Exploring the Potential of Kitchen Gardening and Immunity Booster Plantation in COVID-19 Prevention

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Abstract: *In COVID-19 pandemic, there is a need for herbal remedies to boost the innate and acquired immunity to fight against corona virus. The COVID-19 pandemic has left an indelible mark on urban India's food crisis, which has led the prime minister to advocate the 'vocal-for-local' concept. To mitigate such problems, urban kitchen gardening practices like terrace farming, roof-top farming etc., are not only gaining popularity but are also considered a measure of self-reliance in urban food ecosystems. In this regard, kitchen gardening concept is gaining popularity in urban Indian households, especially in post-COVID-19 lockdown times. Therefore, there is an urgent need to optimize the kitchen gardening practices for urban Indian households for their self-reliance on useful plants production in an environmentally sustainable manner. The aim of the study includes, studying the perception related to the kitchen gardening practices in a COVID -19 pandemic among respondents and to assess the association of kitchen gardening practices and attitude with the different demographic factors.Methodology of the study included the descriptive research design by adopting stratified sampling, sample area was selected in residential house of Lucknow district of Uttar Pradesh .400 respondents were chosen for data collection through interview method by structured questionnaire. Analysis has been conducted by using SPSS 20.0 software. Findings of the study reveal respondents' favorable perceptions of kitchen gardening practices and cultivation of immunity booster plants, indicating that the general population perceives the benefits of cultivating and utilizing them* to prevent disease and improve behavior during the COVID-19 pandemic.

Keywords: COVID-19, Kitchen Gardening, Perception, Plantation, Pandemic.

INTRODUCTION

Since its initial report in Wuhan, China, in late 2019, COVID-19 has spread worldwide. The World Health Organization declared a pandemic on March 11, 2020. Several medicinal plants have been used as preventive measures during this epidemic. According to El Alami et al. (2020), the most commonly utilized plants were Thymus maroccanus, Zingiber officinale, Allium Sativum, Olea europaea, Allium cepa, Eucalyptus globules, Foeniculum vulgare, Curcuma xanthorrhiza, Phoenix dactylifera, Rosmarinus officinalis, Thymus satureioides, Mentha pulegium, and Pimpinella anisum.

The use of herbal plants has gained attention recently because they are natural, have fewer side effects than chemical drugs, and contain compounds such as polyphenols and monophenols that have anti-inflammatory, antimicrobial, anticonvulsant, and antipyretic effects (Ketabchi &PapariMoghadamfard, 2021). The primary and linked disorders of different organs and systems can be treated with a single medicinal plant that can replace multiple synthetic medications (Kamkin et al., 2022). Medicinal herbs were very important during the COVID-19 shutdown. Recent studies have shown a connection between sustainable gardening and the well-being of humans. During pandemics, when vegetable supply networks are disrupted and fresh vegetables are hard to come by, urban gardens of this kind can provide a supply of food and medicinal herbs. Due to COVID-19, home gardening has regained its popularity (Kaur, A. et al., 2024).

Objectives –1. To study the perception of medicinal plants during the COVID -19 pandemic among respondents.

2. The study and examin the medicinal plant cultivation practices among the respondents.

3. To assess the association between medicinal plantation practices and attitudes with the different demographic factors.

REVIEW OF LITERATURE

The majority of those surveyed suggested using medicinal plants to ward off COVID-19, and their use surged during the pandemic. The majority of individuals (45.61%) obtained therapeutic plants from their kitchen gardens. Education level, residence location, primary treatment method, gender, and age class during the COVID-19

lockdown were all substantially correlated with the documented medicinal plants (Khadka, D., et al., 2021).

To treat or avoid COVID-19 symptoms, people employed immunity-boosting herbs during the pandemic. According to the findings, the majority of respondents used chamomile, garlic, cayenne pepper, ginger, and eucalyptus (M. Villana-Tejada et al., 2021).

During the COVID-19 pandemic, the Indonesian population used 59 plants from 28 families, including Curcuma longa, Zingiber officinale, Cymbopogon citratus, Kaempferia galanga, and Curcuma zanthorrhizaa. According to the respondents, the plants were helpful in boosting immunity (71.26%), maintaining good health (24.85%), boosting stamina (12.28%), and preventing viral infections, including COVID-19 (Nayaka, N. M. D. M., et al.,2023).

The associated factors of medicinal plant usage were examined in 641 respondents, 40.20% of whom reported using medicinal plants. Of the 79 different plants found, the most commonly utilized and grown were Melissa officinalis (31.00%), Peumusboldus (24.40%), Mentha spicata (20.90%), Matricaria recutita L. (18.20%), Rosmarinus officinalis (17.00%), and Foeniculum vulgare (14.70%). Additionally, it has been discovered that medicinal plants can be used to treat gastrointestinal and respiratory symptoms that are comparable to those of COVID-19. The use of medicinal plants was linked to comorbidities, lower income, lower schooling, and females (Da Silva, A. M., et al., 2023).

Concerns regarding the use of herbal remedies showed that 36% of respondents thought that no extra precautions were required when taking them, and 47.40% felt that these herbs may prevent disease. The most commonly utilized herbs were kalonji (10.20%), ginger (17.70%), and senna makki (38.80%). Of those who utilized these herbs, 22.30% used them to prevent viruses, 15.10% thought they had no negative effects, and 37.70% reported health advantages (Mushtaq, A., et al., 2023).

The effectiveness of twenty-three herbal products was assessed. The participants' risk of contracting a coronavirus infection decreased by 67.11, 43.56, and 7.18%, respectively, by using medicinal herbs, slimy drinks, and medicinal herb tea. The study participants showed substantial heterogeneity in terms of sex, education, consumption of nutritious food, and use of medicinal herbs ($p< 0.001$). Commonly used therapeutic herbs included ginger (62.90%), lemon (51.10%), mint (46.80%), honey (45.70%), and anise (43.00%) (Al Balawi, A. N., et al.,2024).

METHODOLOGY

Research Design- Descriptive and qualitative research design was adopted to evaluate the attitudes and practices related to the cultivation and use of medicinal plants among the targeted population.

Sample Size: A statistical approach for descriptive and qualitative research was used to calculate the sample size. The following formula was used to determine the sample size:

$$SS= \{Z2 \times (p) \times (1 – p)\} / C2$$

Where:

SS = Sample Size

Z = Z-value (e.g., 1.96 for a 95 percent confidence level)

P = Percentage of population picking a choice, expressed as decimal

C = Confidence interval, expressed as decimal (e.g., .05 = +/- 5percentage points)

The Z-value (Cumulative Normal Probability Table) represents the probability that a sample will fall within a certain distribution.

The Z-values for confidence level 95% is 1.96 = 95

A sample size of 385 was identified using the respective formula. Therefore, considering the literature review and expert opinions, a sample size of 400 respondents was chosen for the primary data collection.

The inclusion criteria were as follows: (i) Individuals engaged in household gardening, (ii) Residents of Lucknow district, and (iii) Individuals from all age groups.

Exclusion criteria: (i) Individuals involved in institutional or commercial gardening

(ii) Individuals not practicing household gardening.

Sample Area: - The Sample area for the proposed study was residential houses in the Lucknow district of Uttar Pradesh. The sample area for the proposed study was residential houses in the Lucknow district of Uttar Pradesh. Here, the strata for the sample survey were five zones by direction, that is: North, East, West, South and Central Zone of Lucknow city and sample size is divided (5 Zone) to collect primary data

Sampling unit: - The sampling units were the houses carrying in-house plantation/gardening are the sample unit.

Sampling Technique: A stratified random sampling technique was employed to select respondents. The sampling units consisted of households engaged in in-house plantations and gardening.

The dependent variables included perception and experience with herbs that improve immunity. The independent demographic variables included the respondent's age, gender, education, occupation, housing type, religion, family structure, and monthly income.

Instrument development: A structured questionnaire was developed, including all categories of close-ended questions. A five-point Likert scale was used to collect data across various parameters of medicinal plants (Strongly Agree-5, Agree-4, neither Agree or Disagree-3, Disagree-2 and Strongly Disagree-1).

Instrument Reliability: A reliability test was performed on seven parameters/variables using SPSS 20.0. Cronbach's alpha test revealed a respectable value of 0.692, or approximately 0.7, suggesting that the scale is dependable.

Statement of Informed Consent: Prior to collecting data, we obtained informed consent from each participant

regarding their replies and opinions on the medicinal plantation.

Statistical Analysis: The Chi-square test and percentages were employed in descriptive analysis using the Statistical Packages for Social Sciences (SPSS) to assess the medicinal plantation perception, practices, and association between numerous demographic variables among respondents.

RESULTS

Table -1: Perception of respondents towards the medicinal plantation in their houses during COVID-19 (n=400)

Statement	Medicinal plants prevent various health related problems				
Variable	Strongly agree(5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly disagree(1)
1.Gender					
a) Male	25.00	57.00	14.80	2.60	0.00
b) Female	43.90	49.10	5.60	0.40	1.10
Statement	Cultivation of Medicinal plants has increased in houses after Covid -19				
2.Profession					
a)Own business	26.30	36.80	21.10	5.30	10.50
b)Government Service	29.20	50.00	8.30	8.30	4.20
c)Private Sector	43.80	45.00	10.00	1.20	0.00
d)Agriculture	0.00	75.00	0.00	25.00	0.00
e)Homemaker	32.80	50.00	17.20	0.00	0.00
f)Any other	30.60	47.90	17.40	3.30	0.80
Statement	Plantation and consumption of medicinal plants has increased in houses after COVID -19				
3.Locality					
a)North Zone	22.20	49.40	21.00	6.20	1.20
b)East zone	28.70	51.70	14.90	4.60	0.00
c)West zone	48.10	35.10	14.30	1.30	1.30
d)South zone	33.30	57.10	9.50	0.00	0.00
e) Central Zone	33.30	46.40	13.00	2.90	4.30
Statement	COVID-19 has changed people's behavior toward plantation by creating awareness, affection, a sense of need, and the necessity for plantation.				
4.Family type					
a)Joint	18.50	53.80	11.80	10.10	5.90
b)Nuclear	24.90	33.10	26.30	8.50	7.10

The data presented in table-1 reveal that a substantial majority (93.00%) of female respondents expressed agreement ('Agree' or 'Strongly Agree') with the statement that medicinal and immunity-boosting plants contribute to the prevention of various health-related problems. In contrast, a comparatively higher proportion of male respondents selected ' undecided,' indicating ambivalence or uncertainty regarding the effectiveness of medicinal plants in promoting health. The findings also revealed that a majority (82.80% and 78.50%) of respondents, comprising housewives and individuals from various other professions, selected 'Agree' or 'Strongly Agree' with the assertion that the plantation and consumption of medicinal plants had increased in households following the COVID-19 pandemic. In contrast, a lower proportion of respondents employed in government services expressed disagreement ('Disagree' or 'Strongly Disagree'), indicating scepticism regarding any perceived increase in the consumption of medicinal plants post-pandemic.

The findings revealed that the majority of respondents from the West and South Zones selected 'Agree' or 'Strongly Agree' with the statement that the plantation and consumption of medicinal or immunity-boosting plants increased in households following the COVID-19 pandemic. In contrast, a lower proportion of respondents from the North and East Zones selected 'Disagree,' indicating that they do not perceive an increase in the plantation and consumption of such plants. Additionally, a considerable number of respondents from the North Zone selected ' undecided,' suggesting a degree of uncertainty or ambivalence regarding the issue.

The results indicate that a majority (70.30%) of respondents from joint families selected ' strongly agree ' or ' agree,' reflecting a significant change in behaviour towards plantation practices and increased awareness following COVID-19. In contrast, a considerable proportion of respondents from nuclear families selected ' undecided, suggesting uncertainty regarding whether their post-pandemic plantation maintenance behaviour had changed.

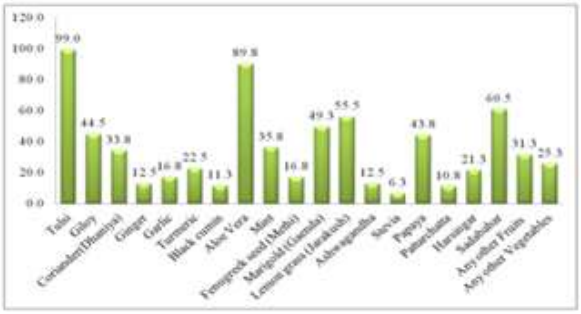

Figure 1: Cultivation of different immunity booster plants during COVID-19

The above figure represents the percentage of respondent's cultivated and used different immunity booster plants during COVID-19: -

Highly cultivated and Used Plants: Tulsi (99.00%) is the most well-known medicinal plant, indicating its widespread cultural and medicinal significance. Aloe Vera (89.80%) is also highly cultivated. Sadabahar (60.50%), known for its medicinal properties, also had significant awareness among respondents.

Moderately cultivated plants included ashwagandha (55.50%), Lemon Grass (49.30%), papaya (43.80%), and Giloy (44.500%). Coriander (33.80%) and mint (35.80%) indicated some recognition but were relatively lower than expected for commonly used herbs.

Less cultivated Medicinal Plants: Certain plants, such as Stevia (12.50%), Harsingar (10.80%), and Black Cumin (11.30%), have lower cultivation, possibly due to limited awareness of their medicinal properties.

Other Fruits and Vegetables: A moderate percentage of respondents (31.30%) were aware of the medicinal benefits of other fruits, while 25.30% recognized the value of other vegetables.

Table 2: Association of medicinal planation attitude and practice with the different demographic variables (n=400)

Variables	Statement		
	COVID changed your behaviour towards	Prevent from health related problems	Cultivation and consumption of medicinal plants has increased in houses
	p-value		
1.Respondent's age	0.101	0.403	0.106
2.Gender	0.904	0.000	0.060
3.Education	0.941	0.764	0.789
4.Profession	0.154	0.104	0.000
5.Locality	0.467	0.290	0.013
6.Family type	0.001	0.088	0.612
7.Type of house	0.250	0.286	0.237
8.Religion	0.057	0.086	0.797
9.Monthly income	0.665	0.305	0.698

Above table-3, shows that a significant association between the type of family (joint or nuclear) and the change in behaviour towards plantation activities ($p = 0.001 < 0.05$). However, when examining the perception of medicinal and immunity-boosting plants, gender emerged as a significant factor ($p = 0.000 < 0.05$). Female respondents exhibited greater awareness of the health benefits associated with medicinal plants in preventing various health-related problems than male respondents. Additionally, profession and locality were significantly associated with the increase in plantation and consumption of medicinal and immunity-boosting plants after COVID-19 (p-value = $0.000 < 0.05$).

Table -3: Perception and Practice towards Immunity Booster Plantation: A Mann-Whitney Test for association

	Statement		
	Behavior change	Prevent from various health problem	Increased cultivation and use
Mann-Whitney :U	15767	12607	14325
Wilcoxon W	22437	19277	20880
Asymp. Sig. (2-tailed)	0.536	0.000	0.051

Grouping Variable: Gender (Male and Female)

The results based on the Mann-Whitney test analysis in table-3 indicates that there is no significant difference between males and Female in post COVID behavioural change in respondents regarding awareness, affection, need, and necessity of plantation. However, a significant difference was observed in the attitude of men and women regarding the use of medicinal/Immunity booster plants to prevent various health-related problems ($p = 0.000$). There was a significant difference between males and females in that the plantation and consumption of medicinal/ immunity booster plants had increased in houses after Covid-19.

DISCUSSION

This study investigated gender- and demographic-based differences in perceptions and behaviours related to the plantation and use of medicinal/immunity-boosting plants in the context of the COVID-19 pandemic. COVID-19. The findings indicate that perceptions regarding the rise in the plantation and consumption of medicinal and immunity-boosting plants vary across different localities, reflecting geographical differences in awareness, practices, and attitudes following the pandemic. Supporting the study by Kumar et al. (2019), medicinal plants have been used for centuries to prevent and treat various health-related problems, including infectious diseases and chronic illnesses. Another study by Singh et al. (2020) found that medicinal plants have antimicrobial and antioxidant properties, which can help prevent and treat various health-related problems. Mishra et al. (2020) found an increase in the cultivation and use of medicinal plants in households during the COVID-19 pandemic. Another study by Gupta et al. (2020) found that the COVID-19 pandemic has led to increased interest in medicinal plants and their potential health benefits. Sharma et al. (2020) indicated an increase in the plantation and consumption of medicinal plants in households during the COVID-19 pandemic.

The familiarity and cultivation practice with the mentioned medicinal plants, such as Tulsi, Aloe Vera, Ashwagandha, and Giloy, indicates the potential of their benefits in COVID-19 prevention. Supporting research conducted by Nayaka, N. M. D. M. et al., (2023), indicated that during the COVID-19 pandemic, the Indonesian population cultivated and used 59 plants from 28 families, including Curcuma longa Zingiber officinale, Cymbopogon citratus, Kaempferia galanga, and Curcuma zanthorrhizaa and findings also indicated medicinal plant helpful in boosting immunity (71.26%), maintaining good health (24.85%), and boosting stamina (12.28%), as well as preventing viral infections, including COVID-19.Another similar study (Da Silva, A. M., et al., 2023) reveals that 40.2% of respondents reported cultivated and used medicinal plants.

Overall, the results in table -2 indicate that a significant association between the type of family (joint or nuclear) and the change in behaviour towards plantation activities ($p = 0.001 < 0.05$). This indicates that family structure influences attitudes towards plantation practices. No significant associations were observed between other demographic factors, such as age, gender, profession, locality, type of house, and monthly income, and the change in behaviour towards plantation activities, indicating that these variables did not significantly influence attitudes towards plantation activities after COVID-19 in this study. A supporting study showed that most of the people (45.61%) were getting medicinal plants from their home gardens and cultivated medicinal plants were significantly associated with the education level, location of home, primary treatment mode, gender, and age class (Khadka, D.,et al.,2021).Another similar study showed an association between the use of medicinal plants and females (Da Silva, A. M., et al., 2023). These results have important implications for public health and environmental policies. Government Awareness Campaign: Launch campaigns emphasizing the health, environmental, and economic benefits of planting immunity-

boosting plants. Television, radio, and social media should be used to spread the message widely. Empowering Women as Health Champions: Form women-led community groups to promote plantation practices, focusing on the preventive health benefits of medicinal plants. Provide training to women on integrating immunity-boosting plants into their diets and traditional medicine. Furthermore, government programs should prioritize accessible resources, expert support, and educational campaigns to foster sustainable urban and rural gardening practices.

CONCLUSION

These findings imply that efforts to promote plantation awareness, gardening improvements, and the adoption of medicinal and immunity-boosting plants can be directed at the population, irrespective of gender. Initiatives targeting both men and women are likely to yield similar engagement levels. Females often play a more direct role in family healthcare and food preparation, which might make them more aware of natural health solutions. Socio-cultural norms might contribute to women valuing preventive health measures more, particularly in rural/urban settings where women are often primary caregivers.

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