access. These pieces of information can be edited by anyone, hence hindering the correctness of the information shared. This awareness can be increased by forming community websites on the internet with verified doctors sharing the correct information (Tasnim *et al.*, 2020).

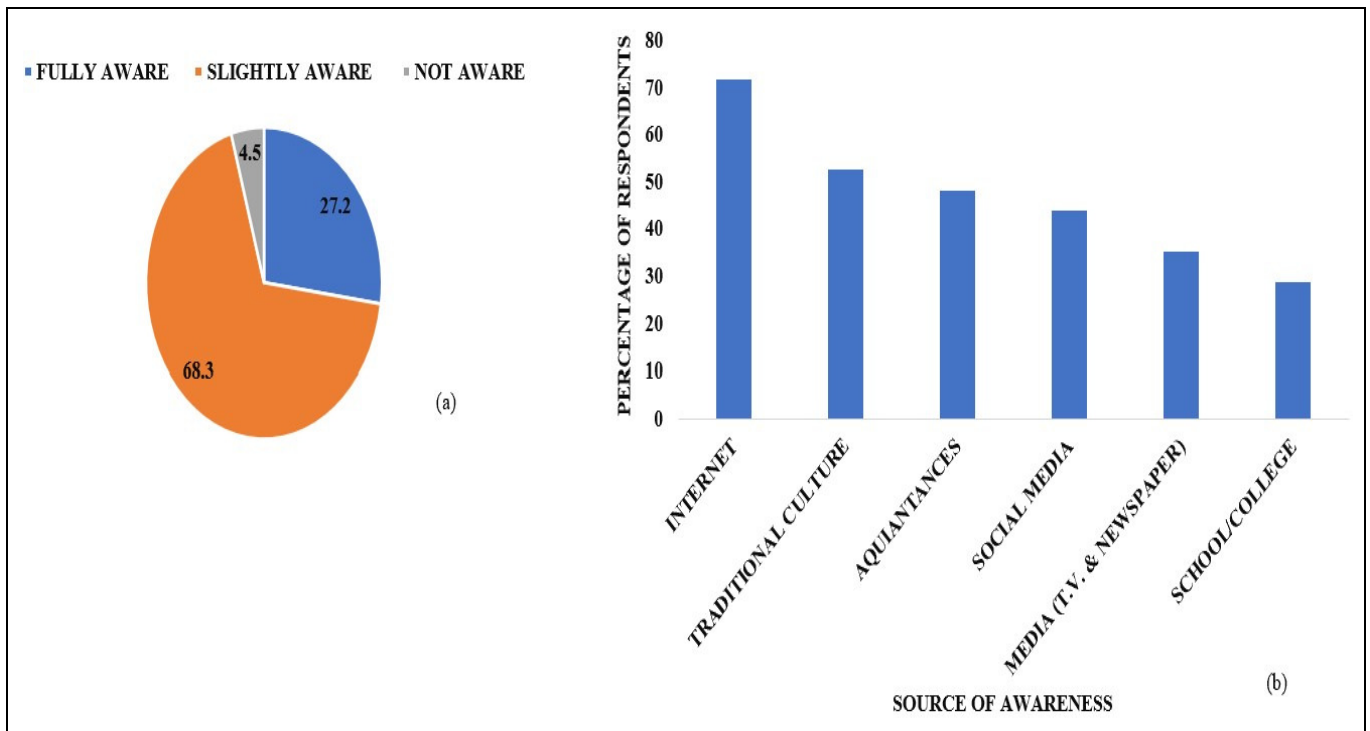


Fig. 1 : (a) Pie-chart depicting the percentage of respondents who were aware of the usage of kitchen ingredients for boosting immunity. (b) Sources of awareness amongst respondents about the usage of kitchen ingredients.

Sustainability of immunity boosting food ingredients

According to a survey conducted by WHO (World Health Organization), it was reported that approximately 80% people worldwide turned towards herbal medicines as trusted sources, to cater to their primary health care needs. As per the sources, approximately 21,000 plant species fall into the potential category of medicinal plants with healing properties, thus throwing light on the significance of immunity boosting kitchen ingredients (Kolhe *et al.*, 2020).

In this period of crisis with pessimism reaching its peak, the significance of nutrition and immunity to protect the human body has increased proportionately. Several researchers have shown that a right amount of nutritional intake play a critical role in the proper functioning of the human body as well as psychological well-being (Felsenstein *et al.*, 2020). In the current scenario, dietary intake has played a significant role in building immunity against viral infections such as COVID-19. Nutrients modulate the immunity of an individual by gene expression and regulation of indicator molecules which enhances the cell immunity. Proteins, carbohydrates, fats etc. have shown to boost up the body's immunity, with vitamin-D in particular, reducing the viral replication rate by reducing pro-inflammatory cytokines. Vitamin-C protects the body from oxidative stress and there are several other minerals and vitamins which are beneficial and are an important component of the human diet (Sekhri *et al.*, 2013).

In India, AYUSH ministry, through their protocol, is spearheading the significance of nutrition and exercises along with other natural activities and has stressed on the fact that dehydration can be one of the reasons for lowered resistance in the body. Dietary liquids like saltwater, fruit juices or lemon water can help in increasing the body's resistance and all these sources are sufficiently sustainable.

As per the survey carried out, 91.7% (Figure-2a) of the respondents understood the significance of kitchen pharmacy with 62.6% (Figure-2b) of the respondents frequently resorting to home remedies for boosting immunity amidst the pandemic. The survey also showed a 36.1% increase in the usage of home remedies, or rather kitchen pharmacy, during the pandemic, as compared to the pre-pandemic times with 32.6% (Figure-2c) reduced usage of allopathy during the pandemic. 77.4% of the respondents used home remedies as the course of medication, whereas only 30.1% relied on ayurveda, and 21.2% relied on allopathy, for boosting their immunity against the virus, providing a concrete statistical result supporting kitchen pharmacy (Figure-2d). The graphical analysis clearly shows an increase in the usage of home remedies and ayurveda over allopathy and homeopathy, emphasising the significance of kitchen pharmacy and its sustainability during these tough times.

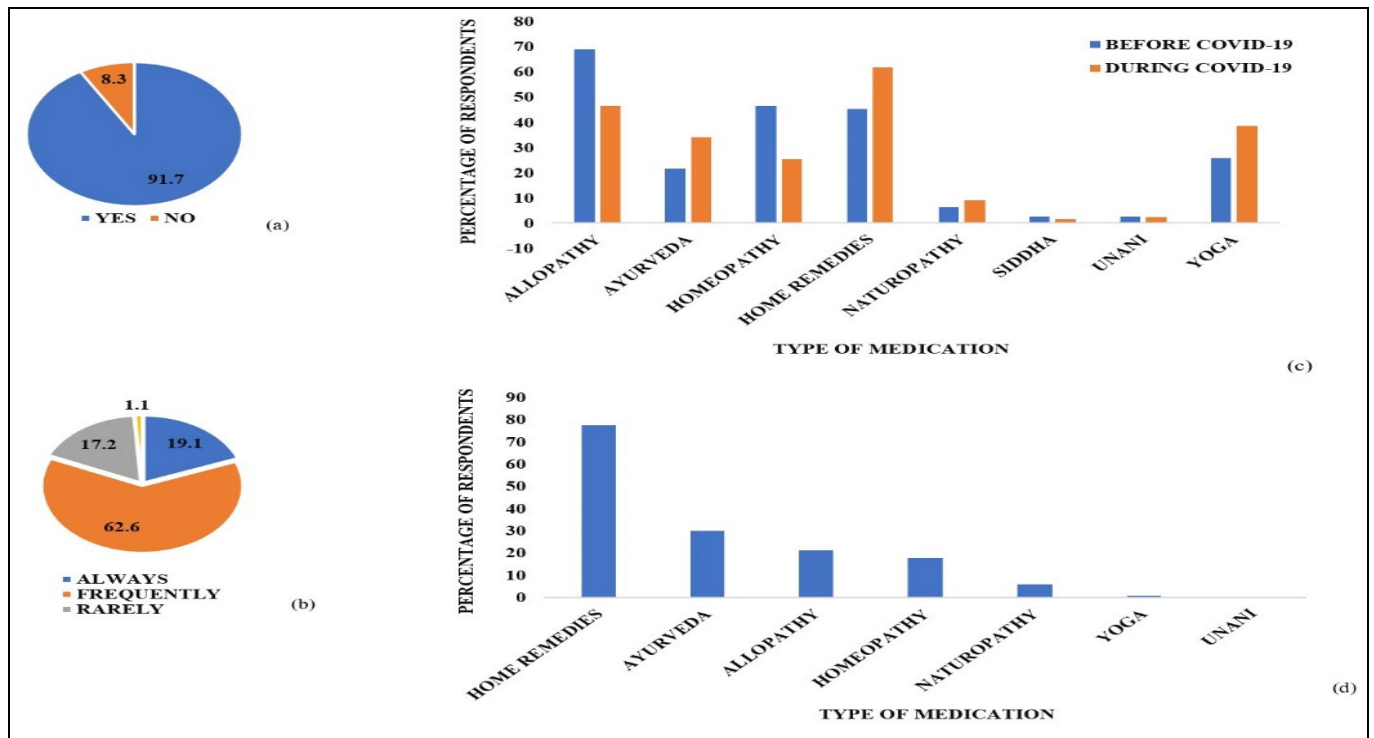


Fig. 2 : (a) Pie-chart showing the response towards understanding the importance of kitchen pharmacy in boosting immunity. (b) Pie-chart depicting the frequency of usage of kitchen pharmacy (in percentage). (c) Graph showing the type of medication preferred by the respondents before and during COVID-19. (d) Graph depicting the type of medication the respondents relied upon for boosting immunity during COVID-19.

Root cure for COVID-19 in kitchen

Majority of the participants preferred home remedies over allopathic medicine, or any other kind of medication, which indicated their belief in the efficacy and safety of herbal products, traditional knowledge, and a positive attitude for treating or prevention of COVID-19 at home. Some of the preferred choices for maintaining holistic health were yoga, ayurveda, homeopathy, naturopathy, siddha, and unani. Home remedies stemming from kitchen pharmacy were significantly preferred for their usefulness in boosting immunity against COVID-19, and the reasons behind this were, that it has minimal side effects and maximum potential to treat a disease with various natural immunity boosting capabilities. Some of the most frequently used home remedies were steam-inhalation, home-made kadha, golden milk/turmeric milk, lemon/ginger water, herbal/ginger/green tea, and some of the kitchen ingredients used were ginger, turmeric, basil, honey, cumin, etc. It is the easiest and safest way that can be employed to strengthen the immunity for the management of COVID-19 symptoms at home (Singh *et al.*, 2020).

Out of the total responses, 79.3% (Figure-3a) of respondents were aware of the medicinal benefits (anti-inflammatory, blood sugar lowering agent, antiviral, antimicrobial, etc.) of the ingredients used in home remedies indicating a wider reach of cognizance for health benefits of the various kitchen ingredients. According to the survey conducted, home remedies were found to be the most useful

type of medication in comparison with allopathy, homeopathy, ayurveda, etc. (Figure-3b). 40.9% (Figure-3c) of the people reported that they have seen cases of recovery solely through the administration of home remedies on a daily basis, hence showcasing the beneficial remedial properties of the kitchen ingredients. Among the various home remedies administered by the respondents for curing flu-like symptoms during the pandemic, kadha was administered by approximately 71.8% of the respondents, hence was the most commonly used home remedy for COVID-19 infection. Other home remedies that were increasingly administered were: - golden milk (59.4%), lemon water with honey (44.9%), chyawanprash (40.1%), ginger water (34.7%), tulsileaves and dried ginger (34.1%), black pepper water with jaggery (17.5%), AYUSHkwath (3.2%), basil leaves and honey, tulsitea with black pepper, vegan dahi, green tea, hot water, etc. (Figure-3d).

Excessive consumption of anything can be harmful to health. Medicinal herbs do have therapeutic properties, but when consumed in an excessive amount they might cause allergic reactions (Abdel-Aziz *et al.*, 2016). Nearly 6.3% of responders reported some kind of allergic reactions like skin allergies, sore throat, burning effect in stomach, constipation, mouth blisters, pimples, etc. due to the usage of medicinal kitchen ingredients (Figure-3e).

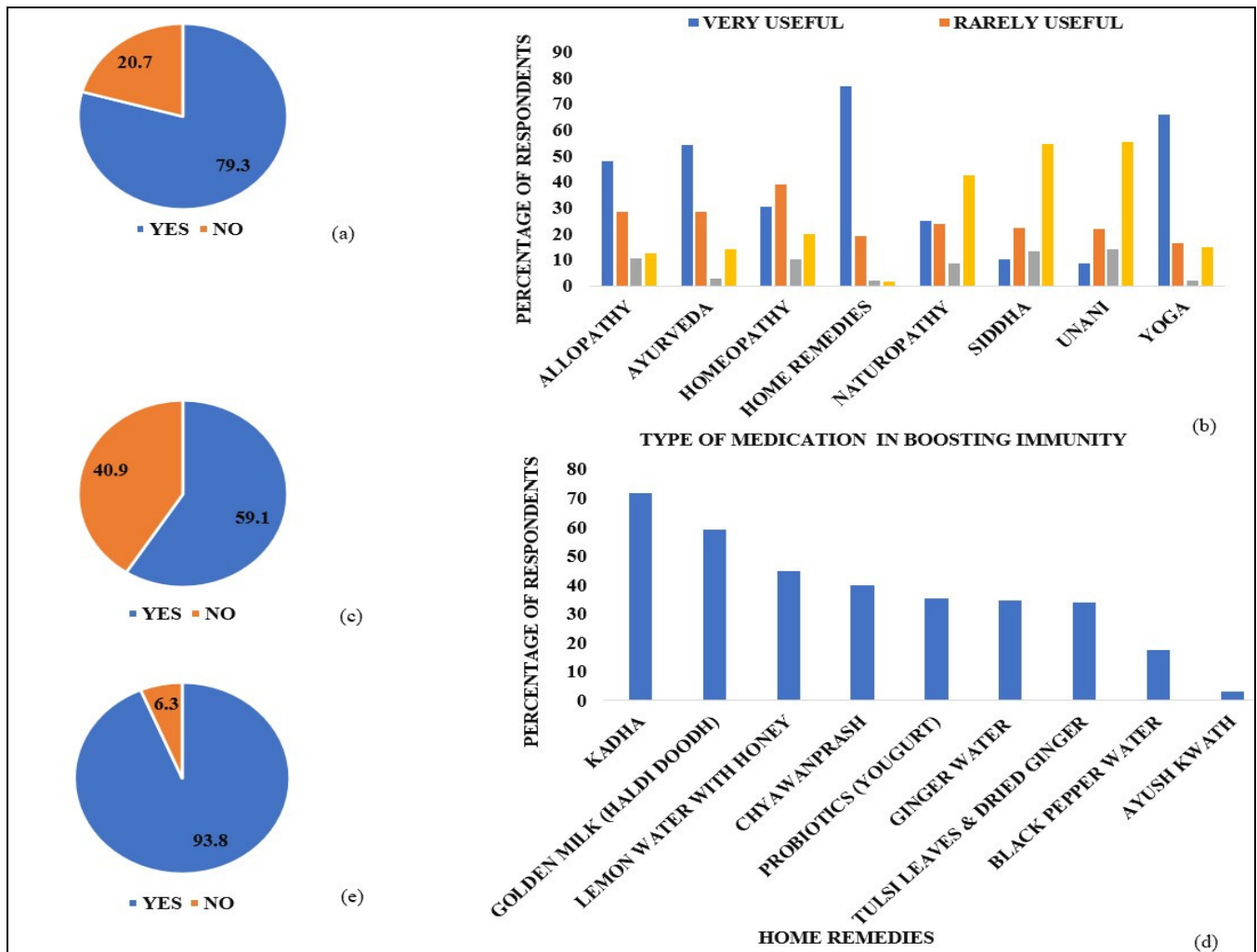


Fig. 3 : (a) Pie-chart illustrating respondents' knowledge of the the various medical benefits of the kitchen ingredient. (b) Graph depicting the usefulness of the given types of medications in boosting the immunity. (c) Pie-chart depicting recovery of COVID-19 patients solely through kitchen pharmacy. (d) Graph showing common home remedies used by the respondents during COVID-19 pandemic. (e) Pie-chart depicting percentage of respondents who experienced allergic reactions due to usage of the kitchen ingredients or other home remedies.

Kitchen ingredients play a significant role in conferring immunity against COVID-19

The COVID-19 pandemic has highlighted an urgent need for boosting one’s immune system to fight the disease. With the progressive increase in COVID-19 cases, the general public has found an inclination towards remedies other than allopathy, such as homeopathy, ayurveda, yoga, with kitchen pharmacy playing an important role. Several kitchen ingredients play a key role in boosting the immunity that forms an integral part of kitchen pharmacy.

As per the guidelines provided by AYUSH, there are few medicines that have been developed by traditional practices that provide respite and alleviate some of the symptoms of COVID-19 and have demonstrated good adaptive immunity against COVID-19 (Ministry of Ayush 2019).

Some of the common mechanisms of action through which various kitchen ingredients act includes their immunomodulatory, virucidal, bactericidal, anti-

inflammatory and hematopoietic activities (Parham *et al.*, 2020). In our survey, it was found that ginger has been the most popularly used kitchen ingredient during COVID-19 (Figure-4). Turmeric was voted the second most used ingredient and the use of Giloy has increased during the pandemic (Figure-4).

Some of the most preferred kitchen ingredients that were used for boosting immunity during the COVID-19 pandemic, which play a key role in kitchen pharmacy are given in (Table-2, Figure-5) (Barati *et al.*, 2020, Banerjee *et al.*, 2020; Logeswari *et al.*, 2020). Apart from the ingredients mentioned in these, several other ingredients were mentioned by the respondents in the survey form such as: - Arjun kichaal, chironji,pipli, fig, lemongrass, jaggery, bottle guard juice, chia seeds, aloe vera, khus-khus, etc.

Another ingredient known as hedge mustard (*Sisymbrium irio* Linn.), or khubkala (in ayurveda), is a recent addition to ayurvedic medicine. Its seeds help in the curing high fever and cough (Rahman *et al.*, 2018).

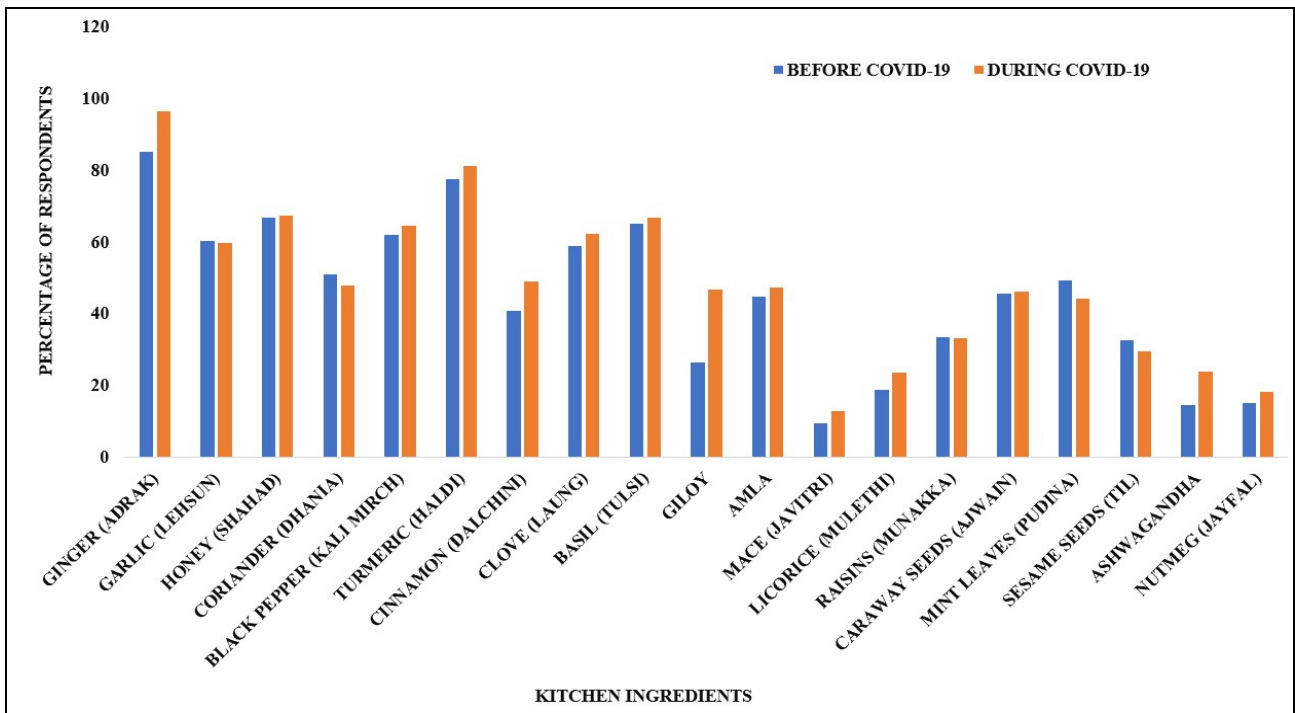


Fig. 4 : Graph depicting usage of kitchen ingredients before and during COVID-19.



Fig. 5 : Different types of medicinal kitchen ingredients.

Conclusion

COVID-19 has rampantly disrupted the daily life and economic stability of billions of people throughout the world and in the absence of a concrete cure, various kitchen ingredients (home remedies) hold a significant position in alleviating the COVID-19 symptoms. Amidst this on-going pandemic these home remedies have come out to play a prominent role in boosting body's immunity and taking a

step towards a secured lifestyle. This paper primarily focuses on the functional aspect of kitchen ingredients in terms of boosting immunity and has shown that their usage has aided significant recovery rates amongst the respondents of the survey carried out. Given the enormous challenges encountered, research on medicinal plant extracts should be seriously considered for developing medicines against SARS-CoV-2 and other pathogens.

Table 1 : Socio- demographic characteristics of the respondents

CATEGORY	GENDER		AREA		AGE				OCCUPATION					
	Male	Female	Urban	Rural	Below 20	20-40	41-60	61 & above	Student	Public sector	Private sector	Home maker	Teacher / Professors	Retired
No. of respondents (out of 372)	325	47	323	49	176	155	33	8	292	31	25	6	11	7
Percentage (%)	12.6	87.4	86.8	13.2	47.3	41.7	8.9	2.2	78.5	8.3	6.7	1.6	3.1	1.8

Table 2 : Medicinal kitchen ingredients used during COVID-19 and their health benefits.

S. No.	Name of the Ingredient	Scientific Name (Phytochemicals Present)	Part Used	Health Benefits
1.	Black pepper (Kalimirch)	<i>Piper nigrum</i> (alkaloid component- piperine)	Fruits	Anti-inflammatory, antioxidant and antibacterial properties.
2.	Ginger (Adarak)	<i>Zingiber officinale</i> (phenolic compound- gingerol, polyphenols, terpene- β -bisabolene)	Rhizome	Relieves nausea, eases flu, relives pain, reduces inflammation, antiviral, and antioxidant properties.
3.	Garlic (Lahasun)	<i>Allium sativum</i> (Allicin (Allyl 2-propenethiosulfinate or diallyl thiosulfate))	Bulb	Combats common cold, antioxidant and antiviral properties, helps in detoxification of the body, and boosts immunity.
4.	Clove (Laung)	<i>Syzygium aromaticum</i> (Eugenol)	Flower buds	Rich in antioxidants, reduces oxidative stress, antiviral, antibacterial and anti-stress properties.
5.	Coriander (Dhaniya)	<i>Coriandrum sativum</i> (Linalool)	Seeds, leaves	Rich in immune boosting antioxidants and has anti-inflammatory properties.
6.	Turmeric (Haldi)	<i>Curcuma longa</i> (Curcumin)	Rhizome	Anti-inflammatory and antioxidant properties.
7.	Cinnamon (Dalchini)	<i>Cinnamomum verum</i> (Cinnamaldehyde (trans-3-phenyl-2-propenal) or cinnamic aldehyde)	Bark	Antioxidant, antifungal, antiviral, and antibacterial properties.
8.	Holy basil (Tulsi)	<i>Ocimum tenuiflorum</i> (Vitamin- A and C, calcium, potassium, fatty acids like lauric acid, linoleic acid, oleic acid, etc.)	Leaves	Antioxidants, anti-inflammatory, antibacterial, antiviral and immunomodulatory properties.
9.	Giloy	<i>Tinosporum cordifolia</i> (Alkaloids- choline, tinosporin, 11-hydroxymustakone)	Stem, Leaves	Treats chronic fever, reduces stress and anxiety, and fights respiratory problems.
10.	Amla (Indian gooseberry)	<i>Phyllanthus emblica</i> (Vitamin-C (ascorbic acid), bioactive phytochemicals like polyphenols (ellagic acid, gallic acid, chebulagic acid, quercetin, leutolin, etc.)	Fruit	Helps fight common cold, boost immunity and metabolism and is rich in antioxidants.
11.	Licorice (Mulethi)	<i>Glycyrrhiza glabra</i> (Glycyrrhizin, also known as glycyrrhizic acid)	Root	Antibacterial, antiviral, anti-inflammatory properties and eases upper respiratory conditions
12.	Raisins (Munakka)	<i>Vitis vinifera</i> (Rich source of phenolic compounds and contains resveratrol, flavonoid, quercetin, catechins, procyanidins and anthocyanins)	Dried grape	Builds and maintains strong bones.
13.	Mint (Pudina)	<i>Mentha</i> (Menthol, Menthone, 1,8-cineole, limonene, beta-pinene, and beta-caryophyllene)	Leaves	Effective nasal decongestant, used for dry cough/sore throat, beats stress and depression.
14.	Caraway (Ajwain)	<i>Carum carvi</i> (Thymol, oleic acid, linoleic acid, γ -terpinene, p-cymene and palmitic acid)	Seeds	Antioxidants, used for dry cough/sore throat, combats infection and anti-inflammatory properties.
15.	Sesame (Til)	<i>Sesamum indicum</i> (Sesamin, sesamol, tocopherols, PUFA, phytosterols, phytates and other phenolics)	Seeds	Antibacterial, good source of fibre, reduces inflammation, supports healthy bones and aids in blood cell formation.
16.	Ashwagandha	<i>Withania somnifera</i> (Withanolides, withanone, withaferin-A)	Whole, dried root	Helps lower cortisol levels, helps reduce stress and anxiety, reduces symptoms of depression and inflammation.
17.	Mace (Javitri)	<i>Myristica fragrans</i> (Dihydroguaiaretic acid, elimicin, myristic acid and myristicin)	Aril /Seed coat covering	Used to cure nausea, boosts blood circulation, acts as a stress buster, treats cold and cough, anti-inflammatory and helps increase appetite.

18.	Nutmeg (<i>Jayfal</i>)	<i>Myristica fragrans</i> (Dihydroguaiaretic acid, elimicin, myristic acid, myristicin)	Seed	Contains powerful antioxidants, anti-inflammatory, antibacterial properties, effective against oral pathogens.
19.	Cardamom (<i>Elaichi</i>)	<i>Elettaria cardamomum</i> (Cineole)	Fruit, Seed	Contains antioxidant and diuretic properties, anti-inflammatory, improves breathing by stimulating oxygen uptake and relaxing air passage, antibacterial.
20.	Honey	C ₆ H ₁₂ O ₆ (Fructose) (From honeybee <i>Apis mellifera</i>)	Raw	Contains antioxidants including flavonoids and is cough suppressant.
21.	Fennel (<i>Saunf</i>)	<i>Foeniculum vulgare</i> (Anethole, estragole, fenchone, limonene, p-cymene)	Seeds	Improves digestive system and has anti-inflammatory property.
22.	Fenugreek (<i>Methi</i>)	<i>Trigonell foenum-graecum</i> (Alkaloids-Trimethylamine, Neurin, Trigonelline, Choline, Gentianine, Carpaine and Betain)	Leaves, Seeds	Anti-inflammatory property and contains antioxidants.
23.	Cumin (<i>Jeera</i>)	<i>Cuminum cyminum</i> (Cumin aldehyde, p-mentha)	Seeds	Contains antioxidants, fights bacteria and parasites and has anti-inflammatory property.
24.	Curry leaves (<i>Curry patta</i>)	<i>Murraya koenigii</i> (Linalool, elemol, myrcene, alpha-terpinene, neryl acetate)	Leaves	Powerful antioxidant and is used as an analgesic.
25.	Lemon (<i>Nimbu</i>)	<i>Citrus x limon</i> (Limonene, sabinene, citronellal, linalool, neral, geraniol, (E)-β-ocimene, myrcene, citronellol, β-caryophyllene, terpene-4-ol, geraniol and α-pinene)	Fruit	Relieves sore throat, promotes hydration, used for common cold, lowers respiratory symptoms, reduces cough, and flu symptoms.

Acknowledgement

The authors acknowledge and extend thanks to all those who supported the study by participating in the questionnaire-based survey and contributed in survey analysis. The authors also thank Gargi College, University of Delhi for all the support during this study.

References

- Abdel-Aziz, S.M.; Aeron, A. and Kahil, T.A. (2016). Health Benefits and Possible Risks of Herbal Medicine. In: Microbes in Food and Health, Garg, N.; Abdel-Aziz, S.; Aeron, A. (eds), Springer, Cham, 97-116.
- Ansari, M.S. (2020). Role of Traditional Knowledge Digital Library (TKDL) in Preservation and Protection of Indigenous Medicinal Knowledge of India. In Herbal Medicine in India, Sen, S.; Chakraborty, R. (eds), Springer, Singapore, 609-620.
- Azam, M.N.K.; Mahamud, R.A.; Hasan, A.; Jahan, R. and Rahmatullah, M. (2020). Some home remedies used for treatment of COVID-19 in Bangladesh. *J. Med. Plants Stud.*, 8: 27-30.
- Banerjee, S.; Srivastava, S. and Giri, A.K. (2020). Possible nutritional approach to cope with COVID-19 in Indian perspective. *J. Med. Clin. Sci.*, 6: 207-219.
- Barati, F.; Poursmaieli, M.; Ekrami, E.; Asghari, S.; Ziarani, F.R. and Mamoudifard, M. (2020). Potential Drugs and Remedies for the Treatment of COVID-19: a Critical Review. *Biol. Proced. Online*, 22: 1-17.
- Davison, G.; Kehaya, C. and Wyn Jones, A. (2016). Nutritional and physical activity interventions to improve immunity. *Am. J. Lifestyle Med.*, 10: 152-169.
- Felsenstein, S.; Herbert, J.A.; McNamara, P.S. and Hedrich, C.M. (2020). COVID-19: Immunology and treatment options. *Clin. Immunol.*, 215: 108-448.
- Galanakis, C.M.; Aldawoud, T.; Rizou, M.; Rowan, N.J. and Ibrahim, S.A. (2020). Food ingredients and active compounds against the corona virus disease (COVID-19) pandemic: A comprehensive review. *Foods*, 9: 1701.
- Kolhe, S.; Dhambhare, M.; Dhankasar, P.; Dhole, P.; Nair, A. and Rewatkar, P. (2020). Home Remedies During Covid Pandemic Lockdown. *J. Res. Med. Dent. Sci.*, 8: 103-107.
- Maurya, V.K.; Kumar, S.; Bhatt, M.L. and Saxena, S.K. (2022). Antiviral activity of traditional medicinal plants from Ayurveda against SARS-CoV-2 infection. *J. Biomol. Struct. Dyn.*, 40: 1719-1735.
- Ministry of Ayush. National Clinical Management Protocol-Ayurveda for Management of Covid-19 (2019).
- Logeswari, J.; Shankar, S.; Biswas, P.G. and Muninathan, N. (2020). Role of Medicinal Plants in the Prevention of Covid-19 Pandemic. *Med. Leg. Update*, 20: 2303-2306.
- Lim, X.Y.; Teh, B.P. and Tan, T.Y.C. (2021). Medicinal plants in COVID-19: potential and limitations. *Front. Pharmacol.* 12: 355.
- Radhika, A. and Malik, H. (2021). Fight against COVID-19: Survey of Spices & Herbs Used in North India. *Open J. Epidemiol.*, 11: 256-266.
- Rahman, M.; Khatun, A.; Liu, L. and Barkla, B.J. (2018). Brassicaceae mustards: Traditional and agronomic uses in Australia and New Zealand. *Molecules*, 23: 231.
- Sapkal, G.N.; Yadav, P.D.; Ella, R.; Deshpande, G.R.; Sahay, R.R.; Gupta, N.; Vadrevu, K.M.; Abraham, P.; Panda, S. and Bhargava, B. (2021). Inactivated COVID-19 vaccine BBV152/COVAXIN effectively neutralizes recently emerged B.1.1.7 variant of SARS-CoV-2. *J. Travel Med.*, 28: taab051.
- Sekhri, K.; Bhanwra, S. and Nandha, R. (2013). Herbal products: a survey of students' perception and knowledge about their medicinal use. *Int. J. Basic Clin. Pharmacol.*, 2: 71-6.
- Shareef, M. (2020). Immunity Booster against Corona Virus (COVID-19). *Int. J. Sci. Res.*, 9: 561-564.
- Singh, P.; Tripathi, M.K.; Yasir, M.; Khare, R.; Tripathi, M.K. and Shrivastava, R. (2020). Potential inhibitors for SARS-CoV-2 and functional food components as nutritional supplement for COVID-19: a review. *Plant Foods Hum. Nutr.* 75: 458-466.
- Srivastava, A.K.; Chaurasia, J.P.; Khan, R.; Dhand, C. and Verma, S. (2020). Role of medicinal plants of traditional use in recuperating devastating COVID-19

- situation. *Open Access J. Med. Aromat. Plants*, 9: 2167-0412.
- Tasnim, S.; Hossain, M.M. and Mazumder, H. (2020). Impact of rumours and misinformation on COVID-19 in social media. *J. Prev. Med. Public Health*, 53: 171-174.
- Yadav, P.D.; Nyayanit, D.A.; Sahay, R.R.; Sarkale, P.; Pethani, J.; Patil, S.; Baradkar, S.; Potdar, V. and Patil, D.Y. (2021a). Isolation and characterization of the new SARS-CoV-2 variant in travellers from the United Kingdom to India: VUI-202012/01 of the B. 1.1. 7 lineage. *J. Travel Med.*, 28: taab009.
- Yadav, P.D.; Nyayanit, D.A.; Sahay, R.R.; Shete, A.M.; Majumdar, T.; Patil, S.; Patil, D.Y.; Gupta, N.; Kaur, H.; Aggarwal, N. and Vijay, N. (2021b). Imported SARS-CoV-2 V501Y. V2 variant (B. 1.351) detected in travellers from South Africa and Tanzania to India. *Travel Med. Infect Dis.* 41: 102023.