

Awareness, Cultivation and Consumption Practices of Microgreens among Urban Women of Varanasi: An Interventional Study

Shahzadi Khatoon and Mukta Singh*

Banaras Hindu University, Faculty of Science, Department of Home Science, Varanasi, India

*Corresponding author: drmuktasingh@gmail.com (ORCID ID: 0000-0002-5054-2882)

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ABSTRACT

Globally significant parts of the population consume substantially less nutritious foods than recommended levels. People have been encouraged to find alternative food sources due to growing public health concerns. Microgreens are young, immature plants that are a new type of vegetable that have just been developed, adapting their production at the micro-scale. In diets that support good health, microgreens are becoming more and more important. They are regarded as excellent providers of nutrients and bioactive substances, and they have promise in preventing chronic illnesses and undernutrition. This study is basically focused on assessment of awareness, cultivation, and consumption practices regarding microgreens among urban women of Varanasi. The cross-sectional study was carried out in which samples were selected randomly, and the total sample size was 110 subjects. Educational intervention program was also conducted after the survey. Results demonstrated that the majority of respondents (97.22%) hadn't any knowledge about microgreens before the intervention, but they were willing to know about growing methods of microgreens. After intervention (73.14%), subjects had knowledge about microgreens. In which (65.74%) subjects started to grow and consumption of microgreens after 3rd month of follow-up. Therefore, it is essential to develop more and more community awareness-building initiatives and campaigns in the locals so that it can as soon as possible, become a regular part of people's diets.

HIGHLIGHTS

- ① A community based survey was carried out to know the awareness of microgreens among urban women of Varanasi.
- ① Subjects were introduced to the nutritional benefits of food named microgreens.
- ① Furthermore, a feedback was taken after 3 months from the aforesaid section of society about the implementation microgreens in their diet.

Keywords: Microgreens, Malnutrition, Functional food, Urbanization, Awareness

Hunger and poverty are widespread in developing nations like India. People who eat to fill their stomachs do not consume a balanced diet that will keep them healthy. This is a consequence of rapid urbanization and industrialization. As a result, the population has limited access to land resources. Functional foods, fruits, and vegetables are not commonly found on people's plates in appropriate quantities or in their natural state. In this situation, cultivating microgreens at home and consuming

them regularly can aid in overcoming a variety of deficits. By incorporating microgreens into a daily diet, can be prevented several deficiencies and is potentially helpful in combating malnutrition. However, in India, relatively few people are aware

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of it. Keeping these facts in mind, this study is focused on assessing knowledge, awareness, and practices of microgreens among urban women of the Varanasi district.

Nutrition and health depend on having a healthy diet (Micha *et al.* 2020). A good diet is act as “health-promoting and disease-preventing” (Neufeld *et al.* 2021). It delivers an adequate amount of nutrients and acts as a beneficial health agent from wholesome food while avoiding harmful consumption. Around the world, around three billion people cannot afford healthful foods (FAO *et al.* 2021; Herforth *et al.* 2020).

Microgreens have become recognized as promising therapeutic and functional foods for enhancing entire health through dietary supplementation. They have a soft texture, distinct aromas, and an outstanding amount of different nutrients, contributing to better nutraceutical benefits than their mature counterparts. Microgreens are gaining popularity due to their intriguing organoleptic characteristics and the nutritional importance of these plants (Sharma *et al.* 2022). It is vital to feed the entire population with a large quantity of food that should also be nutritious as the world population grows. It is time to switch to farming techniques that require less time, effort, money, and space. Therefore, farming uses little acreage, no fertilizers, and a lot of micronutrient-rich produce (Burlingame, 2014; Ridgway *et al.* 2015).

Malnutrition due to a lack of certain micronutrients is a major issue that affects both developing and wealthy nations. One of the Millennium Development Goals is preventing mineral malnutrition, one of humanity’s greatest difficulties. Microgreens are a new crop that is high in micronutrients and doesn’t need to be biofortified or genetically modified. Microgreens are young, edible plants that are typically harvested 7–14 days after germination. Microgreens can be made from a wide range of herbs, vegetables, and flowers. Microgreens are more flavourful and often very spicy than their mature counterparts. They are becoming increasingly popular among chefs to add flavor and texture accents to sandwiches, salads, and other foods. The number of micronutrients in conventionally cultivated veggies is roughly 40% higher, which is a very intriguing (Treadwell, D., 2010; Wallin, 2013; Weber, 2016, 2017).

METHODOLOGY

Kashi Vidyapeeth Block of Varanasi District was selected purposively for the study. In 11 Apartments were randomly selected. Ten respondents were selected randomly a middle-aged group of women from each apartment. So the total sample size was 110. Two respondents were dropout during the study. Data were collected through a self-constructed questionnaire to assess the awareness regarding microgreens. After the survey, educational intervention program was carried out of willing respondents, and also three-month follow-ups were taken. Educational intervention was given through Self-constructed folder, Demonstration, Learning by doing method, and E-Video by using the YouTube channel platform.

RESULTS AND DISCUSSION

Table 1: Distribution of respondents according to their general information

Variables	Characteristics	Frequency (%)	Mean ± S.D
Working status	Working women	32 (20.62)	1.70 ± 0.45
	Non-working women	76 (70.37)	
	Total	108(100)	
Education	<High school	3 (2.7)	3.30 ± 0.91
	Intermediate	10(9.25)	
	Undergraduate	59 (54.62)	
	Post graduate	21(19.44)	
	Ph. D & above	15 (13.8)	
	Uneducated	0 (0)	
Total	108(100)		
Dietary Preferences	Vegetarian	73 (67.80)	1.32 ± 0.47
	Non vegetarian	35 (32.4)	
	Total	108(100)	

The table 1 demonstrates that most individuals (70.37%) were not employed. Regarding educational background, most respondents (54.62%) had undergraduate degrees, followed by postgraduate, Ph.D. or higher, intermediate, and high school degrees. Working status may significantly impact microgreens growth techniques since working women have busier schedules than non-working women. Therefore, they may not give as much time to the cultivation of microgreens. Understanding the significance and health advantages of microgreens may be influenced by educational background.



Dietary habits also reveal the individuals' interest in vegetarian cuisine.

Table 2: Distribution of respondents according to their preferable buying site of vegetables

Vegetables buying options	No of respondents (%)	Mean ± S.D
Supermarket	21(19.44)	2.51 ± 1.15
Vegetable market/ Mandi	46 (42.59)	
Farm	3 (2.77)	
Venders	38 (35.18)	
Total	108 (100)	

Table 2 reveals that the majority of respondents (42.59%) purchased their veggies in a mandi or vegetable market, with the remaining purchasing them from vendors (35.18%), supermarkets (19.44%), and farms (2.77%). Individuals who purchase anything from a supermarket may be more aware of new items, such as baby form veggies since supermarkets are the primary options for many marketing strategies. Buying vegetables may also suggest exposure to new inventive goods.

Table 3: Distribution of respondents according to their knowledge about baby form of vegetables (i.e. Baby spinach, baby corn etc.)

Variables	Type of baby vegetables	Number of respondents (%)	Mean ± S.D
Yes	Baby Spinach	3(2.7)	2.08 ± 0.49
	Baby Corn	99(91.66)	
	Other	0(0)	
No	—	6(5.55)	
Total		108(100)	

Table 3 shows that 91.66% of respondents were aware of baby corn, and only 2.7% of respondents knew about baby spinach. Other than these two commons, no other subjects were found to be knowledgeable about any other baby form of vegetables. Because baby leaves like spinach are exclusively available in supermarkets, whereas baby corn is now available in regular vegetable markets like mandis.

Table 4: Distribution of respondents according regarding knowledge and consumption of organic food

Variables	Type	Number of respondents (%)	Mean ± S.D
Knowledge	Yes	19(17.59)	1.82 ± 0.38
	No	89(82.40)	
Total	—	108(100)	
Consumption	Yes	5(4.62)	1.95 ± 0.21
	No	103 (95.37)	
Total	—	108(100)	

Table 4 demonstrates that just 17.59% of individuals had knowledge of organic food, and 4.62% had consumed it. Respondents haven't knowledge of what is precisely organic food.

Table 5: Distribution of respondents according to their reason behind usage of organic food

Variables	Causes	No of respondents (%)	Mean ± S.D
Yes	Due to health benefits	1(0.92)	1.80 ± 0.44
	Not harmful	4(3.70)	
Total	—	5 (100)	
No	Costly	6(5.55)	2.77 ± 0.55
	Trust issue	8(7.40)	
	Don't know	89(82.40)	
Total	—	103(100)	

Table 5 reveals that 82.40 percent of respondents are unaware of organic food, 7.40 percent had trust issues, and 5.55 percent did not utilize organic food because it was too expensive. So it is expected that the bulk of organic goods are grown by commercial producers, and the overall cost of organic farming is higher than that of conventional farming. Additionally, there is a rise in fraud as some farmers sell tainted organic food to increase their profits.

Table 6: Distribution of respondents on the basis of land holding and knowledge of respondents regarding Urban farming

Variables	Number of respondents (%)	Mean± S.D
With agricultural field	9(8.33)	1.91 ± 0.27
Without agricultural field	99(91.66)	
Total	108(100)	



Have knowledge about urban farming	2(1.85)	1.98 ± 0.13
Haven't knowledge about urban farming	106(98.14)	
Total	108(100)	

Table 6 shows that 91.66 % of subjects haven't agriculture field only 8.33% subjects have agriculture field. About 1.85% of subjects have knowledge about urban farming. Microgreens are directly related to urban farming, which doesn't need any land resources.

Table 7: Distribution of respondents according to growing practices of vegetables, methods, type and place of growing

Variables	Method of growing	No of respondents	Mean± S.D
Growing	—	7(6.48)	1.93 ± 0.24
Not growing	—	101(93.51)	
Total	—	108(100)	
Growing method	In field	1(0.92)	2.24 ± 0.78
—	In pots	2(1.85)	
—	Disposable containers	4(3.70)	
—	Other	0	
—	Total	7	
Place of growing	On window/ balcony	6(5.55)	1.14 ± 0.37
	On farm land	1(0.92)	
	Other	0(0)	
	Total	7	
Type of food they grow	Vegetables	5(4.02)	1.57 ± 0.97
	Fruits	0	
	Edible Herbs (lemongrass etc.)	2 (1.85)	
	Other food	0	
	Total	7	

Table 7 indicates that most of the respondents (93.51%) weren't growing any kind of food because there haven't any fields available. About 3.70 percent of subjects used disposable containers for growing, 5.55 percent of respondents used windows or balconies for growing spaces, and only 1 percent of respondents used actual fields for growing. In which 4.02 percent of survey participants were growing veggies.

Table 8: Distribution of respondents on the basis of their knowledge regarding soil alternatives

Variables	No of respondents	Mean± S.D
Knowledge about soil alternatives	2 (1.81)	1.98 ± 0.13
Didn't knowledge about soil alternatives	106(98.01)	
Total	108(100)	

Table 8 shows that most of the subjects (98.01%) haven't knowledge about soil alternatives. Only a few respondents (1.81%) respondents know about this i.e., coconut coir dust.

Table 9: Distributions of respondents based on their knowledge of microgreens

Variables	Types	No of respondents (%)	Mean± S.D
About microgreens	Aware	3(2.77)	1.97 ± 0.16
	Unaware	105(97.22)	
	Total	108(100)	
Source of information	Social media	2(1.85)	1.66 ± 1.15
	Newspaper	0(0)	
	Magazine	1(.92)	
	Other	0	
	Total	3(100)	

Table 9 indicates that only 2.77% of respondents have knowledge about microgreens and their sources of information was magazines and social media. But the majority of the subjects haven't knowledge about this due to its popularity is still limited to developed countries and metro cities. Developing countries like India haven't knowledge about microgreens and their health benefits.

Table 10: Distribution of respondents according to their willingness to know about cultivation, consumption, and methods of growing microgreens

Variables	No of respondents	Mean± S.D
Willing	87(80.55)	
Not willing	21(19.44)	1.19 ± 0.39
Total	108(100)	

Table 10 indicates that the majority, 80.55 % of respondents, were willing to know about cultivation, consumption, and methods of growing microgreens

after knowing that it can be cultivated without field in less time and cost consuming of this superfood.

Table 11: Distribution of respondents regarding knowledge of whole harvesting process, benefits and consumption of microgreens

Variables	Pre-intervention No of respondents (%)	Post-intervention No of respondents (%)	Mean± S.D
Aware	3(2.4)	79(73.14)	1.97 ± 0.16
Unaware	105(97.22)	29(26.85)	
Total	108(100)	108(100)	

Only 2.4 percent of respondents knew about microgreens at the time of the survey, and after the intervention, 73.14 percent of subjects learned about them. Michell *et al.* (2020) concluded that customer acceptance levels are positively impacted by educational intervention programs. Because knowledge, awareness is significant factor regarding the usage and consumption of any new food items. It would be helpful to minimize food neophobia.

Table 12: Distribution of respondents according to their practices regarding growing of microgreens during pre and post intervention

Variables	Pre	1 st month	2 nd month	3 rd month
Practicing of growing microgreens	0	43(39.81)	59(54.62)	71(65.74)
Not practicing	0	65(60.18)	49(45.37)	37(34.25)
Total	0	108(100)	108(100)	108(100)
Working	0	13(30.23)	11(22.03)	23(32.3)
Not working	0	30(69.76)	48(67.60)	48(67.60)
Total	0	43(100)	59(100)	71(100)

Table 12 indicates that 1st month follow-up after intervention 39.91%, in 2nd month 54.62%, and 3rd month 65.74% subjects were using microgreens. In 69.76%, 67.60% and 67.60% of respondents were non-working in 1st 2nd and 3rd months of follow-up, respectively. Educational intervention programs highly affected the cultivation and consumption of microgreens.

Table 13: Distribution of respondents according to their usage of microgreens on the routine basis

Variables	1 st month	2 nd month of intervention	3 rd month of intervention
Daily	12(27.90)	20(33.89)	29(40.84)
Weekly	5(11.62)	9(15.25)	7(6.4)
Alternative days	26(60.46)	30(50.84)	35(32.40)
Total	43(100)	59(100)	71(100)

According to Table 13, about 27.90% of respondents used microgreens every day in the first month of the follow-up, followed by 33.89% in the second and 40.84% in the third month. Due to their hectic schedules, the remaining people used alternate and weekly days.

Table 14: Variations of using microgreens in their diet

Variables	Various forms	Number of respondents
Raw form	As a salad / sprout/ garnishing	31(43.66)
Cooked form	As a soup and with many recipes	7(9.85)
Both	In soup, salad, garnishing, with many recipes	33(46.47)
Total	—	71(100)

Table 14 shows that total 46.47 percent of respondents used microgreens in both raw and cooked forms, whereas 43.66 percent used them in raw form. Because many respondents consumed microgreens despite not liking some of their flavours but consumed due to their health benefits.

Table 15: Distribution of respondents according to their motivation of using microgreens

Variables	No of respondents (%)
Using for the taste	9(12.67)
Using for the nutritional benefits	13(12.02)
Use for the aesthetics	0(0)
All of the above	49(69.01)
Other reason	0
Total	71(100)

Table 15 shows that approx. 13% of respondents were using microgreens for taste, 12.02% of



respondents used them for nutritional benefits, and 69.01% of respondents were using them for both reasons. Therefore, it is possible to say that education and awareness could enhance a healthy diet and lifestyle.

CONCLUSION

Microgreens are a very nutritious food, but in Developing countries like India, their cultivation and consumption is very low due to the lack of awareness. Microgreens are limited to the boundaries of chef’s and metro cities. However, this Nutritious food can be grown very quickly at home without a field at the cheapest cost. So educational intervention programs through campaigns and demonstrations should be created in entire communities. That could be helpful in maintaining many micro and macronutrient deficiencies in the country.

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