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Dietary Habits and Meal Pattern of People Residing in Anand District during COVID-19 Lockdown

Viraj Roghelia*, V. H. Patel

Abstract

Background: Coronavirus disease-2019 (COVID-19) is a condition caused by the novel coronavirus SARS-CoV-2. It was declared as global pandemic as it affected millions of people worldwide. A nationwide lockdown was announced to prevent the spread of the disease in India on March 24, 2020. The sudden change in routine lifestyle, home confinement, and fear of this pandemic caused stress and anxiety among the people and this has affected many habits of the people. **Objective:** The present study was conducted to evaluate changes in the dietary habits and meal pattern of people residing in Anand district during COVID-19 lockdown. **Methodology:** An online survey was conducted through semi-structured questionnaire to study the dietary habits and meal consumption pattern before and during COVID-19 lockdown. **Result:** The result showed a change in the regularity of meal consumption, type, and number of meals consumed by the respondents. More than 25% of respondents have reported an increase in the number of meals cooked, quantity of food cooked, and number of food items in one meal during the lockdown. Moreover, higher consumption of fruits and vegetables, protein rich foods, herbs, spices, and limited use of fats, oils, sugar, and salt was reported by more than 30% respondents. **Conclusion:** The present study concludes that this shift toward healthier food habits if sustained could have positive effects on health of people.

Keywords: COVID-19, Dietary habits, Meal pattern, Fruit and vegetable consumption, Lockdown

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Introduction

The novel coronavirus disease-2019 (COVID-19) is a condition caused by the SARS-CoV-2 and it was first reported in December, 2019 in Wuhan, China.[1] Due to the global spread of this viral disease, in January 2020, it was declared as a global pandemic by the World Health Organization.[2] The disease shows mild-to-severe range of symptoms such as sore throat, dry cough, aches, fever, severe respiratory congestion, and breathlessness.[3] It is a fatal disease that spreads through droplet transmission mainly within 1 m of area.

A nationwide lockdown was announced on March 24, 2020 for 21 days by the Indian government to prevent the spread of the disease in India. It was further extended till May 30, 2020 in various phases.[4,5] It has made the people to stay indoors and this sudden change affected the routine lifestyle and other related habits of people. Moreover, the nationwide lockdown resulted in panic buying and piling up the stock of groceries due to the assumption of a shortage of basic needs, including food items in grocery stores.[6]

In addition, the restriction on mass gathering, not meeting relatives and friends, online working along with the fear of the severity, and fatality of this pandemic could cause anxiety and stress among the people.[7,8] These psychological changes impacted many aspects of life. One of the changes is a deviation in eating habits. The degree of stress may result in hyperphagia or hypophagia.[9,10] Stress impacts on consumption of caloric dense food rather than nutrient-dense foods.[11]

Few studies have reported that to overcome stress, anxiety, monotonous routine, and boredom of this quarantined period, subjects led to overeating,[12,13] especially carbohydrate rich foods which are reported to enhance serotonin production that has a positive effects on mood.[14] Availability of free time also resulted into more television watching and usage of social media. Screen time is associated with snacking frequency mainly HFSS food, ready to eat foods, and ready to cook foods and sodas.[15,16] Hence, the meal quantity and quality may be affected. The long-term effect of this change may affect the nutritional status of a person. On the contrary, the food restriction due to managing the cooking from available resources as well as due to psychological stress influenced the overall daily food intake of an individual. This may lead to physiological stress reactions which are related to the feeding induced satiety.[17] After studying the available literature, it can be stated that very few studies are available to evaluate the effect of the lockdown and quarantined life on dietary habits and behavior of people, especially in India. Hence, the present research was planned to study the dietary habits and meal pattern of people residing in Anand district during COVID-19 lockdown.

Department of Home Science, Sardar Patel University, Vallabh Vidyanagar - 388120, Gujarat, India

***Corresponding Author:** Viraj Roghelia, Department of Home Science, Sardar Patel University, Vallabh Vidyanagar - 388120, Gujarat, India. E-mail: virajshalin@gmail.com

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Methodology

To check the effect of the lockdown on dietary habits of people, an online survey was conducted through semi-structured questionnaire. Research through an online survey is a recommended approach to reach group of subjects mainly in this pandemic situation.[18] The questionnaire was designed through a Google form in the English language. The questionnaire was

disseminated through WhatsApp to the known personal and professional contacts. The adult subjects above 18 years, living in various area of Anand district, namely, Anand, Vallabh Vidyangar Khambhat, Karamsad, and Bakrol, constituted the sample of the present study.

Tool of the Study

Semi-structured questionnaire was the tool for the present study. The questionnaire was developed to study changes in dietary habits and meal pattern of people during the lockdown. A pilot study was conducted on 25 respondents to check the reliability of the questionnaire. Few questions were reformulated and final questionnaire was developed. The reliability of the questionnaire was tested and Cronbach's alpha value was 0.703. The questionnaire consisted of 60 items and it was categorized into two main sections. The first section focused on questions seeking demographic information like name, age, educational qualification, occupation, monthly family income, type of family, number of family members, member belong to particular age category such as infancy, childhood, and old age as well as with special physiological state such as pregnancy, lactation, and chronic diseases.

The second section consisted information regarding dietary habits, type of diet, main meals consumed in a day, change in meal consumption in the lockdown, the reasons for the change if any, change in the consumption of fruits, vegetables, herbs, spices, protein rich foods, ready to eat foods, ready to cook foods, fried foods, and sweets.

The respondents were informed about the confidentiality of the data provided by them and its use only for the purpose of research.

Statistical Analysis

About 202 responses were collected. The responses were coded and entered in SPSS for the statistical analysis. Univariate analysis, McNemar test, and paired t test were conducted. $P < 0.05$ was considered as statistically significant.

Results and Discussion

Total 202 respondents from Anand district have responded to the questionnaire. Table 1 depicts the demographic information of the subjects. About 44.1% of the respondents were male and 55.9% were females. The maximum percentage of the respondents belonged to 31–45 years (44.1%) followed by 18–25 years (38.1%), 46–60 years (14.9%), and 60 years and above (3.0%). The majority of the respondents were postgraduates, 24.3% were graduates, 23.3% were doctorate, 2.5% have done higher studies while the remaining respondents were studied up to H.S.C., Diploma. Looking at the data of occupation, it was observed that the majority of the respondents were doing job, namely, government job (28.2%) and private job (33.7%). About 22.8% of the respondents were students. About 2.5% were doing business, 6.4% were professionals, 4.0% were housewife/home maker, and 2.5% were retired. About 69.8% respondents were married and 30.2% were unmarried. The majority of the respondents (54.5%) belonged to a nuclear family while 45.5% of the respondents belonged to a joint family.

The majority of the respondents (58.9%) have 3–4 members in their family followed by 30.7% respondents with 4–8 members, 5.9% respondents with two members, and 4.5% of respondents with more than eight members in their family. The data showed that the majority of the respondents (30.2%) have family income above Rs. 1 lakh/month while an equal number of respondents (23.3%) have reported family income up to Rs. 50,000–Rs. 1,00,000; Rs, 25,000–Rs. 50,000, and up to Rs. 25,000/month.

Figure 1 represents that 52.48% of the respondents have a school-going child; 50% have elderly person; 35.64% have a person with chronic illness such as diabetes and cardiovascular disease; 9.90% have an infant; and 7.92% have pregnant or lactating woman in their family. The nutritional needs and food requirement by these groups are different. The sudden change in the lifestyle may affect the routine of children and may be related to food choices by them. Pietrobelli *et al.*[19] have reported higher consumption in potato chips, sugary drinks, red meat, and fruit during the lockdown while no change was reported in consumption of vegetables. The

Table 1: Demographic information of the respondents (*N*=202)

Variable	*Category*	*N*	*%*
Gender	Male	89	44.1
	Female	113	55.9
Age group	18–30 years	77	38.1
	31–45 years	89	44.1
	46–60 years	30	14.9
	Above 60 years	6	3.0
Educational qualification	Up to H.S.C.	5	2.5
	Diploma	4	2.0
	Graduate	49	24.3
	Postgraduate	92	45.5
	Doctorate	47	23.3
	Other	5	2.5
Occupation	Government job	57	28.2
	Private job	68	33.7
	Business	5	2.5
	Professional	13	6.4
	Homemaker	8	4.0
	Student	46	22.8
	Retired	5	2.5
Marital status	Married	141	69.8
	Unmarried	61	30.2
Type of family	Nuclear	110	54.5
	Joint	92	45.5
Number of family members	2	12	5.9
	3–4	119	58.9
	4–8	62	30.7
	More than 8	9	4.5
Monthly family income	Up to Rs. 25000	47	23.3
	Rs. 25,000–Rs. 50,000	47	23.3
	Rs. 50,000–Rs. 1,00,000	47	23.3
	Above Rs. 1,00,000	61	30.2

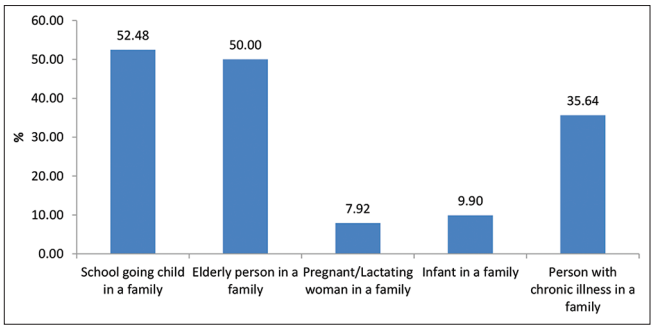

Figure 1: Distribution of respondents with special age group members in a family

type of food consumed by children may affect their nutritional status in growing age. Food-based prevention of chronic disease consisted of regular intake of fruits, vegetables, whole grains, nuts, legumes, fermented dairy products, and vegetable oils.[20] Hence, the type of food intake is very crucial in prevention and as a dietary treatment for chronic diseases. There was a considerable increase in the nutritional requirements during pregnancy and lactation due to physiological changes that occur in these phases. Hence, to fulfill these additional nutritional requirements, food quality and quantity need a precise attention.[21,22]

Figure 2 indicates the dietary pattern of respondents in regular days and during the lockdown. For this, McNemar test was used to determine if there are differences on a dichotomous dependent variable between two related groups. It was observed that dietary pattern of 133 respondents was irregular in regular days and during the lockdown period. While, 27 respondents have started following regular dietary pattern who followed an irregular dietary pattern before lockdown. Similarly, 26 respondents had regular dietary pattern in regular days and in the lockdown period, whereas, 16 respondents changed their dietary pattern from regular to irregular. However, this change was non-significant ($\chi^2 = 2.326$ and $p = 0.127$). Kumar and Dwivedi[23] have also reported that 75% of the subjects had change in eating habits during the lockdown. The confinement to home resulted into irregular eating pattern.[24] Irregularity of dietary pattern affects the secretion of ghrelin, an orexigenic hormone. It may act as stimulus for eating more food and snacking.[25]

Figure 3 depicts the information of meal consumption in regular days and during the lockdown period. It was observed that number of respondents who have regularly consumed only three major meals per day was reduced in the lockdown period. While there was an increase in the percentage of respondents that was noted for the consumption of four or more meal comprising of three major meals, namely, breakfast, lunch, and dinner. It indicates that during the lockdown period, people have incorporated the other meals like mid-morning meal, afternoon snacks, late evening snacks, and dessert apart from three major meals.

Table 2 shows the change in a specific meal consumed in a day during the lockdown. McNemar's test was done to compare type of meal consumed by the respondents before and during the lockdown. The data in table describe that 32 respondents started taking breakfast during the lockdown period who were not taking breakfast in regular days. On the other hand, 21 respondents were not taking breakfast during the lockdown who were having breakfast in regular days. About 149 respondents did not show any change in their breakfast consumption pattern. The change in breakfast consumption may be attributed to the change in sleep-wake up cycle. One hundred and fifty-eight respondents did not consume a mid-morning meal in regular days and during the lockdown period. Twenty-one respondents started consuming a mid-morning meal who did not practice it in regular days. While, 15 respondents stopped consuming a mid-morning meal as compared to regular days. One hundred and eighty-five respondents were taking lunch in regular days and during the lockdown period. Fourteen respondents have started taking lunch who were not taking it in regular days. Thirty-two respondents and 26 respondents have started consuming afternoon snacks and late evening snacks, respectively, in the lockdown period who did not consume these meals in regular days. About 16 respondents stopped consuming dinner while seven respondents started consuming dinner during the lockdown as compared to regular days before the lockdown. About 12 respondents started consuming dessert during the lockdown who have not practiced consuming dessert before the lockdown. Only four respondents started consuming bed time meal during the lockdown who did not consume bed time meal before the lockdown.

Table 2: Change in a specific meal consumed in a day during the lockdown as compared to regular days (before lockdown)

Type of meal	*Regular days (before the lockdown)*	*During the lockdown*		*P-value*
		No	*Yes*	
Breakfast	No	9 (4.46)	32 (15.84)	0.170
	Yes	21 (10.40)	140 (69.31)	
Mid-morning meal	No	158 (78.22)	21 (10.40)	0.405
	Yes	15 (7.43)	8 (3.96)	
Lunch	No	2 (0.99)	14 (6.93)	0.001*
	Yes	1 (0.50)	185 (91.58)	
Afternoon snacks	No	106 (52.48)	32 (15.18)	0.630
	Yes	37 (18.32)	27 (13.37)	
Late evening snacks	No	120 (59.41)	26 (12.87)	0.596
	Yes	31 (15.35)	24 (11.88)	
Dinner	No	6 (2.97)	7 (3.47)	0.093
	Yes	16 (7.92)	173 (5.94)	
Dessert	No	176 (87.13)	12 (78.22)	0.503
	Yes	8 (3.96)	6 (2.97)	
Bed time meal	No	184 (91.09)	4 (1.98)	0.388
	Yes	8 (3.96)	6 (2.97)	

*$P < 0.05$ indicates significant change

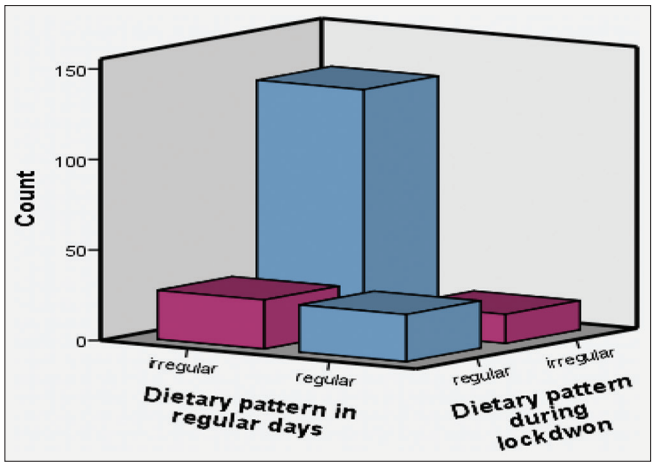

Figure 2: Dietary pattern of respondents in regular days (before the lockdown) and during the lockdown

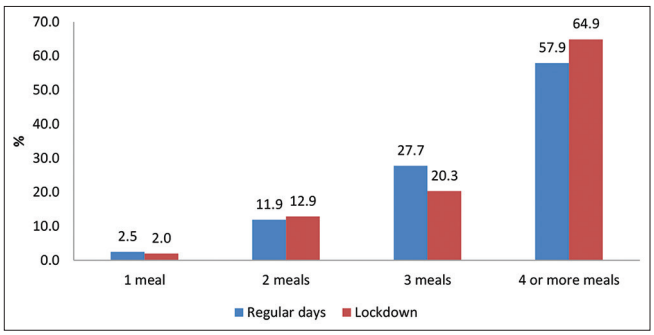

Figure 3: No. of meals consumed by respondents in regular days (before the lockdown) and during the lockdown

Sandhu and Kaur[26] have reported increased consumption of two meals and two snacks as well as two meals and one snacks by the respondents during the lockdown as compared to before the lockdown. They reported that changes in meal pattern might be attributed to more leisure time with families, relaxation from the routine schedule, unavailability of domestic help and distribution of available food wisely, and so on.

Figure 4 indicates the frequency of consumption of other cuisines such as pav bhaji, dhokla, handvo, muthiya, bhelpuri, panipuri, chaat, idli, dosa, sandwich, pizza, burger, Frankie, and so on by the respondents in regular days and during the lockdown period. The majority of the subjects did not change the frequency of consumption of other food items during the lockdown. However, 28 respondents were consuming other food items more frequently in the lockdown as compared to regular days and 24 respondents have less frequently consumed other food items in the lockdown period as compared to regular days. This change was non-significant ($\chi^2 = 0.173$, $P = 0.677$). The free time for cooking, the demand of family members, and entire family at home may be the reasons for the change in consumption of other cuisines during the lockdown.

Figure 5 represents a change in the number of meals cooked, quantity of food cooked, and the number of food items in one meal by the respondents during the lockdown. It was observed that the majority of the respondents did not change in any of these cooking habits. However, 40.6% of respondents have increased the number of meals cooked. About 31.2% and 27.2% of the respondents have also reported increasing the quantity of food cooked and number of food items in one meal, respectively. The reasons for the increase in these cooking habits are mentioned in Figure 6. It was noted that the majority of the respondents increased cooking number of meals, the number of food items in one meal and quantity of food cooked due to all the family members was at home during the lockdown followed by reason of demand of family members or to cater the extra food needs of family members. About 32.9% and 40.3% of the respondents have also responded availability of free time for cooking also led to an increase in numbers of meals cooked and numbers of food items cooked in one meal, respectively. Sidor and Rzymski[27] reported that 43.5% and 51.8% of the respondents admitted eating more and more frequent snacking between the meals during the lockdown. They also reported that 62.3% of the respondents have also declared cooking more food during the lockdown. Rodríguez-Pérez *et al.*[6] have also reported a higher frequency of cooking by about 45% of the respondents.

Figure 7 shows the change in consumption of different food commodities during the lockdown period. About 45.6% and 69.3% of respondents did not change the fruits and vegetable consumption, respectively. About 42.6% of respondents increased consumption of fruits while 18.8% of respondents increased consumption of vegetables during the lockdown period. It was noted that average fruit consumption was significantly ($P < 0.01$) increased during the

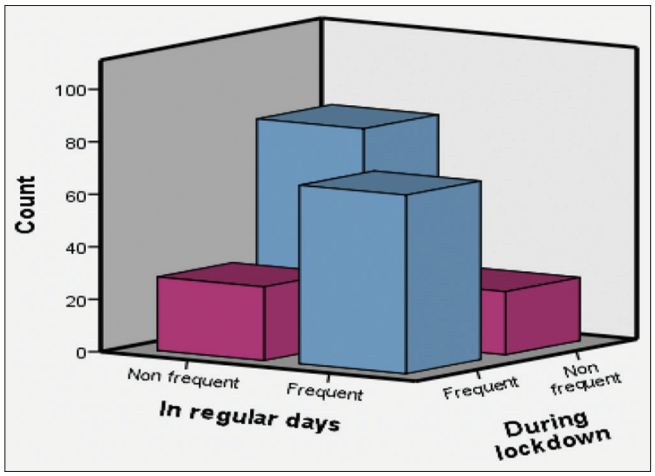

Figure 4: Consumption of other cuisines by respondents in regular days (before the lockdown) and during the lockdown

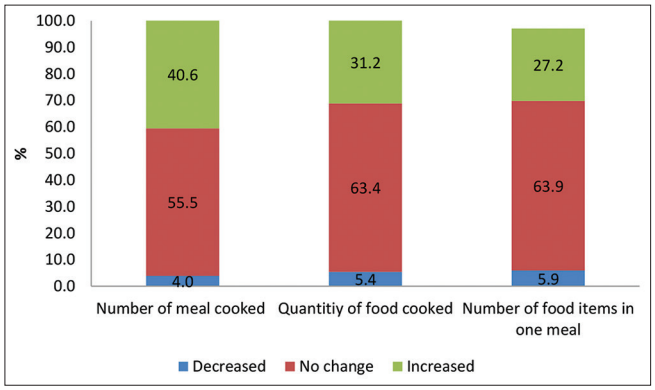

Figure 5: Change in number of meals cooked, quantity of food cooked, and number of food items in one meal by the respondents during the lockdown

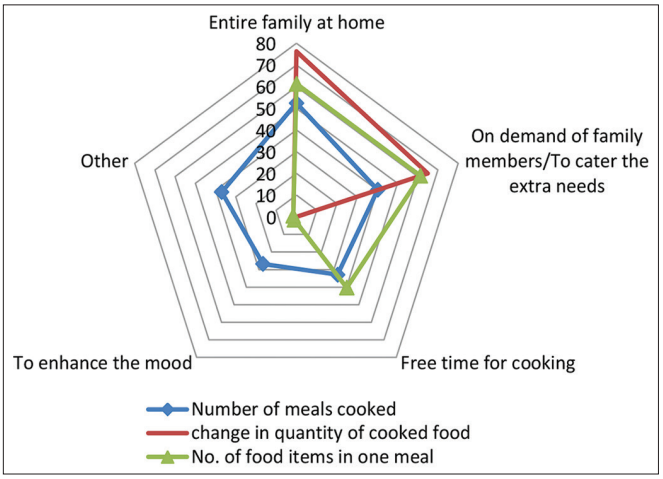

Figure 6: Reasons for increase in cooking habits

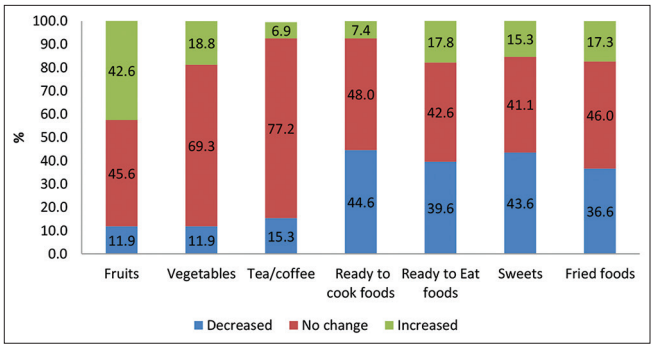

Figure 7: Change in consumption of different food commodities during the lockdown

lockdown while a non-significant increase in average consumption of vegetables by the respondents also noted as shown in Table 3. About 11.9% each of the respondents decreased the consumption of fruits and vegetables. Simlar observation was made in a study conducted by Rodríguez-Pérez *et al.*[6] They reported 25.3% and 23.3% of the respondents increased consumption of fruits and vegetables, respectively. While, 17.7% and 17% have reported to have decreased consumption of fruits and vegetables, respectively. Sidor and Rzymski.[27] have stated that about 42.1% of the respondents had fruits and vegetables consumption once in a day during the lockdown.

Further, the majority of the respondents did not change in consumption of tea or coffee followed by 15.3% of respondents decreased and 6.9% of respondents increased tea and coffee consumption. About 44.6% and 39.6% of the respondents have decreased the consumption of ready to cook foods and ready to eat foods, respectively, while 7.4% and 17.8% of respondents have increased the consumption of ready to cook foods and ready to eat foods consumption during the lockdown period. The majority of the respondents have decreased the consumption of sweets while 15.3% of the respondents have increased sweet consumption during the lockdown. About 36.6% of the respondents have decreased and 17.3% of respondents have increased consumption of fried foods during the lockdown. Sidor and Rzymski[27] have reported about 37.1% and 27.7% of the respondents had tea and coffee consumption more than one in a day during the lockdown**.** About 36.6% of the respondents had sweet consumption a few times a week in the lockdown. Rodríguez-Pérez *et al.*[6] have reported that 6.3% of respondents increased and 20.3% of the respondents decreased fried food consumption, respectively**.**

Table 4 depicts the information on conscious consumption of herbs and spices by the respondents during COVID-19 lockdown period. It was observed that 62.9%, 57.9%, and 55.0% of the respondents were consuming ginger, lemon, and turmeric, respectively. Tulsi (50.0%), garlic (47.5%), black pepper (39.6%), and clove (32.7%) were also consciously consumed by the respondents. Moreover, 4.0% of the subjects have also given conscious attention on the consumption of carom seeds, fenugreek seeds, dry ginger powder, garam masala, cinnamon, and honey. Sandhu and Kaur[26] stated that the practice of consuming honey, lemon water, turmeric milk, and warm water was found to be higher among the respondents during the lockdown to improve their immunity. Moreover, use of turmeric, garlic, cumin, coriander in cooking; detoction (kadha) made from tulsi, cinnamon, black pepper, dry ginger, and raisins as well as golden milk incorporated with turmeric is also suggested by Ministry of Ayush.[28]

The responses regarding dietary practices to enhance the immunity and overall health during this pandemic are reported in Figure 8. It was observed that 63.4% have increased the consumption of fruits, 42.1% have increased consumption of vegetables, 47% have increased consumption of protein rich foods, and 50% have increased consumption of herbs and spices. It was also noted that 31.7% and 33.2% of the respondents have practiced limited use of fats/oils and sugar and salt, respectively. Higher consumption of fruit and vegetables lead to a reduction in proinflammatory mediators and improved immune cell profile.[29] High glucose intake results into affect the Vitamin C entry into the cell and so it reduces immune cell reactivity Moreover, high sodium intake of sodium produces more helper T cells that damage living tissues.[30]

Table 3: Average consumption fruits and vegetable (in grams) before and during the lockdown

Fruits/vegetables	*Before the lockdown*	*During the lockdown*	*t-value*
Fruits	173.22±19.59	229.34±23.29	3.820**
Vegetables	216.54±23.77	221.15±23.63	0.877^{NS}

Values are mean±SEM, **indicates significant difference at $P < 0.01$

Table 4: Consumption of herbs and spices by respondents during the lockdown

Herb/spice	*Response*	*N*	*%*
Ginger	Yes	127	62.9
	No	75	37.1
Lemon	Yes	117	57.9
	No	85	42.1
Turmeric	Yes	111	55.0
	No	91	45.0
Tulsi	Yes	101	50.0
	No	101	50.0
Garlic	Yes	96	47.5
	No	106	52.5
Black pepper	Yes	80	39.6
	No	122	60.4
Clove	Yes	66	32.7
	No	136	67.3
Other	Yes	8	4.0
	No	194	95.0

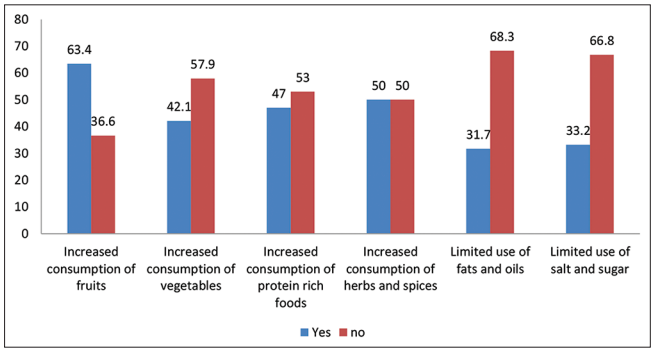

Figure 8: Dietary practice to boost up immunity and overall health during the lockdown

Conclusion

Changes in consumption number of meals, type of meal, type of meals cooked at home, the quantity of food cooked; the number of food items in one meal; and consumption of different food commodities were practiced. All the family members at home and their demand were the primary reasons for these changes. Respondents have also indicated increase in consumption of fruits and vegetables, protein rich foods, herbs and spices, and limited use of fats, oils, sugar, and salt. The present study concludes improvement in dietary habits of people especially consumption of fruits and vegetables. This shift in dietary behavior if continued could have a positive impact on health of an individual.

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