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Dr. Karavadi Vidusha
Assistant Professor, Department of Community Medicine Rajarajeswari Medical College and Hospital, Kambipura, Kengeri Bengaluru, Karnataka, India

Dr. Naveen Sukumaran Nair
Assistant Professor, Department of Community Medicine, SR Medical College and Research Centre, Akathumuri PO, Varkala, Thiruvananthapuram, Kerala, India

Dr. Shashikala Manjunatha
Professor & HOD, Department of Community Medicine Rajarajeswari Medical College and Hospital, Kambipura, Kengeri Bengaluru, Karnataka, India

Correspondence
Dr. Naveen Sukumaran Nair
Assistant Professor, Department of Community Medicine, SR Medical College and Research Centre, Akathumuri PO, Varkala, Thiruvananthapuram, Kerala, India

Health problems prevailing among the female workers in a garment factory, Bengaluru

Dr. Karavadi Vidusha, Dr. Naveen Sukumaran Nair and Dr. Shashikala Manjunatha

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Abstract
Background: Garment workers are susceptible to various health problems by virtue of their workplace and working conditions. The present study was conducted to assess the morbidity profile of female workers of garment factory in Bengaluru.
Methodology: A cross-sectional descriptive study was conducted among all the females working in the garment factory. An interview was conducted using a semi-structured pretested questionnaire. Clinical examination was done to measure height, weight. Visual acuity was tested using Snellen's chart. The data was compiled in Microsoft (MS) Excel worksheet and analyzed using SPSS.
Results: The mean age of the study participants was 30.33 ±7.06 years. Musculoskeletal problems were the most common problems present among 110(51.4%) study participants. 61.22% of the females worked in standing posture.
Conclusion: In the present study found that the most common problem was musculoskeletal disorders. Regular periodic medical examination would help in early diagnosis and treatment of morbidities among the workers.

Keywords: garment factory, musculoskeletal problems, females, morbidity

1. Introduction
Textile and clothing are considered as the oldest, largest and most global industries in the world and in India, it is also considered as the second largest employment sectors [1].
According to ILO estimates, at least 2 million deaths per year are accounted to occupational diseases and injuries [2]. Every occupation is associated with one or other ill affects on health [3]. One such occupational group, causing a wide range of co –morbid conditions are the garment industry. Garment workers are susceptible to various health problems by virtue of their workplace and working conditions [4].
The workers in the garment factories are mainly exposed to prolonged sitting, prolonged standing, highly repetitive work, lifting of heavy objects, working with their hands lifted to shoulder level or even higher, and working with their back twisted or bent forward, that have been shown to predict impaired work ability and enhance long-term sickness [5].
Workers with high physical work demands are well documented to be at elevated risk for impaired work ability, musculoskeletal problems, cardiovascular disease, long-term sickness absence, early retirement and all-cause mortality. Specifically, the workers with repetitive nature of work due to the physical demands are prone to get physical, psychological and nutritional health problems [6, 7]. The most common health hazards are respiratory problems, cardio vascular diseases, gastrointestinal diseases, gynecological diseases, and neurological, musculoskeletal and nutritional problems [1].
Approximately 60% of the population employed in the garment industry is women [1]. Today is an era of women who have diverse role to play in society. Often they handle two or more tasks simultaneously. They are therefore prone to suffer from work related diseases, which are further complicated by social, psychological and physiological issues. Roughly, 1 out of 300 female is suffering from some occupation related disease [8].
Studies have reported that women perform a dual role and often end with stress, which result in psychological related problems [1].They also struggle to combine their roles to look after their families. Women household workers have a double burden as there is greater demand for their skills as care-givers and service workers outside home [9].

Information on the existing morbidity pattern of the garments workers is essential to provide need based health care delivery to any population [10]. Hence the present study was conducted to assess the health problems among female workers of garment factory in Bengaluru

2. Objective

To assess the health problems prevailing among the female workers in a garment factory in a field practice area of a teaching hospital, Bengaluru.

3. Materials and Methods

- A cross-sectional descriptive study was conducted among females working in a garment factory in the field practice area of a teaching hospital, Bengaluru. The study was conducted during October to December 2016. Considering the study done by Saha K T *et al.* [11] prevalence of musculoskeletal problems is 69.64% by using formula $4pq/L^2$ with an allowable error of 10% and alpha error of 5% the estimated sample size is 177.Complete enumeration of the female workers of the garment factory was done (214).
- **Inclusion criteria:** Workers ≥18 years of age who have been working for minimum one year duration in the same factory.

3.1 Methodology

- Data was collected after obtaining clearance from the institutional ethics committee. A written informed consent was obtained from the workers after which an interview was conducted using a semi-structured pretested questionnaire.
- Questionnaire included variables like demographic details of the study participants, socio-economic status (Modified Kuppuswamy classification 2017), Morbidity pattern.
- Information on visual problems, hypertension, and diabetes were collected, followed by clinical examination to measure height, weight for assessment of body mass index (BMI). Blood Pressure was recorded and classification was done using JNC – VII criteria.6 Visual acuity for distant and near vision was tested using Snellen's chart.
- Participants who had been identified with problems were referred for further assessment and treatment to higher centers.

3.2 Statistical analysis

The data was compiled in Microsoft (MS) Excel worksheet and analyzed using SPSS (Statistical Package for Social Sciences) software version 20.0. The descriptive statistics-All qualitative variables was presented as frequency and percentages. All quantitative variables were presented as mean and standard deviation. Appropriate tests of significance were applied where ever necessary. P values of less than 0.05 would be considered statistically significant.

4. Results

A total of 214 study participants were examined in the study. The mean age of the study participants was 30.33 ±7.06 years. Most of the study participants i.e. 101 (47.2%) belonged to21-30 years age group and 112 (52.3%) had completed their high school education. Majority i.e. 161 (75.2%) were married. It was found that 95 (44.4%) and 103 (48.1%) belonged to Class II and class III socioeconomic status respectively (Table 1). It was found that 40.1% were tailors and 59.9% of the workers were working in those sections which involved prolonged hours of standing. Figure 1 shows different health problems among the study participants. Musculoskeletal problems were the most common problems present among 110(51.4%) study participants. 91 (42.5%) study participants have anemia. In the resent study, 6 (2.8%) participants were found to have normal blood pressure. 8(3.7%) had history of diabetes mellitus. Body mass index among the study participants was measured and it was found that 131(61.2%) had normal BMI and 8(3.7%) participants were obese. The work profile of the workers was shown in Table 2 which shows that 64.5% had less than 3 years of total experience in the garment factory and 61.22% of the females worked in standing posture. The workers had a leisure time of 1 hour and 30 minutes and the mean duration of working hours was 8 hours per day.89% had no history of tobacco use. It was observed that musculoskeletal problems were more common among the age group >35years (Table 3). The difference among them was found to be statistically significant ($p<0.05$). Among the study participants who were working in standing posture 63(57.27%) had musculoskeletal problems. The difference was not found to be statistically significant.

Table 1: Socio demographic profile of the study participants (N=214).

Variable	Number	Percentage
Age (years)		
<20	19	8.9
21-30	101	47.2
31-40	80	37.4
>41	14	6.5
Religion		
Hindu	198	92.5
Muslim	13	6.1
Christian	3	1.4
Literacy		
Illiterate	29	13.6
Primary/Middle school	70	32.7
Higher secondary/Intermediate	112	52.3
Graduate	3	1.4
Socio economic status		
Class I	-	-
Class II	15	7.0
Class III	95	44.4
Class IV	103	48.1
Class V	1	0.5
Marital status		
Married	161	75.2
Unmarried	34	15.9
Widowed/Divorced/Separated	29	8.9
Total	214	100.0

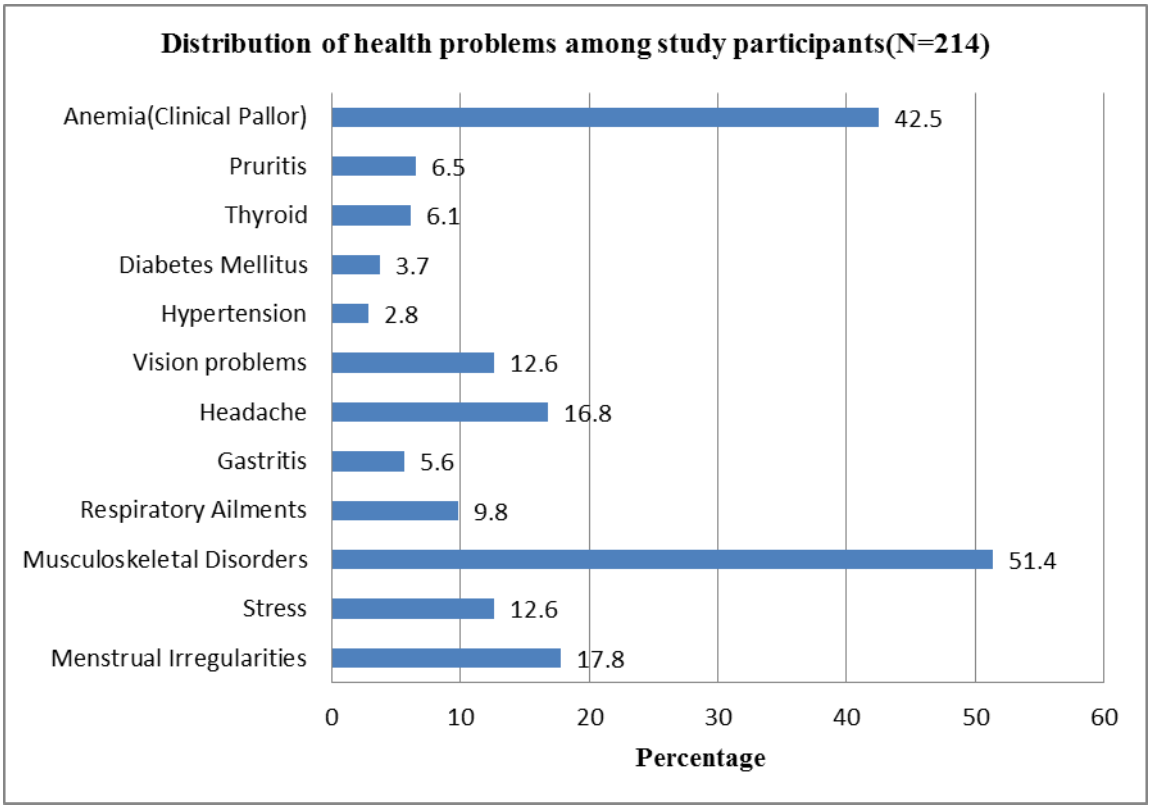

Fig 1: Bar diagram showing the distribution of health problems among study participants (N=214)

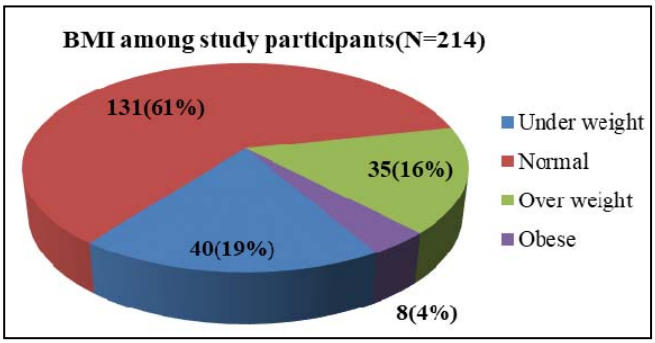

Fig 2: Pie chart showing the distribution of study participants according to BMI (N=214)

Table 2: Distribution of study subjects according to the work profile (N=214)

characteristics	Frequency	Percentage
Work experience in years		
<3years	138	64.50
>3years	76	35.50
Work posture		
Standing	131	61.22
Sitting	83	38.78
Total	214	100.00

Table 3: Association of Musculoskeletal problems with Age and work posture (N=214)

Age(Years)	Musculoskeletal problems		Total	Chi square	df	P Value
	Present (%)	Absent (%)				
<35	71(64.5)	88(84.6)	159(74.3)	11.27	1	0.001
>35	39(35.5)	16(15.4)	55(25.7)			
Total	110(100)	104(100)	214(100)			
Posture						
Standing	63(57.27)	68(65.38)	131(48.09)	1.482	1	0.22
Sitting	47(42.73)	36(34.62)	83(51.91)			
Total	110(100)	104(100)	214(100)			

5. Discussion

Being one of the biggest job creators in India, this sector makes one out of every six households to depend on them either directly or indirectly. The workers are unaware of their basic rights and their health problems are generally left unaddressed. In this study the mean age of the study participants was 30.33 ±7.06 years. This corresponds with the studies done by Ravichandran SP *et al* [12], Kumary P *et al*. [9].

Most of the participants (64.5%), in our study were employed in sections which involved prolonged hours of standing. These results are comparable with a study done by Tiwari RR *et al*. [13], where 60.7% of the study subjects adopted a standing posture during majority of their working hours.

Among the various health problems, musculoskeletal disorder was more common (51.4%). Anemia was reported in 42.5% of the study participants. In a study done in Tamil Nadu [4] it was reported musculoskeletal problem as common health problem (77.6%) followed by anemia

(57.1%).In a study done by Saha KT *et al*. [11] in Kolkata it was observed that musculoskeletal problems were the commonest health problem (69.64%) followed by sleep disturbances and gastrointestinal problems. These variations may be due to difference in the socio demographic characteristics and occupational setting.

2.8%ofthe participants were found to have hypertension in the present study these results corroborates with the studies done by Yerpude *et al*. [3] and Joseph *et al*. [14].

In the present study 16% of the study participants were overweight and 4% were obese these results were comparable to the study done by Joseph *et al*. [14] where 11.9% were overweight and 2.9% were obese. The participants were explained about the risk of obesity and advised to follow regular exercise and diet.

In the current study Musculoskeletal disorders were significantly more among participants <35years age group These results differed from the other studies by Bandyopadhyay L *et al*. [15], Ravichandran SP *et al*. [12] where musculoskeletal disorders were more among workers in age group above 35 years. This difference may be due to the more number of study participants in age group above 35 years in present study.

6. Limitation

The study was conducted in one garment factory hence results cannot be extrapolated to all the workers of the different garment factories.

7. Conclusion

Success of the garment factory has been made at the cost of worker's health. The health problems prevailing among garment workers is quite high with the most common being musculoskeletal problem and anaemia. The study has highlighted the possibility of age as a significant factor in the development of various musculoskeletal problems.

8. Recommendation

Screening by pre-placement examination and periodic health check-ups of the workers, so as to ensure early diagnosis and prompt treatment of symptoms. Proper posture adoption at work place will help in reducing musculoskeletal disorders.

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Prevalence of dental Fluorosis among children aged 12 to 17 years in an endemically affected area of Rural Bangalore – a Cross Sectional study

Padma K Bhat[1] , MDS, Jayachandra M Y[2] ,BDS, Amrita K[3],BDS, Jayanth Kumar K[4] ,MD, Naveen S Nair[5] ,MBBS ,.

[1-] *Professor & Head, Dept. of Public Health Dentistry, RajaRajeswari Dental College & Hospital*
[2-] *Post graduate student, Dept. of Public Health Dentistry, RajaRajeswari Dental College & Hospital*
[3-] *Post graduate student , Dept. of Public Health Dentistry, RajaRajeswari Dental College & Hospital*
[4-] *Professor, Dept of Community Medicine, RajaRajeswari Medical College and Hospital*
[5-] *Post graduate student , Dept of Community Medicine, RajaRajeswari Medical College & Hospital*

Abstract:
Objective: *This study was undertaken to assess the prevalence and severity of Dental Fluorosis among children aged 12 -17 years in an endemically affected area in Rural Bangalore and to determine the public health significance of Dental Fluorosis.*
Introduction: *Ground water has been a significant water source for domestic, irrigating, and industrial purposes in India. More than 85% of rural and 50% of urban domestic water requirements is met from ground water resources [1]. Presence of excess amount of fluoride in drinking water leads to dental fluorosis.*
Methodology: *This was a cross sectional study conducted in the rural field practice area of RajaRajeswari Medical College and Hospital Bangalore. A total of 250 study subjects belonging to the age group of 12 to 17 years were studied. The dental Fluorosis was assessed in the mixed dentition and was graded using Dean's index and Community Fluorosis Index calculated.*
Results: *The prevalence of dental Fluorosis was 60.8%. The highest percentage of study subjects suffered from Grade 2 Dental Fluorosis i.e., Mild Fluorosis (25.2%) as per Dean's Index and the least seen was Severe Dental Fluorosis (5.2%). The Community Fluorosis Index was 0.45 suggesting the concerned issue as a Borderline public health problem.*
Conclusion: *It was concluded that Dental Fluorosis is a public health problem among children of villages coming under Ittamadu Primary Health Centre, Ramnagar District. It needs to be rectified at the earliest for implementation of policy.*
Keywords: *Dental fluorosis, Endemic, Rural, Community Fluorosis Index*

I. Introduction:

Ground water has been a significant water source for domestic, irrigating, and industrial purposes in India. More than 85% of rural and 50% of urban domestic water requirements is met from ground water resources [1]. Fluoride is a salt of the element fluorine; fluorine is the most highly reactive element of halogen family. Fluoride is the one of the very few chemicals that has been shown to cause significant effects in people through drinking water [2]. Fluorosis, an endemic disease, is caused due to excess ingestion of fluoride. Fluoride acts as an essential component for normal mineralization of bone, teeth, and formation of dental enamel in minute amounts and at the same time when consumed in higher doses it has been a danger. Fluoride content of water sources above the permissible limits (1.5 mg/L) may lead to dental and skeletal fluorosis.

Globally, 23 nations have the problem of excess fluoride in drinking water, principally involving the developing countries including India [1]. India lies in a geographical fluoride belt, which extends from Turkey up to China and Japan through Iraq, Iran and Afghanistan. In India, the disease is endemic in about 275 districts of 20 states and UT's, with 66 million people, at risk [3]. Andhra Pradesh, Rajasthan, Punjab, Tamil Nadu, and Karnataka have reported highest endemicity rate [1]. Approximately 25 million people are already affected by Fluorosis. As per Central Ground Water Boards report (2009), a Government of India organization under the Ministry of Water Resources, in Karnataka, Dharwad, Gadag, Bellary, Belgaum, Raichur, Bijapur, Gulbarga, Chitradurga, Tumkur, Chikmagalur, Mandya, Bangalore Rural and Mysore districts are identified to be endemic for Fluoride and the range of fluoride concentration varies from 0.2 to 18.0mg/L in these districts [2].

Clinical dental Fluorosis being the most convenient biomarker of Fluoride exposure [4] evoked the thought of conducting the present study with the following objectives:

1. To assess the prevalence and severity of Dental Fluorosis among children aged 12 -17 years in an endemically affected area in Rural Bangalore.
2. To determine the public health significance of Dental Fluorosis in the study area using Community Fluorosis Index.

II. Materials and Methods:

This cross sectional study was conducted among children aged 12 to 17 years in two randomly selected villages of Ittamadu, namely Thoraidoddy and Banandur, an endemically affected area in Rural Bangalore, coming under the field practice area of RajaRajeswari medical College and Hospital, Bangalore. The study was conducted during January to March 2015. Two villages coming under Ittamadu Primary health centre were selected randomly and complete enumeration of all the children aged 12-17 years were done. The number of study subjects hence came up to be 250. Institutional Ethical Clearance and informed consent from the study participants was obtained prior to the study.

The dental Fluorosis was assessed in the mixed dentition and was graded using Dean's index. Oral examination was performed by two trained and calibrated dentists. Each tooth in the mouth was rated according categories of Dean's index, and the individual's dental Fluorosis score was arrived at based on the severest form recorded for two or more teeth.

Community Fluorosis Index (CFI) was calculated to quantify public health significance of dental Fluorosis [1]. CFI was computed by summing up the scores of individual grades of dental Fluorosis as described by Dean and dividing the sum by the total sample size.

The public health significance of CFI values was as below:

Sl. No	CFI value range	Public health significance
1	0.0-0.4	Negative
2	0.4-0.6	Borderline
3	0.6-1.0	Slight
4	1.0-2.0	Medium
5	2.0-3.0	Marked
6	3.0-4.0	Very marked

The data was entered into Microsoft Excel 2010 and analyzed using SPSS version 20.0. The data was expressed in percentages and chi square test of significance was applied wherever possible. A p value <0.05 was considered as statistically significant.

III. Results:

A total of 250 school going children in the age group of 12-17 years were studied. 30.8% were in less than 14 years of age, 36.4 % were in the age group 14-16 years and 32.8% were > 17 years of age. There were 140 male children (56.0%) and 110 female children (44.0%) among the study subjects (Table No. 1).

Table No. 1 - Socio-Demographic Details of Study Subjects

AGE WISE DISTRIBUTION		
Age	**Number**	**Percentage (%)**
<14 years	77	30.8
14-15 years	91	36.4
> 16 years	82	32.8
TOTAL	**250**	**100.0**
GENDERWISE DISTRIBUTION		
Gender	**Number**	**Percentage (%)**
Males	140	56.0
Females	110	44.0
TOTAL	**250**	**100.0**
DISTRIBUTION ACCORDING TO RELIGION		
Religion	**Number**	**Percentage (%)**
Hindu	250	100.0
Others	0	0.0
TOTAL	**250**	**100.0**
DISTRIBUTION ACCORDING TO CLASS OF STUDY		
Class of Study	**Number**	**Percentage (%)**
8th Std	77	30.8
9th Std	91	36.4
10th Std	82	32.8
TOTAL	**250**	**100.0**

The prevalence of dental Fluorosis was 60.8%. The highest percentage of study subjects suffered from Grade 2 Dental Fluorosis i.e., Mild Fluorosis (25.2%) as per Dean's Index and the least seen was Severe Dental Fluorosis (5.2%). The Community Fluorosis Index was 0.45 suggesting the concerned issue as a Borderline public health problem (Table No. 2)

Table No. 2 – Distribution of Study Subjects according to grading of Fluorosis

	Grading of Dental Fluorosis					**Total**
	No Fluorosis	**Questionable Fluorosis**	**Mild Fluorosis**	**Moderate Fluorosis**	**Severe Fluorosis**	
Number	98	56	**63**	20	13	**250**
Percentage	39.2	22.4	**25.2**	08.0	05.2	**100.0**
CFI	-	0.13	**0.45**	0.24	0.21	**-**

It was found that occurrence of Dental Fluorosis was significantly associated with gender (chi-square test 9.59, $P < 0.05$) (Table 3). The prevalence of dental Fluorosis was more in males when compared to females. However, there was no significant association between occurrence of Dental Fluorosis and the age of study participants.

Table No. 3– Association of Dental Fluorosis with Age and Sex of Study participants

AGE	**Grading of Dental Fluorosis**					**TOTAL (%)**
	No Fluorosis (%)	**Questionable Fluorosis (%)**	**Mild Fluorosis (%)**	**Moderate Fluorosis (%)**	**Severe Fluorosis (%)**	
13-14 years	29 (29.6)	22 (39.3)	17 (27.0)	06 (30.0)	03 (23.1)	**77 (30.8)**
14 – 15 years	36 (36.7)	23 (41.1)	22 (34.9)	06 (30.0)	04 (30.8)	**91 (36.4)**
15 -16 years	33 (33.7)	11 (19.6)	24 (38.1)	08 (40.0)	06 (46.1)	**82 (32.8)**
TOTAL	**98 (100.0)**	**56 (100.0)**	**63 (100.0)**	**20 (100.0)**	**13 (100.0)**	**250 (100.0)**
chi-square = 7.11 degrees of freedom = 8 probability = 0.577						
SEX	**No Fluorosis (%)**	**Questionable Fluorosis (%)**	**Mild Fluorosis (%)**	**Moderate Fluorosis (%)**	**Severe Fluorosis (%)**	**TOTAL (%)**
Male	52 (53.1)	34 (60.7)	39 (61.9)	11 (55.0)	04 (30.8)	**140 (56.0)**
Female	46 (46.9)	22 (39.3)	24 (38.1)	09 (45.0)	09 (69.2)	**110 (44.0)**
TOTAL	**98 (100.0)**	**56 (100.0)**	**63 (100.0)**	**20 (100.0)**	**13 (100.0)**	**250 (100.0)**
chi-square = 9.59 degrees of freedom = 4 probability = 0.047						

IV. Discussion:

Dental Fluorosis is hereby found out to be a borderline public health problem in Ittamadu Primary health centre area of Ramnagar District.

The findings from the present study imply 60.8 % prevalence of dental Fluorosis, significantly being associated with male gender. However, a study conducted by Shruthy Narayanamurthy *et al*., on Prevalence of dental Fluorosis in school children of Bangarpet taluk, Kolar district has concluded the prevalence of dental Fluorosis to be 31.05% which had significant association to age and gender of the children studied. When our study revealed that Dental Fluorosis was a borderline public health problem, it was seen that in Kolar it was a slight Public Health problem [1].

According to a study conducted by C B Shivayogimath *et al.,* on the prevalence of dental Fluorosis among residents of Gadag District in Karnataka, it was revealed that out of the 2001 people surveyed, maximum number i.e., 28.18% suffered from mild levels of Dental Fluorosis. This was similar to our study in which maximum number i.e. 25.2% suffered from mild levels of Dental Fluorosis [2].

Sunil V Gitte *et al.,* in their study on prevalence of Fluorosis in endemic village of Chhattisgarh found out a higher prevalence of Dental Fluorosis among the male study subjects. This observation was in sync with that from this present study wherein there was significant association between occurrence of Dental Fluorosis and male gender [3].

S Saravanan *et al.*,[4] in Chidambaram Taluk, Cuddalore district, Tamil Nadu, among 5-12 years age group, reported 31.4% prevalence of dental Fluorosis and a significant association with age ($P < 0.001$) . This was in total contrast to our study where the prevalence of dental Fluorosis was 60.8% with no significant association with the age of study participants [4].

Gopalakrishnan *et al.,* [6] in Alappuzha district, Kerala showed 35.6% prevalence of dental Fluorosis with female preponderance and an inverse association with age. This was also in contrast with our study showing 60.8 % prevalence of dental Fluorosis with male preponderance and no significant association with age.

Bhat and Kumar [7] in their study on dental Fluorosis among residents of Hanumantharayanaplaya, Ramnagar district, Karnataka in 2011 showed that 36.4% were affected with mild grade Fluorosis and community Fluorosis index of 1.76.

V. Conclusion:

Fluorosis is a public health problem among children of villages coming under Ittamadu Primary Health Centre, Ramnagar District.

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Prevalence and Patterns of Self Medication among Adults of Randomly Selected Villages in Rural Bangalore – A Cross Sectional Study

Naveen S Nair[1], Karavadi Sri Sai Vidusha[2]

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Author's Affiliation:
[1]Assistant Professor, Dept of Community Medicine, S R medical College and Research Cenrte, Thiruvananthapuram; [2]Assistant Professor, Dept of Community Medicine, RajaRajeswari Medical College and Hospital, Bangalore

Correspondence
Karavadi Sri Sai Vidusha
k.vidusha@gmail.com

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ABSTRACT

Introduction: Self medication using prescription medicines is common in certain developing countries due to lack of strict drug regulatory implementations and monitoring by the concerned authorities. Hence this study was carried out to know the prevalence and practices of self medication among the rural population of a village in rural Bangalore and plan for appropriate alternative health seeking behavior.

Method: This is a descriptive cross- sectional study carried out in Ittamadu Rural Health Centre area covering a population of 10,875 people, coming under 19 villages, employing Multi Stage Random Sampling.

Results: This study revealed that the prevalence of self medication was high (75.1%). Lack of time and financial reasons were found to be the most common reasons for self medication. Fever was found out to be the most common ailment for which self medication was practiced and analgesics were the most common drug used.

Conclusion: This study revealed that prevalence of self medication was high among adult population aged 18-60 years and there existed statistical association between practice of self medication and socio demographic determinants like Gender, Storage of Drugs at home after use, Awareness regarding possibility of Adverse Drug reactions occurring.

Keywords: Self Medication, rural area, Bangalore, Prevalence, patterns

INTRODUCTION

Self Medication involves the use of certain pre existing medicines by the general population to either cure or treat self- diagnosed symptom or group of symptoms or the continued or intermittent use of certain medications previously prescribed by health care personnels for recurring diseases, without consulting the health care personnel[1]. Self medication using prescription medicines is common in certain developing countries due to lack of strict drug regulatory implementations and monitoring by the concerned authorities.

Although widely practiced in developing countries due to a plethora of reasons, self-medication is regarded as an unnecessary and potentially unhealthy practice in the western world[2,3]. In countries like India, most episodes of self-medication practices occur due to many factors like easy availability of a wide range of drugs, lack of knowledge about the cons of using such drugs without prescription, inadequate health services etc[4]. This practice has earned much acclaim and recognition among the masses of today especially those belonging to the lower strata of the socio economic classes.

Poverty, ignorance, extensive advertisement and lack of proper rules and regulations regarding OTC (over the counter) drugs are certain other reasons responsible for the growing trend of self medication[5].

Inappropriate self medication results in irrational as well as incorrect use of drugs, thereby resulting in wastage of national resources, technical complications like increased resistance towards common antibiotics, delayed cure and thereby prolonged suffering. Therefore, as against the proposed idea of alleviating health care burden, practice of self medication only worsens the situation[6,7].

Hence this study was carried out to calculate the prevalence and describe the patterns of self medication among the rural population of Ittamadu rural health centre.

SUBJECTS AND METHODS

The study area was Ittamadu Rural Health Centre area, covering a population of 10,875 people coming under 19 villages. All the subjects more than 18 years of age residing in the selected villages and willing to participate in the study were included and non-permanent residents (have been staying in the village since less than 6 months) were excluded. This was a community based cross sectional study conducted on the basis of a study done by Kulkarni et al. on Self Medication practices among the adults in Hyderabad[4], in which the prevalence of Self Medication was found out to be 30.5%. In the present study to get 95% confidence level and relative precision of 8%, the study requires a minimum of 1369 subjects. Multi Stage Radom Sampling technique was employed as follows:

Stage 1: Stratification of Villages

All the villages (19), coming under the area covered by Ittamadu primary health Centre were listed. The villages were then divided into three different strata based on the size of population.

a) 1st strata: villages with population ≤ 500 people
b) 2nd strata: villages with population between 500 and 1000 people
c) 3rd strata: villages with population ≥ 1000 people

Employing the Probability Proportional to Population Sampling (PPPS) technique, the required sample size from each of the three strata was also calculated.

Stage 2: Selection of villages

In each of the strata, all the villages were alphabetically listed. From them, four villages were randomly selected using the Lottery method. In case any selected village did not have the necessary population to cover the required sample size from that particular stratum, more villages were selected so as to reach the required sample size.

Stage 3: Estimation of sample size from each selected village

From each of the selected village, the required sample size was again calculated using

Stage 4: Selection of the study subjects

In order to select the required people for the study, randomization was employed. again as follows.

From the selected villages all the people ≥18 years of age and are permanent residents of the village and willing to participate in the study were studied. The data was collected using a pre tested, semi structured questionnaire. The data included age, sex, educational status, family income, frequency of Self Medication, and reasons for the Self Medication and B.G. Prasad classification to assess socio economic status.

Ethical clearance was obtained before conducting the study from the Institutional Ethical Committee. During the survey, informed written consent was taken from the study subjects. Assurance was given that the confidentiality regarding their information will be maintained strictly. Descriptive analysis of Prevalence of Self Medication, patterns of Self Medication was analyzed and presented in terms of percentage and its 95% confidence interval was estimated. Chi square test was used to find out the association between socio demographic profile of the study subjects and Self Medication practices. The data was analyzed statistically using SPSS version 20 and tabulated accordingly.

RESULTS

Among the 1369 people studied, 759 (55.4%) were males and 610 (44.6%) were females. A wide majority, 88.6% of the study subjects belonged to the Hindu religion. Majority of the study subjects (67.9%) were literates whereas only 32.1% were illiterate. 35.9% of the study subjects (492 in numbers) had High School education. Out of the total 1369 study subjects, only 18.3% were unemployed. 33.4% of the study subjects were unskilled workers and almost 26.9% of the study subjects were involved in clerical jobs. 491 (35.9%) belonged to Joint family and 409 (30.0%) belonged to Nuclear family. Most of the study subjects, i.e., 598 people (43.7%) belonged to the Lower Class where as only 16.1% belonged to the Upper Middle Class as per Modified B.G. Prasad Distribution – 2013. (Table No. 1)

Table 1: Socio -Demographic Data of Study subjects (n=1369)

Variable	Subjects (%)
Age Group	
18-30	548 (40)
31-40	394 (28.8)
41-50	137 (10)
51-60	148 (10.8)
>60	142 (10.4)
Gender	
Male	759 (55.4)
Female	610 (44.6)
Religion	
Hindus	1213 (88.6)
Muslims	156 (11.4)
Educational Status	
Not Literate	440 (32.1)
Middle School	161 (11.8)
High School	492 (35.9)
Secondary School/Diploma	276 (20.2)
Employment status	
Not employed	250 (18.3)
Home maker	293 (21.4)
Unskilled worker	457 (33.4)
Skilled worker	369 (26.9)
Socio-economic class	
Upper middle class	221 (16.1)
Middle class	208 (15.2)
Lower middle class	342 (25)
Lower class	598 (43.7)

It was seen that out of the total 1369 study subjects, 1028 (75.1%) said that they have practiced self-medication at least once in the previous 6 months.

It was observed that out of the 1028 study subjects who practiced self medication, majority were Literate (77.1%). Among the 341 study subjects who were not practicing self medication, literacy rates were comparably high (79.5%). However, this statistical association between Educational status and practice of self medication among the study subjects was not found to be statistically significant.(χ^2 = 0.8042,df = 1, P = 0.37**)** (Table 2)

It was also observed that out of the 1028 study subjects practicing self medication, most of them were Males (51.7%). Out of these 1028, 42% belonged to the age group 18-30 years where as only 10% were above 60 years of age. In contrast, out of the 341 study subjects not practicing self medication, only 34% were aged between 18-30 years. There was a significant association between Age, Gender and practice of Self Medication (χ^2 = 79.550, df = 4, P < 0.005) and (χ^2 = 22.759, df = 1, P< 0.005) respectively. (Table 2)

It was observed that out of 1028 study subjects who were practicing self medication, 766 (74.5%) were unaware of the possible Adverse drug reactions where as 262 (25.5%) were aware of the possibility of such reactions to occur. There was a statistically significant association between Awareness regarding Adverse Drug reactions and practice of Self medication (χ^2 = 159.147, df = 1, P < 0.005). (Table 2)

Among the 1028 study subjects practicing self medication when asked about the reasons, 658 (64%%) said that there was lack of time to consult a doctor whereas 513 (49.9%) of them quoted financial reasons and 407 (39.6%) said that they did not want to go to a doctor for mild ailments. (Table 3)

In this study, it was noted that out of the 1028 study subjects who were practicing self medication, the main source of information regarding the drugs was "friends" for 756 (73.5%) study subjects and "earlier Prescriptions" for 633 (61.2%) of the study subjects. (Table 4)

Table 2: Comparison of practice of self medication with socio-demographic and awareness indicators

	Self Medication practice		Total (n=1369)(%)	Chi-square	df	P value
	Yes (n=1028)(%)	No (n=341)(%)				
Educational Status						
Not Literate	235 (22.9)	70 (20.5)	305 (22.3)	0.8042	1	0.37
Literate	793(77.1)	271 (79.5)	1064(77.7)			
Age- Group						
18-30 years	432 (42.0)	116 (34.0)	548 (40.0)	79.550	4	<0.005
31-40 years	240 (23.4)	154 (45.2)	394 (28.8)			
41-50 years	129 (12.5)	008 (02.3)	137 (10.0)			
51-60 years	124 (12.1)	024 (07.0)	148 (10.8)			
>60 years	103 (10.0)	039 (11.5)	142 (10.4)			
Gender						
Males	532 (51.8)	227 (66.6)	759 (55.4)	22.759	1	<0.055
Females	496 (48.2)	114 (33.4)	610 (45.6)			
Awareness of ADRs						
No	766 (74.5)	126 (37.0)	892 (65.2)	159.147	1	<0.055
Yes	262 (25.5)	215 (63.0)	477 (34.8)			
Awareness regarding Storage of Drugs						
No	282 (27.4)	185 (54.3)	467 (34.1)	81.951	1	<0.055
Yes	746 (72.6)	156 (45.7)	902 (65.9)			

Table 3: Distribution of study subjects practising self medication based on reasons for self medication

Reason	Subjects (n=1028)* (%)
Time constraint	658 (64)
Financial reasons	513 (49.9)
Poor care in hospitals	334 (32.5)
Not wanting to go to doctor for mild ailments	407 (39.6)
Travelling difficulty	279 (27.1)
Dislike to a particular doctor	84 (8.1)
Others	89 (8.7)

*Indicate multiple responses

Table 4:- Distribution of study subjects practising self medication based on source of information about self medication (n=1028)*

Source	Numbers (%)
Friends	756 (73.5)
Family	291 (28.3)
Earlier Prescriptions	633 (61.2)
TV and radio	110 (10.7)
Chemists	155 (15.1)

*Indicate multiple responses

Table 5: Distribution of study subjects practising self medication based on common ailments for which self medication is practiced (n=1028)*

Health condition	Subjects (%)
Fever	910 (88.5)
Cold	695 (67.6)
Cough	736 (71.6)
Sore Throat	82 (8)
Vomiting	24 (2.3)
Diarroeha	60 (5.8)
Joint Pain	355 (34.5)
Headache	495 (48.2)
Others	75 (7.3)

*Indicate multiple responses

It was observed form this table that among the 1028 study subjects practicing self medication, 746 (72.6%) were storing drugs in their houses for further use where as 282 (27.4%) said that they did not store the drugs, instead procured them whenever it was needed. The association between Storage of drugs and Practice of Self medication was found to be statistically significant (χ^2 = 81.951, df = 1; P< 0.005). (Table 2)

In this study, it was observed that self medication was practiced by 85.1% of the 342 study subjects belonging to the Lower Middle Class, 84.6% of the 123 study subjects in the Upper Middle Class and 70.7% of the 598 study subjects belonging to the Lower Class.

In this study, out of the 1028 study subjects who were practicing self- medication, 88.5% cited Fever as the most common disease for which they practiced self- medication followed by 71.6% for Cough and 67.6% for cold. (Table 5)

DISCUSSION

As is seen in this study, out of the 1028 study subjects who were practicing self- medication, 66.5% cited Fever as the most common disease for which they practiced self- medication. These results were found to be in accordance with most of the studies done in India and abroad with similar objectives. According to Malvi Reteesh et al, generally, self medication is used in some clinical conditions like fever (36.2%), pain (32.7%), headache (25.8%), cough (24.1%), cold (20.6%) etc [2]. A study done by Dr. Pavan Kumar Kulkarni et al on "Self medication practices among slum dwellers in South Indian city" opines that the symptoms for which medicines were used are mostly pain, cough, and fever[4].

In this study, it was observed that out of the total 1369 study subjects, 1028 study subjects i.e., 75.1 % had practiced at least one form of self medication during the past 6 months. This observation was similar to few other studies conducted by eminent a study conducted by Jyoti Kaushal et al[6], Abhishek Sharma et al[7] . However, the results of our study were in contrast to the observations made by certain other researchers in similar studies. A study conducted by S G Deshpande et al (31%)[8], Pandya R et al (82.3%)[9] S. Kayavizhi et al[10] , Parita Patel et al (64%)[11] and Pankaj Jain et al (2.5%) [12]. The difference in prevalence may be due to factors like Education, better Socio economic conditions and occupational oppurtunities in these areas when compared with the area under this study.

In this study, it was observed that among 1028 study subjects who were practicing self medication, 432 (42.1%) belonged to the age group 18-30 years. In a study conducted by S G Deshpande et al, it was found that among 31% Indians who practiced self medication; about 26.9 per cent of them were in the age group of 31 to 40 and 30.8 per cent between 41 and 50 years [8]. These results were not completely out of league with the current study.

In this study, out of the 1028 study subjects practicing self medication, 51.8% were males and 48.2% were females. This observation was in accordance with some studies done by other researchers with similar objectives. A statistical Study on Self Medication Pattern in Haryana, done by Pankaj Jain et al, states that the proportion of the interviewee practicing self medication as regards sex was 35.6% among female and 64.4% among males [12]. Mateti Uday Venkat et al opines that of the total 100 self medication prescriptions analysed during their study, 71% belonged to males and 29% to females [13].

A study on the "Prevalence of self-medication practices and its associated factors in Urban Puducherry, India" observes that 24.3% of the study population practicing self medication were in the age group 50-59 years, on contrast to 12.1% in the current study; 17.6% in the age group 40-49 years as opposed to 12.5% in the present study; 16.7% in the age group >60 years as against 10.0% in this study; 10.7% in the age group 20-29 years in contrast to 42.1% in this study and 10.5% in the age group 30-39 years as against 23.3% in the present study [14]. Bhavna Puwar et al in their study titled "Self medication practice among adults of Ahmedabad city" observe that majority of the respondents (33.6%) practicing self medication was in the age group of 20-29 years. The least number of respondents practicing self medication was in the age group >60 years (4.3%) [16]. An article published in the International research Journal of Pharmacy authored by Mateti Uday Venkat et al reveals that the highest incidence of self medication was in the age group 26-35 years, coming up to 39% However, the least number of people practicing self- medication was in the age group >65 years which came up to only 4% of the study population [17].

As is seen in this study, out of the 1028 study subjects who were practicing self- medication, 66.5% cited Fever as the most common disease for which they practiced self- medication. Marília Garcez Corrêa da Silva et al conducted a study titled "Self-medication in university students from the city of Rio Grande, Brazil" and concluded that the overall reasons for self-medication were headache (89.7%), cold (82.9%), sore throat (58.1%), fever (56.2%), menstrual cramps (47.6%), muscle pain (41.0%), cough (36.4%) and heartburn (29.4%); and also stomachache (27.1%), nausea (26.4%), vomit (22.3%), allergy (21.2%) and intestinal colic (14%) [18]. Most of these results reflected in the current study where the common ailments for self medication were fever, Cough, Common Cold, Headache, Joint pain etc. An "Assessment of Self-Medication Practices Among Medical, Pharmacy, and Health Science Students in Gondar University, Ethiopia" done by Abay S M finds out that Fever and headache (24.8%) were the most frequently reported causes of morbidity for which self medication was practiced [19]. These results were found to be in accordance with most of the studies done in India and abroad with similar objectives. According to Malvi Reteesh et al, generally, self medication is used in some clinical conditions like fever (36.2%), pain (32.7%), headache (25.8%), cough (24.1%), cold (20.6%) etc [2]. A study done by Dr. Pavan Kumar Kulkarni et al on "Self medication practices among slum dwellers in South Indian city" opines that the symptoms for which medicines were used are mostly pain, cough, and fever[4].

It was observed that out of 1028 study subjects who were practicing self medication, 746 (72.6%) were unaware of the possible Adverse drug reactions. Comparable observations were made by other researchers with similar objectives in studies done across the country and the world. A study entitled "Study of self-medication practices and its determinants among college students of Delhi university north campus, New Delhi, India" conducted by Mrinmoy Adhikary et al concludes that the awareness about adverse drug reactions of the drugs used was 93.6% among the study subjects [20]. A study published conducted by Rushi N Pandya et al reveals that more than 90% of respondents were aware of the adverse affects associated with self-medication [9]. In contrast, Malvi Reteesh et al, in their study on "Self medication among the people of Bhopal Region of Madhya Pradesh" concludes that out of the 116 respondents, very few had the knowledge regarding the adverse effects of the drugs being consumed without a doctor's advice [2].

CONCLUSION

This study revealed that the prevalence of self medication was high (75.1%) among the adult population aged 18-60 years and there existed statistical association between practice of self medication and some socio demographic determinants like Female gender, Storage of Drugs at home after use, Awareness regarding possibility of Adverse Drug reactions occurring. Schooling and education was not found to be having any effect on the practice of self medication. Lack of time and Financial reasons were found to be the most common reasons for practice of self medication. Fever was found out to be the most common ailment for which self medication was practiced and analgesics were the most common drug used for self medication purposes. Since the study covered a large sample size of 1369 and random selection of the study subjects were done, the study findings are most likely to be truly reflective of the problem in Ittamadu PHC population.

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STRESS, ANXIETY AND DEPRESSION AMONG STUDENTS OF SELECTED MEDICAL AND ENGINEERING COLLEGES, BANGALORE- A COMPARATIVE STUDY

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Naveen S
Post Graduate, Dept. of Community Medicine, RajaRajeswari Medical College and Hospital, Bangalore
dr.naveennair@ymail.com

Swapna M
Assistant Professor, Dept. of Community Medicine,RajaRajeswari Medical College and Hospital, Bangalore

Jayanthkumar K
Professor, Department of Community Medicine,RajaRajeswari Medical College and Hospital, Bangalore

Shashikala Manjunatha
Professor and Head, Dept. of Community Medicine,RajaRajeswari Medical College and Hospital, Bangalore

Abstract: ***Students of professional courses are under considerable amount of stress, owing to the ever-increasing study load and the burden of expectations from the society. Some of them go to the extent of falling into Depression and associated psychosocial disorders. This study was done to assess the proportion of students with stress, anxiety and depression in the 2nd, 3rd and final years of MBBS and Engineering courses, in selected medical and engineering colleges, Bangalore using the Depression Anxiety Stress Scale. Of the total 304 students in different years of each of the professional course, 33.6 % suffered from stress, 49.3% suffered from anxiety and 37.8% suffered from depression in varying levels of severity.***

Index terms: **Medical students, Engineering students, Stress, Anxiety, Depression**

I.INTRODUCTION

Mental health refers to a broad array of activities directly or indirectly related to the mental well-being component included in the World Health Organization's definition of Health [1]. Mental Health problems are a major public health concern due to their high prevalence rates, difficulties related with identification, treatment and their tendencies to become chronic. A student of Medical and Engineering courses has to read many hours a day routinely to understand vast field of study. Family and society has very high expectations from them [2]. Studies, related to anxiety and depression among students of such professional courses, have been reported from abroad, but such data from India is scarce [1]. Therefore, this study was undertaken to assess the level of perceived mental pressure among the students of the 2nd, 3rd and 4th years of the MBBS and Engineering courses.

OBJECTIVES:

I. To assess and compare the proportion of students with Stress, Anxiety and Depression studying in the Second, Third and Final Years of a Medical and Engineering college, Bangalore.

II. To describe the pattern of occurrence of Stress, Anxiety and Depression among medical and engineering students.

II.METHODOLOGY

This cross sectional study was carried out among the second, third and final year undergraduates of a medical and engineering college in Bangalore during the months of October and November 2014. The study was aimed at finding the effect of professional courses, its curriculum and the amount of hard work it demands, on the mental stress of the students and hence the First year MBBS and

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Engineering students who had just joined the college and not adequately exposed to the syllabus or examinations of the courses were excluded from the study. Similarly, students who were already diagnosed and treated for any psychosocial disorders were also excluded from the study. Based on similar studies conducted by Modi K et al on medical students [2], the sample size was calculated as 152 each from medical and engineering students. Probability Proportionate to Population Sampling method was employed to select the study subjects. Data was collected using a standard questionnaire, which had 2 sections consisting questions for socio-demographic information and the Depression Anxiety Stress Scale developed by the Australian Psychology Foundation, Sydney and approved by the WHO [3].

Data was entered in Microsoft Excel and analyzed using SPSS-20.0. Chi square test of significance was employed. Fisher's exact test was used when the cell frequencies were less than 5. Informed written consent was taken prior to the study. Institutional Ethical Clearance was obtained.

III.RESULTS:

The total strength of students in the second, third and final year MBBS and Engineering courses was 220 and 290 respectively. Out of the total students, 152 participants were selected each form MBBS and Engineering courses. The study subjects comprised of 50 boys and 102 girls in the MBBS course and 104 boys and 48 girls in the Engineering courses. Their ages ranged from 18 to 22 years.

In case of the MBBS course, the study subjects included 64 students from the second year (42.2%), 52 students from the third year (34.2%) and 36 (23.6%) students from the final year. In the engineering courses, 62 (40.8%) students were in the second year, 50(32.8%) students in the third year and 40 (26.4%) students were in the final year.

Of the 152 students in different years of the MBBS course, 50 suffered from stress, 71 suffered from anxiety and 58 suffered from depression in varying levels of severity. The highest proportion of students with stress and anxiety was in the Third year which amounted to 21 (42.0%) and 31 (43.7%) students respectively. In case of depression, the highest proportion of students was seen in the Second year where 26 (44.8%) students were suffering. In case of the 152 engineering students interviewed, 52 (34.2%) suffered from stress, 79 (52.0%) suffered from anxiety and 57 (37.5%) from depression. The highest proportion of students suffering from stress and anxiety was seen in the Second year which was 19 (36.5%) and 33 (41.8%) respectively. Depression was seen in the highest proportion in the Third year affecting 21 (36.8%) students (Table No. I).

TABLE I PROPORTION OF STUDENTS WITH STRESS, ANXIETY AND DEPRESSION (N=304)

Medical course			
Year	*Stress(n=50)*	*Anxiety(n=71)*	*Depression(n=58)*
Second	20 (40.0)	29(40.9)	26(44.8)
Third	21(42.0)	31(43.7)	24(41.2)
Final	9 (18.0)	11(15.4)	8(14.0)
Total	50(100.0)	71(100.0)	58(100.0)
Engineering course			
Year	*Stress(n=52)*	*Anxiety(n=79)*	*Depression(n=58)*
Second	19 (36.5)	33(41.8)	19(33.3)
Third	17(32.7)	25(31.7)	21(36.8)
Final	16(30.8)	21(26.5)	17(29.9)
Total	52(100.0)	79(100.0)	57(100.0)
Grand total	102	150	115

Figures within parenthesis indicate percentages

Among the 50 MBBS students suffering from Stress, 14 (28.0%) were suffering from Severe levels and 18 (36.0%) each were suffering from Mild and Moderate levels. In case of the Engineering students, out of the 52 students suffering from Stress, 22 (42.3%) were suffering from Moderate stress, 18 (34.6%) from Mild and 12 (23.1%) from Severe levels. (Table No. II).

TABLE II PROPORTION OF STUDY SUBJECTS WITH STRESS (N=102)

Course	**Mild**	**Moderate**	**Severe**	**Total**	**X^2 value** / **P value**
MBBS(n=50)					
Second Year	10 (55.6)	03 (16.7)	07 (50.0)	20 (40.0)	2.61
Third Year	04 (22.2)	11 (61.1)	06 (42.9)	21 (42.0)	
Final Year	04 (22.2)	04 (22.2)	01 (07.1)	09 (18.0)	0.27
TOTAL	18 (100.0)	18 (100.0)	14 (100.0)	50 (100.0)	
ENGINEERING(n=52)					
Second Year	08 (44.4)	07 (31.8)	04 (33.3)	19 (36.5)	1.27
Third Year	06 (33.3)	07 (31.8)	04 (33.4)	17 (32.7)	
Final Year	04 (22.3)	08 (36.4)	04 (33.3)	16 (30.8)	0.53
TOTAL	18 (100.0)	22 (100.0)	12 (100.0)	52 (100.0)	

Figures within parenthesis indicate percentages

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Out of the total 71 MBBS students suffering from Anxiety, 26(36.6%) students were suffering from Severe levels, 24 (33.8%) from moderate levels and 21(29.6%) from mild levels. In case of the Engineering courses, the numbers were 28 (35.4%), 32 (40.5%) and 19 (24.1%) respectively. (Table No. III)

TABLE III PROPORTION OF STUDY SUBJECTS WITH ANXIETY (N=150)

Course	Mild	Moderate	Severe	Total	X^2 value / P value
MBBS (n=71)					
Second Year	09 (42.8)	08 (33.3)	12 (46.2)	29 (40.8)	2.31
Third Year	08 (38.1)	13 (54.1)	10 (38.5)	31 (43.7)	
Final Year	04 (19.1)	03 (12.6)	04 (15.3)	11 (15.5)	0.31
TOTAL	21 (100.0)	24 (100.0)	26 (100.0)	71 (100.0)	
ENGINEERING(n=79)					
Second Year	09 (47.4)	15 (46.9)	09 (32.1)	33 (41.8)	0.83
Third Year	05 (26.3)	09 (28.1)	11 (39.3)	25 (31.6)	
Final Year	05 (26.3)	08 (25.0)	08 (28.6)	21 (26.6)	0.66
TOTAL	19 (100.0)	32 (100.0)	28 (100.0)	79 (100.0)	

Figures within parenthesis indicate percentages

Out of the 58 MBBS students suffering from Depression, 24 (41.3%) students were suffering from Moderate levels, 20 (34.5%) were suffering from Severe and 14 (24.2%) were suffering from Mild levels. In a total of 57 students in the Engineering course suffering from Depression, the proportion of students suffering from Severe, Moderate and Mild levels were 21(36.8%), 25(43.9%), and 11(19.3%) respectively (Table No. IV).

TABLE IV PROPORTION OF STUDY SUBJECTS WITH DEPRESSION (N=115)

Course	Mild	Moderate	Severe	Total	X^2 value / P value
MBBS (n=58)					
Second Year	09 (64.3)	09 (37.5)	08 (40.0)	26 (44.8)	2.61
Third Year	03 (21.5)	12 (50.0)	09 (45.0)	24 (41.4)	
Final Year	02 (14.2)	03 (12.5)	043 (15.0)	08 (13.8)	0.27
TOTAL	14 (100.0)	24 (100.0)	20 (100.0)	58 (100.0)	
ENGINEERING (n=57)					
Second Year	03 (27.3)	08 (32.0)	08 (38.1)	19 (33.3)	1.28
Third Year	05 (45.5)	09 (36.0)	07 (33.3)	21 (36.8)	
Final Year	03 (27.2)	08 (32.0)	06 (28.6)	17 (29.9)	0.53
TOTAL	11 (100.0)	25 (100.0)	21 (100.0)	57 (100.0)	

Figures within parenthesis indicate percentages

It was also observed that there was an increase in the occurrence of Stress and Anxiety in the MBBS students from the Second to the Third year which was followed by a decrease in the Final year. However, Depression was found to decrease in proportion from the Second to the Final years. This (Fig No.1).

In case of Engineering students, when Stress and Anxiety showed a decrease from the Second to Final year students, Depression was seen to be the highest in the Third year (Fig. No. 2).

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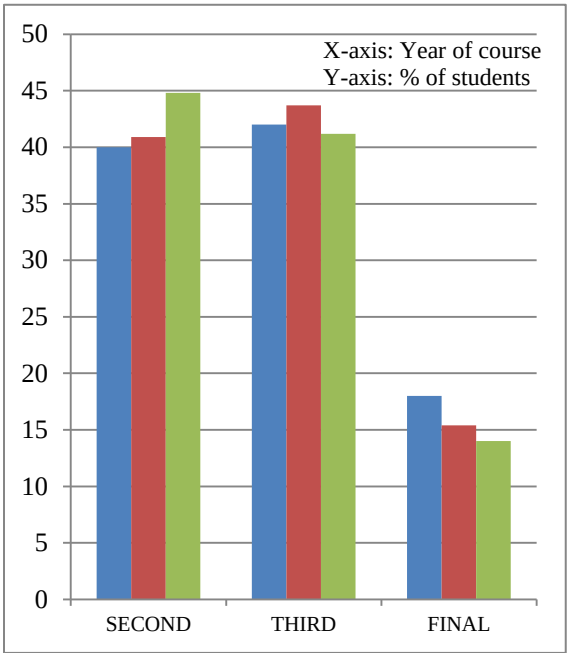


Fig 1 -Pattern of Stress, Anxiety and Depression with years of MBBS course

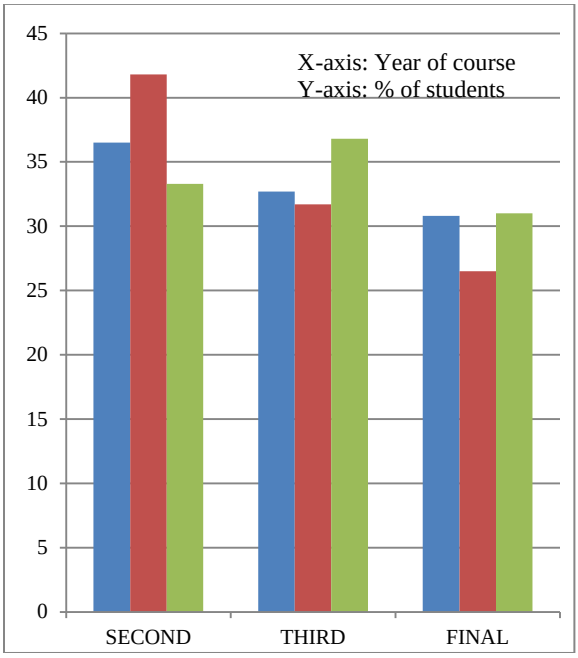
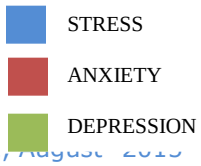


Fig 2 -Pattern of Stress, Anxiety and Depression with years of Engineering course



V.DISCUSSION:

The study reveals that both the medical and engineering students have considerable amount of perceived stress or mental pressure. In this study, 115 (3782%) students of professional courses like MBBS and Engineering experienced various levels of Depression, which is comparable to a study done by Modi K et al [2] and other studies from Indian sub continent [4, 6, 7]. In this study it was seen that when 32.9% of Medical students suffered from stress, 34.2% of the engineering students suffered from stress. This was in contrast to a study done by Vivek B et al who found out that the proportion of stress in medical and engineering students were 25.1% and 19.7% respectively [5]. As the study tools used were different in different studies, these rates are not necessarily comparable but all point in the same direction. The proportion of stress, anxiety and depression among the 152 MBBS students was 32.9%, 46.7% and 38.2% respectively. These differ from the values obtained in the study done by Modi K et al among medical students of Gujarat [2]. The decrease in the occurrence of all the three psychosocial disorders in the Final year students of both courses could be due to the various student friendly programmes being done in the concerned colleges so as to motivate them.

VI.CONCLUSION & SUGGESTIONS:

The study concluded that out of the 304 selected students the proportion of students suffering from Stress, Anxiety and Depression was 102, 150 and 115 respectively. Stress and Anxiety was found to be the highest among Engineering students than the students of the MBBS course. However, the proportion of students suffering from Depression in both Engineering and MBBS courses were comparable. It was also observed that there was a decrease in the occurrence of all the three psychosocial disorders in the MBBS and Engineering students of the Final year. Institutes are required to proactively seek out those students who need counseling and arrange for the necessary services. Such strategies have been tried successfully abroad. Students support cells and mentorship services could be few such examples. It is also suggested that students of professional courses involve themselves in co- curricular and extracurricular activities at frequent intervals which help them to relieve their mental strain. The main limitation of

this study lies in the fact that the study was done in a single college in a small sample. More studies involving larger population must be done in this regard so as to benefit the students.

VI. Acknowledgment:

I would like to acknowledge the contributions made by the faculty and staff of the Dept. of Community Medicine, RajaRajeswari Medical College and Hospital towards the conduct of my study. I also acknowledge and thank all the participants of my study for their valuable time.

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A Cross-Sectional Study on Post Covid Manifestations among Covid-19 Vaccinated Individuals Admitted in a Selected Covid Care Unit in Central Kerala

Naveen Nair [1], Joe Mathew [2], Gatha B. R [2]

1. Community Medicine, Mount Zion Medical College Hospital , Adoor, Pathanamthitta, Kerala, Bengaluru, IND 2. Community Medicine, Mount Zion Medical College Hospital, Kerala, IND

Corresponding author: Naveen Nair, dr.naveennair@ymail.com

Abstract

Abstract

Introduction: Coronavirus disease 2019 (COVID-19) has been one of the major pandemics affecting the whole world and human beings since the end of 2019. Numerous reports from various parts of the world have shown that COVID 19-19 has a variety of long-term effects on almost all systems including respiratory, cardiovascular, gastrointestinal, neurological, psychiatric, and dermatological systems. The present study is undertaken to determine the prevalence of various post COVID manifestations among COVID 19 vaccinated individuals who attended CoViD Care Unit in a tertiary care hospital in Pathanamthitta and elucidate the spectrum of illness that persists even after the apparent recovery.

Objectives:

To assess the proportion of post CoViD 19manifestations among the COVID 19 cases.

To estimate the vaccination status of the COVID 19 cases.

To analyse the association between the vaccination status and Post CoViD-19 manifestations among such patients.

Methodology: This cross-sectional study was done among all CoViD positive patients admitted in the CoViD care unit here. in a randomly selected tertiary care hospital in Pathanamthitta A total of 351 people participated in the study. A pre designed semi structed pilot tested questionnaire which was validated with the help of study subjects was used. The questionnaire was administered to the study subjects through one-to-one interview method after getting written consent.

Results: Out of the total 351 study subjects, 64% had presented with some form of post-CoViD 19 manifestation. Most of them had breathlessness on walking up a flight of stairs (42.45%) and fatigue (41.3%) after CoViD infection. Most of the post-CoViD 19 manifestations (53.7%) were seen in the age group 16-30 years. Majority (89%) had taken 2 doses, and the remaining (11%) had taken only 1 dose of the CoViD 19 vaccination.

Conclusion: Patients should be aware about the significance of post CoViD- 19 manifestations and they must be educated about its complications. Clinicians should pay attention regarding post CoViD 19manifestations and its management as much as that of CoViD 19 infection.

Keyords: CoViD 19, Vaccination, Post CoViD Manifestations

Categories: Preventive Medicine, Epidemiology/Public Health, Infectious Disease
Keywords: pandemic prevention and control, covid-19 india, post covid manifestations, vaccination, covid 19

Introduction

Coronavirus disease 2019 (COVID-19) has been one of the major pandemics affecting the whole world and human beings since the end of 2019. Although the severe course of the disease has caused concern since the beginning of the pandemic, as time has passed, the appearance of many post recovery manifestations on survivors has become another cause for concern. Numerous reports from various parts of the world have shown that COVID- 19 has a variety of long-term effects on almost all systems including respiratory, cardiovascular, gastrointestinal, neurological, psychiatric, and dermatological systems [1].

A considerable part of patients recovering from acute infection continue to suffer from a variety of symptoms including dyspnoea, cough, myalgia, fatigue, and headache [2]. The National Institute for Health and Care Excellence (NICE) guideline recommends using the term long COVID for signs and symptoms that continue for more than 4 weeks and are not explained by an alternative diagnosis, and the term post-COVID syndrome for ongoing signs and symptoms beyond 12 weeks after infection [3].

The present study is undertaken to determine the prevalence of various post COVID manifestations among COVID vaccinated individuals who attended CoViD Care Unit in a tertiary care hospital in Pathanamthitta and elucidate the spectrum of illness that persists even after the apparent recovery

Materials And Methods

This is an analytical cross sectional study done among all CoViD positive patients admitted in a tertiary care hospital in Pathanamthitta, Kerala. Based on the report by Department of Health and Family Welfare, Government of Kerala on Kerala COVID seroprevalence, the estimated prevalence was found to be 44.4% [4]. The sample size was calculated using the formula,

Sample size, n= (Zα/2)2 * pq/(L)2 = 351 study subjects.

Simple random sampling of all COVID-19 patients was done. Before the start of the study, due permission from the Institutional Ethics Committee of Mount Zion Medical College. Informed written consent was taken from the study subjects or their parents (in case of study participants less than 18 years of age) before data collection. Anonymity of the study subjects was guaranteed throughout the data collection and analysis.

The data was collected using the questionnaire and entered into MS excel. Data analysis was done using SPSS version 20.0. Quantitative variables were expressed in terms of frequencies and percentages. Association between variables was calculated using Chi square test of significance.

Results

Out of 351 study subjects most belong to the age group 16 to 30 years (50%) and the least proportion belong to the age group 0 to 15 years (1%). Majority of the study subjects were females (70%); were married (52%) and belong to middle class of the Socio Economic Strata (75%). Most of the study subject were students (75%) and belonged to the Hindu Religion (52%).

Out of 351 study subjects, 149 had no history of any comorbidities during the time period they were diagnosed as COVID positive. Among the remaining 202 study subjects, 65 (32.19%) were hypertensive, 68(33.66%) were diabetic, 23(11.39%) had cardiovascular diseases, 21(10.39%) were asthmatic and 17(8.41%) had arthritis. COPD and other co infections constitute 4 (1.98%) each.

Majority (85%) of the study subjects had taken Covishield vaccination against CoViD-10, and 53 (15%) had taken Covaxin. Almost 90 % of the study subjects had completed 2 doses of the vaccine, although none had taken the booster dose. 77% were vaccinated through the Government sector and a considerable proportion (23%) had been vaccinated through the private sector. Out of the 351 study subjects, 302 (86.04%) had developed some manifestations after CoViD vaccination (Covaxin/Covishield) - 136 (45%) developed fever, 73(24%) developed myalgia,54(18%) developed pain over vaccinated area and 22(7%) developed dizziness within 2 days post vaccination.

When asked about post CoViD manifestations within a period of 1-5 years after vaccination, out of 351 study subjects, 225(64%) reported to have had presented with some form of post CoViD manifestations - most of them had breathlessness on walking up a flight of stairs (15%) and fatigue (15%) after COVID infection. The least proportion are having difficulty controlling bowel (1%) and bladder (1%). 71(20%) developed post CoViD psychological manifestations- anxiety(51%) and depression(49%) being the most common. Majority of people (54%) felt that their overall health is in an excellent condition during the post COVID period. However, 2.3% complained that their overall health had worsened.

H/o Cardiovascular diseases	***Intermittent Chest discomfort - post CoViD***					***Total***	***Chi square value* p value**
	Absent	*Mild*	*Moderate*	*Severe*	*Very Severe*		
Absent	*299*	*16*	*12*	*1*	*0*	*328*	
Present	*16*	*2*	*4*	*1*	*0*	*23*	*16.785 0.001*
Total	*315*	*18*	*16*	*2*	*0*	*351*	

Habits of smoking or Drinking alcohol	*Breathlessness at rest – post CoViD*					*Total*	*Chi square value* p value
	Absent	*Mild*	*Moderate*	*Severe*	*Very Severe*		
Absent	227	58	41	5	5	336	
Present	11	0	2	2	0	15	*13.000 0.011*
Total	238	58	43	7	5	351	
Age (in completed years)	Frequency of hospitalization post CoViD					*Total*	*Chi square value* p value
	Absent	*Once /Twice per week*	*Once/ Twice per month*	Once/ Twice per year	Once/Twice per 2 years		
0-15	0	0	0	0	4	4	
16-30	0	6	15	45	109	175	
30-45	0	0	4	5	41	50	
46-60	0	2	5	13	30	50	*37.591 0.001*
61-75	0	1	6	9	32	48	
> 75	0	0	10	6	8	24	
Total	0	9	40	78	224	351	
No. of times affected with CoViD	Feeling of Fatigue – Post CoViD					Total	*Correlation value p value*
	Absent	*Mild*	*Moderate*	*Severe*	*Very Severe*		
1	180	49	46	14	8	297	
2	16	15	4	3	1	39	*-0.024* 0.001
>2	10	5	0	0	0	15	
Total	206	69	50	17	9	351	
No. of times affected with CoViD	Limitation of Mobility – Post CoViD					Total	*Correlation value p value*
	Absent	*Mild*	*Moderate*	*Severe*	*Very Severe*		
1	246	24	16	10	1	297	
2	32	2	3	2	0	39	*-0.036 0.001*
>2	14	1	0	0	0	15	
Total	292	27	19	12	1	351	
No. of times affected with CoViD	Loss of Muscle Power – Post CoViD					Total	*Correlation value p value*
	Absent	*Mild*	*Moderate*	*Severe*	*Very Severe*		
1	237	25	22	10	3	297	
2	26	6	3	3	1	39	
>2	10	5	0	0	0	15	*0.49* 0.047
Total	273	36	25	13	4	351	
Age (in completed years)	Post CoViD Anxiety					Total	*Correlation value p value*
	Absent	*Mild*	*Moderate*	*Severe*	*Very Severe*		
0-15	4	0	0	0	0	4	
16-30	148	11	6	8	2	175	
30-45	46	2	1	0	1	50	
46-60	48	0	0	2	0	50	*-0.113 0.046*

61-75	47	0	0	1	0	48	
> 75	22	1	0	1	0	24	
Total	315	14	7	12	3	351	

Habits of smoking or Drinking alcohol	Post CoViD manifestations		*Total*	*Chi square value* p value
	Absent	Present		
Absent	121	215	336	
Present	5	10	15	*14.045 0.032*
Total	126	225	351	

Vaccination taken	Post CoViD Manifestations		*Total*	*Chi square value* p value
	Absent	Present		
Incomplete	11	27	38	
Complete	115	198	313	*10.895 0.034*
Total	126	225	351	

Age (in completed yrs)	Post CoViD Manifestations		*Total*	*Chi square value* p value
	Absent	Present		
0-15	4	0	4	
16-30	81	94	175	
30-45	18	32	50	
46-60	13	37	50	*34.113 0.005*
61-75	9	39	48	
> 75	1	23	24	
Total	126	225	351	

TABLE 1: Distribution of the study subjects with respect to dependent variable (occurance of Post CoVid Manifestations) and various independent variables

during post COVID period.

According to the given table, when analysed, it was observed that out of the 175 study subjects belonging to the age group of 16 - 30 years of age, 94 (53.7%) had reported some form of post CoViD manifestations. This association between age and the occurrence of post CoViD manifestations was found to be statistically very significant. It was also observed that out of the 175 study subjects belonging to the age group of 16 to 30 years of age 21 (12%) had to visit the hospital more than once or twice in a month. This association between age and number of hospital visits was also found to be statistically significant.

It was observed that occurrence of post CoViD anxiety has a negative correlation (R = -0.113) with increasing age. This inverse correlation between Age and Post CoViD anxiety was also found to be statistically significant.

It was observed that occurrence of breathlessness at rest during post CoViD period has a negative correlation (R = -0.31) with the no of doses of vaccine taken against COVID. This correlation between no. of CoViD vaccine doses and grade of breathing difficulty at rest post CoViD was found to be statistically significant.

It is observed that development of loss of muscle power during post COVID period has a positive correlation (R = 0.47) with increase in frequency of CoViD positivity. and this correlation was also found to be statistically significant.

It is observed that generalised limitation of mobility during post CoViD period has a negative relation with increase in frequency of COVID infection i.e.no of times affected with COVID and the relation is found to be

statistically significant.

it was also observed that increased fatigue post CoViD infection has a negative correlation (R=-0.024) with increase in frequency of COVID infection i.e.no of times affected with COVID. This negative correlation between the frequency of CoViD positivity and the severity of Fatigue post CoViD was found to be statistically significant.

Association between age, gender, no. of times tested positive for COVID 19 infections was analysed with respect to the occurence of Post CoViD Manifestations. However, these associations were not found to be statistically significant.

Discussion

From the tables we can see that our study population was 70% females and 30% males while it was 54% males and 46% females in the study conducted by Dr. Deepa K.R. [5], 37% men and 63% women in the study conducted by Anjana NN [6]. 140 (33.3%) were females and 281 (66.7%) were males in the study conducted by Daljeet Kaur et al.

In our study, it was observed that, out of 351 study subjects, majority (89%) have taken 2 doses and the remaining (11%) have taken only 1 dose of the prescribed CoViD vaccination in contrast to the study conducted by Sabarish Balachandran [7] et al where only 346 (23.9%) were vaccinated; 189 received one dose and 157 both doses.

In our study on history of comorbidities among post CoViD patients most of them (42%) had no history of comorbidities and the least (1%) proportion had COPD and Co-infections. While in a study conducted by Nidhi Uniyal [8] and Yashendra Sethi [9] 19.09% had comorbidities and 15.6% had no comorbidities, in a study done by Anjana N.N. [6] 9.7% had comorbidities and 90.3% had no comorbidities. In our study population it is observed that, out of 351 study subjects, most of them had fever (50%),the least proportion had breathing difficulty(18%) as main symptom during the time of COVID infection and out of this 40 peoples(8%) doesn't show any of the following symptoms(Fever, Cough, Breathing difficulty).

In our study it was observed that 64% of the study subjects had one or the other post CoViD manifestations which was in line with the observations made by Nikhil Teja Khambampati [8] where 60.8% of inpatients treated for CoViD had post-CoViD symptoms at 6 weeks post- discharge from hospital. Our results were comparatively higher than that observed in a study conducted by Daljeet Kaur et al [10] where analysis of post-COVID manifestation revealed that 35.5% of all subjects suffered with at least one symptom. Our results were also in contrast to the results of a study conducted by Das S et al [11] where out of those 500 post-COVID-19 individuals 279 (55.8%) were normal, 48 (9.6%) persons expired and 173 (34.6%) had complications. However our results were much lower than that observed in a study conducted by Mohanraj K P et al [12] where about 85% of study subjects reported post-COVID manifestations of varying degrees and as per a study conducted by Bhatnagar N [13] where the majority of the participants (79.7%) reported experiencing post-COVID-19 symptoms and also contrasts with a study conducted by Marco Colizi where 47.2% presented with at least one symptom.

In our study population it is observed that, out of 351 study subjects majority have been affected by CoViD once (85%) and the least proportion have been affected for more than two times (4%) while in study conducted by Hemat Allam [14], it was observed that Thirty-nine contributors (31.7%) think they caught COVID-19 infection more than once, while 84 (68.3%) think they have not. While, of these 39 people, 27 (69.23%) had strong personal suspicion of COVID-19 re-infection, 6 (15.4%) were diagnosed based on medical advice without examination nor investigations, 4 (10.25%) patients were diagnosed by swab/saliva PCR test, and the last 2 patients (5.12%) were diagnosed by positive CBC blood test. These results were slightly different from that seen in a study conducted by Marco Colizzi et al [15] and Badinlou et al [16] where the large majority of COVID-19 patients were symptomatic (92%), with most of them presenting with mild symptoms of disease (67.7%) and a relatively lower proportion with moderate to critical severity (24.3%).

The results of our study shows that 42.45% of the study subjects felt breathlessness on walking up a flight of stairs while in the study conducted by Anjana N.N. [6], only 2.5% and in the study conducted by Sivaselvi C [17], 72% had breathlessness on walking up a flight of stairs while in the study conducted by Anjana N.N. [6],it is found that out of 154 study persons 120(78%) patients showed symptoms during COVID infection (Cough-18.8%,fever-16.8%,headache-16.2%, rhinitis -14.9% and sore throat-11.7%) and Most of the patients, 109 (70.8%) were having minimal symptoms at the time of admission and reported as Category A by the treating physician and 43 (29.2%) were having moderate symptoms and were belonging to Category B. Two patients had significant symptoms (Category C) but were allowed to be treated at CFLTC as there were no co-morbidities or other danger signs.

In our study 10.25% of subjects had angina while 1.2% had chest pain in the study conducted by Anjana NN. In a study by Dr. Deepa K.R. [5], 3.4% had cardiac illness. And in a study conducted by Sivaselvi C [17], 14.5% had chest pain.

It can be seen from the present study that 13.67% of the study subjects had throat sensitivity while 11.7% study subjects had throat sensitivity in the study conducted by Anjana N.N. [6].

In our study on mobility issues reported among post CoViD-19 patients, as a result of joint pain, limb weakness, muscle pains, it was observed that around 16.8% of our subjects reported mobility issues , whereas a study conducted by Nidhi Bhatnagar [14], showed 36% of her subjects had joint pain associated mobility issues . A similar trend was also observed in a study conducted by Hemat Allam [13], where it was seen that around 30.9 % of his subjects reported mobility issues associated with bone and joint pain.

In our study it was found that 13.96% of sample population suffered from weight loss, while it was 22.5% in the study conducted by Nikhil Teja [8]. In a study conducted by Chithra V Nair [18], 16.7% of the study subjects experienced weight loss.

Fatigue is one of the most commonly observed post CoViD manifestations among post CoViD-19 patients, in over study it was observed that 41.3% of our subjects reported persistent fatigue whereas in a study conducted by Nidhi Bhatnagar [14], it was observed around 21.9% of her subjects reported persistent fatigue, it was also noted that In a study conducted by Hemat Allam [13], 40.6% showed signs of persistent fatigue. A similar study conducted by Sivaselvi C [17], reported 42.2% of her subjects were also seen to be having persistent fatigue post CoViD.

In case of one's ability in performing daily activities, in our study it was observed that 17.3% of our subject's reported inability in completing daily tasks and activities, similarly in a study conducted by Hemat Allam [13], it was observed that 46.3% of his subjects were seen to be have difficulty completing daily activities.

Inability to concentrate was also one of the manifestations considered in our study, 9.6% of our subjects reported inability to concentrate post CoViD, similar results were also observed in studies conducted by Hemat Allam [13] and Marco Colizzi [15] respectively. Hemat Allam's [13] study concluded that 13% of his subjects were having problems associated with inability to concentrate, similarly Marco Colizzi's study reported 20% of his subjects were also having problems associated with inability to concentrate.

Our study also established that 13.1% of our subjects were having short term memory lapses, forgetfulness and general memory problems. Studies conducted by Hemat Allam [13], reported 13% of his subjects dealt with the same. Similarly, a study conducted by Nidhi Bhatnagar [14], also reported, 19.7% of her subjects also dealt with similar lapses of memory and forgetfulness.

Mental health was observed to have been significantly affected post CoViD, in our study around 10.3% of our subjects reported Anxiety issues post CoViD whereas as around 10% reported having depressive episodes post CoViD. Similar studies conducted by Hemat Allam [13], reported 26.6% of his subjects' showed signs of Mood changes in the form of anxiety, depression or irritability. Whereas a study conducted by Farzaneh Badinlou [16], reported, 55% and 20.5% showed signs of depression and anxiety respectively.

Overall health post CoViD as reported by our subjects showed that, A majority of our subjects (54.4%) reported to being in great health, as comparable to before CoViD and the rest (45.6%) reported some form of Post CoViD manifestations. As was the case reported by Hemat Allam [13], which reported 44.2% of his subjects returning to normalcy where as 55.8% reported some form of Post CoViD manifestations.

Conclusions

We conclude that 64% of the study subjects had presented with some form of post-CoViD manifestations like breathlessness on walking up a flight of stairs and fatigue etc. after CoViD infection, most of which were seen in the age group 16-30 years.

It was found that the majority (89%) of the study population had taken 2 doses of the prescribed vaccine. Among those who had completed both doses of vaccination, 63.2% had reported some form of post-CoViD manifestation. in contrast to 71.1% of the study subjects who were partially immunised.

The public should be made aware of the prevalence of post COVID manifestations, they must be well informed of its clinical presentations and complications. Clinicians must take due diligence in addressing post COVID manifestations and its management as they would with a case COVID-19 infection. The government should encourage further research and studies into post COVID manifestations, how they present, what are the risk factors, complications and their management. Post CoVid patients are to be encouraged to take regular follow-ups, any presentation of post CoVid manifestations needs to be consulted and diagnosed.

Additional Information

Disclosures

Human subjects: All authors have confirmed that this study did not involve human participants or tissue. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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Corresponding author:
U. Venkatesh;
Email: venkatesh2007mbbs@gmail.com

FASAI Study Group (Dr. Govindrao Kusneniwar, AIIMS Bibinagar, Hyderabad; Dr. Chandralekha Kona, AIIMS Bibinagar, Hyderabad; Prof. Dr. Anmol Gupta, IGMC Shimla; M. Gurukrushna, Institute of Medical Sciences and Sum Hospital Siksha 'O' Anusandhan, Bhubaneswar).

Determinants of substance use among young people attending primary health centers in India

U. Venkatesh[1], P. Aparnavi[2], K.A. Mogan[3], R. Durga[4], Jennifer Pearson[5], Surekha Kishore[6], Hari Shanker Joshi[1], Naveen Sukumaran Nair[7], B. Nisha[8], Renu Agrawal[9], Karavadi Vidusha[10], C. Vankhuma Chenkual[11], Bhola Nath[12], Venkata Rao Epari[13], Ranjeeta Kumari[14], Pooja Goyal[15], Farhad Ahamed[16], Madhurjya Baruah[17], R. Anil[18], Amrut Arun Swami[19], Bhushan Dattatray Kamble[20], Gopal Ashish Sharma[21], Akash Sharma[22], Om Prakash Bera[23], Ashoo Grover[24], Shikhar Kishore Verma[25] and FASAI Study Group

[1]Department of Community & Family Medicine, All India Institute of Medical Sciences, Gorakhpur, India; [2]Kovai Medical Center and Hospital Institute of Health Sciences and Research, Coimbatore, India; [3]South Asia Field Epidemiology and Technology Network, Inc., Metro Manila, Philippines; [4]Department of Dentistry, All India Institute of Medical Sciences, Gorakhpur, India; [5]School of Public Health University of Nevada, Reno, NV, USA; [6]All India Institute of Medical Sciences (AIIMS), Gorakhpur, India; [7]Mount Zion Medical College Hospital, Enadimangalam, Kerela; [8]Saveetha Medical College and Hospital, Kuthambakkam, India; [9]Sarojini Naidu Medical College, Agra, India; [10]Rajarajeswari Medical College and Hospital, Bangalore, India; [11]Zoram Medical College, Mizoram, India; [12]All India Institute of Medical Sciences, Raebareli, India; [13]Institute of Medical Sciences and Sum Hospital, Bhubaneswar, India; [14]All India Institute of Medical Sciences, Rishikesh, India; [15]Employment State Insurance Corporation Medical College and Hospital, Faridabad, India; [16]All India Institute of Medical Sciences, Kalyani, India; [17]Lakhimpur Medical College and Hospital, Assam, India; [18]PES Institute of Medical Sciences and Research, Beggilipalle, India; [19]Zydus Medical College and Hospital, Dahod, India; [20]All India Institute of Medical Sciences, Bibinagar, India; [21]Indira Gandhi Medical College, Shimla, India; [22]Department of Medicine, University at Buffalo – Catholic Health System, Buffalo, NY, USA; [23]Global Health Advocacy Incubator, Washington, DC, USA; [24]Indian Council of Medical Research, New Delhi, India and [25]Independent Researcher

Abstract

Background: Substance use is a complex condition with multidimensional determinants. The present study aims to find the prevalence and determinants of substance use among young people attending primary healthcare centers in India.

Methods: A multicentric cross-sectional study was conducted across 15 states in India on 1,630 young people (10–24 years) attending primary health centers. The Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) was used to capture data on substance use. The degree of substance involvement was assessed and multivariate regression analysis was conducted to determine the risk factors of substance use.

Results: The prevalence of substance use was 32.8%, with a median substance initiation age of 18 years. Among the substance users, 75.5% began before completing adolescence. Tobacco (26.4%), alcohol (26.1%) and cannabis (9.5%) were commonly consumed. Sociodemographic determinants included higher age, male gender, urban residence, positive family history, north-eastern state residence and lower socioeconomic class. Over 80% of users had moderate or high involvement.

Conclusions: High substance use prevalence among young people in Indian healthcare centers underscores the urgency of targeted intervention. Insights on determinants guide effective prevention strategies for this complex public health issue.

Impact statement

Our study findings align with the global scenario where tobacco use remains a significant public health concern. India, being the second largest consumer of tobacco globally, faces substantial health risks associated with its use. The study also highlights the high prevalence of alcohol and cannabis use among young individuals. The early initiation of substance use underscores the urgency of targeted interventions during early adolescence. The sociodemographic determinants identified, such as age, male gender, urban residence, family history, and lower socioeconomic class, provide valuable insights for developing targeted prevention and intervention strategies. These determinants mirror findings from previous research, emphasizing the need for multi-faceted approaches that consider social, economic and cultural factors influencing substance use. The study's geographical variation in substance use prevalence, with Mizoram having the highest and Kerala having the lowest, suggests the importance of regional context in understanding and

addressing substance use patterns. The findings underscore the need for tailored interventions for regional differences and cultural nuances. The severity of substance involvement, with more than 80% of users falling into the moderate or high involvement categories, signals the urgency for comprehensive and multi-pronged interventions. The study's use of the WHO ASSIST tool provides a nuanced understanding of substance involvement across various substances, allowing for targeted interventions based on the specific patterns observed. The study's emphasis on early adolescence as a critical period for intervention aligns with existing evidence that early substance use initiation can lead to dependence, affecting psychosocial behavior, physical health and mental well-being. The call for interventions addressing the accessibility of substances emphasizes the importance of policy measures to restrict easy access, especially considering that friends are reported as the primary source of introduction to substances.

1. Background

Substance use includes the misuse of prescription drugs; the use of tobacco, alcohol and illicit drugs (i.e., cocaine, heroin, methamphetamines, inhalants, hallucinogens or ecstasy); and the use of injection drugs (WHO, 2010; McLellan, 2017) Whereas substance abuse is the hazardous use of substances in amounts such that it causes physical or mental harm (WHO, 2023a). In 2017, it was reported that around 5.5% of the global population aged 15–64 had used substances, and about 35 million people were estimated to be affected by substance use disorders. Globally, half a million deaths annually are attributable to substance use and contribute about 1.3% of the disease burden (WHO, 2023b). Tobacco use is the single largest source of preventable deaths worldwide. Though alcohol is the most common substance used worldwide, tobacco is highly prevalent in India. India is the second largest tobacco consumer globally, and around one-fourth of adults in India consume tobacco (Centres for Disease Control and Prevention (CDC), 2016). Among persons aged 13–18 years, the prevalence of ever tobacco users was 18.5% and about half started tobacco before the age of 10 (Government of India (GoI), 2019a). Few other studies showed that a majority of adults initiate substance use in their youth (Sharma and Tyagi, 2016). In current trends, cannabis use among youth has been gradually increasing, and very few studies were conducted to assess the pattern and determinants (Kuepper et al., 2011).

Studying substance use in adolescence is crucial due to heightened vulnerability to initiation during this critical developmental phase. Early substance use can lead to enduring physical, mental and cognitive impacts, elevating the risk of future substance use disorders and associated problems like educational underachievement (Balyakina et al., 2014; Baingana et al., 2015). Behaviors established during this period often persist into adulthood, emphasizing the need for early identification and intervention to prevent harmful habits. Moreover, the profound developmental changes in the adolescent brain, especially in decision-making and impulse control areas, underscore the long-term consequences of substance use. Social dynamics and peer influence significantly contribute to substance initiation among youth, influencing the design of targeted interventions. Substance use among young people not only poses individual risks but also contributes to broader public health issues, necessitating strategies that address societal impacts (Tsering et al., 2010; Mogan et al., 2020). Research in this area informs evidence-based policies and prevention efforts tailored to specific age groups, presenting valuable opportunities for early intervention programs that mitigate the negative consequences of substance use (Boys et al., 2001; Chandler et al., 2009; United States, 2016; Santangelo et al., 2022). Primary health centers (PHCs) serve as the frontline of healthcare and first point of contact with community, making them pivotal in identifying and addressing substance use issues early on. Early detection and intervention at PHCs can prevent the escalation of substance use disorders, reducing the burden on higher levels of healthcare. Moreover, integrating substance use studies into PHCs aligns with a comprehensive approach to healthcare, addressing not only physical health but also mental and behavioral aspects, thus promoting holistic well-being in the community. Furthermore, while national surveys offer insights into the prevalence of individual substance use, they do not conduct a comprehensive examination of all types of substance use within a single study. Additionally, there is a limited exploration of the factors associated with substance use in these surveys. The present study aimed to estimate the prevalence and determinants of substance use among young people attending rural and urban primary health centers in India.

2. Methods

2.1 Study design, setting and population

We conducted a multicenter, cross-sectional study across 15 states in India (one medical college from each state) from March to October 2022 (Figure 1, Supplementary material S2). The participants were young people (10–24 years) attending rural and urban primary health centers of those colleges. Only those in need of emergency management were excluded from the study. The eligible participants were chosen by consecutive sampling.

2.2 Sample size and sampling technique

The sample size was calculated using "Epi-info," a public domain software developed by the Centers for Disease Control (CDC) version 7. Considering the NFHS 5 data for tobacco use (rural) of 42.7%, 95% confidence level and 5% confidence limit, the calculated sample size was 376. Accounting for a design effect of 4.0, based on a study by Emilie et al. (Shea et al., 2009) for multicentric studies, the minimum sample size required was 1,504 from 15 study sites. The study sites were chosen by convenience sampling, representing all five zones and the northeastern (NE) part of India (Government of India (GoI), 2022).

2.3 Study tools and data collection

After a review of literature and discussion with subject experts, a predesigned, semi-structured questionnaire was used to capture sociodemographic details and determinants of substance use. The World Health Organization Alcohol, Smoking, and Substance Involvement Screening Test (WHO ASSIST) in clinical setting (v3.1) was used to assess the participants for substance use (World Health Organization, 2010). ASSIST involves screening for tobacco products, alcoholic beverages, cannabis, cocaine, amphetamine-type stimulants, inhalants, sedatives, hallucinogens, opioids and intravenous substance use based on lifetime use. Substance involvement score was calculated individually for each substance and divided into grades 1 (low), 2 (moderate) and 3 (high) based on the use of

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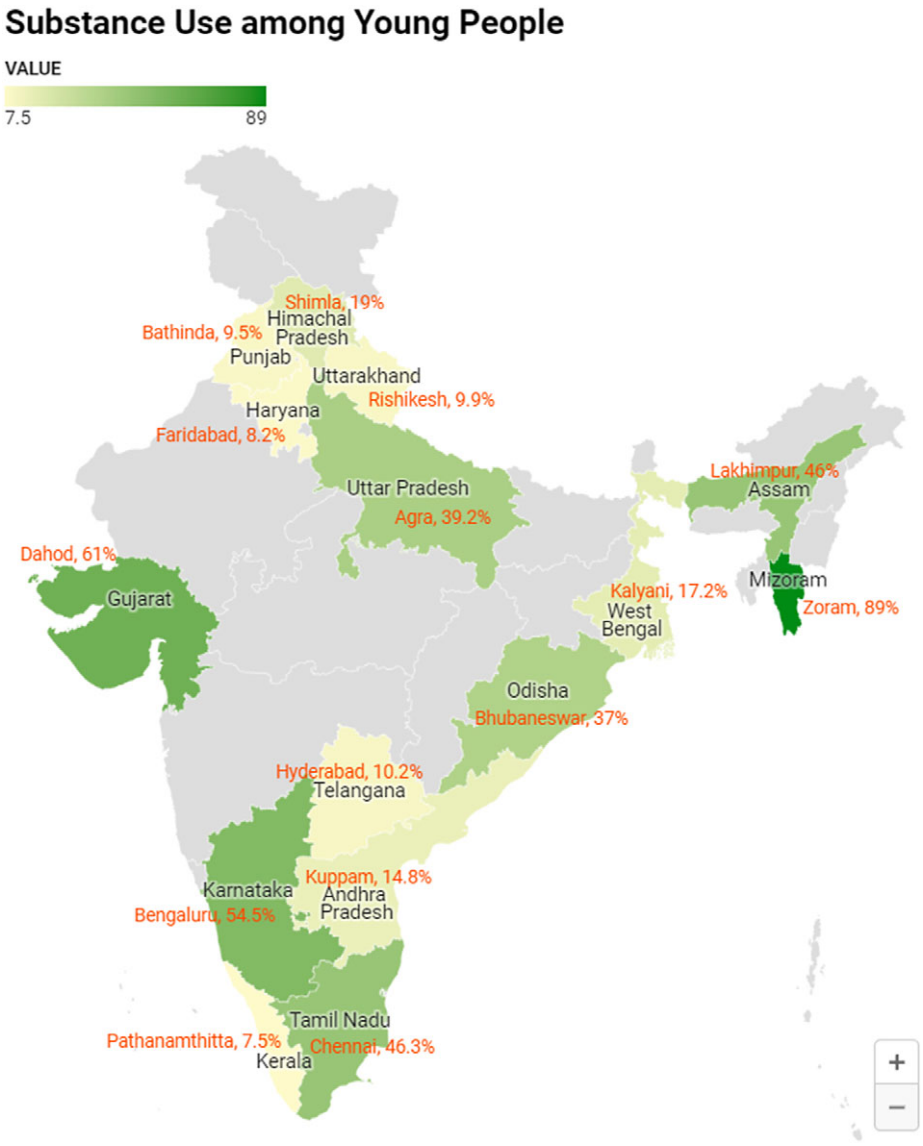

Figure 1. Map of India showing the distribution of substance users (N = 1,630).
Note: Tobacco was consumed by 26.4% (430/1630), followed by alcohol (26.1%, 424/1630) and cannabis (9.5%, 155/1630). More than one substance was consumed by 22.2% (362/1630). Injectable drugs were used by 3.5% (58/1630), which was 11% (58/524) of the substance users. The median substance use score as per the ASSIST tool was the highest for opioids at 29.5 (12–36) and lowest for hallucinating drugs at 3 (0–6). Tobacco and alcohol had median scores of 15 (11–22) and 16 (6–26), respectively. Among opioid users, majority (55.4%, 51/92) were in the high involvement category (Table 1). Substances were introduced to the users majorly by friends (87.2%, 457/524), followed by family members (7.4%, 39/524). Less than 5% (26/524) started using substances by themselves, either through the internet or accidentally at parties.

substances in the past 3 months as per the ASSIST guidelines. The ASSIST tool showed 95% sensitivity and specificity of 79%–93% (Gryczynski et al., 2015). Brahm Govind (BG) Prasad's socioeconomic scale (SES) was first proposed in 1961 and updated real time based on the Consumer Price Index (CPI). BG Prasad scale with reference CPI values as of January 2022 was used for calculating the socioeconomic class (Bashar, 2022). By norms, the medical colleges in India have rural and urban training at PHCs. All eligible participants attending OPD for their illness were approached and explained about the study. Data was obtained by one-on-one interview administered via a Google form questionnaire.

Operational definitions: Substance use was defined as the use of licit or illicit substances other than when medically indicated, such as tobacco, alcohol, cannabis, cocaine, amphetamines, inhalants, sleeping pills, hallucinogens, opioids and intravenous drugs (World Health Organization 2010). The standard WHO definition of young people as an overlap of adolescents (10–19 years) and youth (19–24 years), which included those 10–24 years, was adopted (WHO, 202,3).

2.4 Data analysis and statistical methods

Data was checked for completeness and errors and analyzed using Statistical Package for Social Sciences (SPSS) software (version 21.0), acquired by the International Business Machines (IBM), New York, USA. As per the ASSIT tool, the prevalence of substance use was calculated based on self-reported data for lifetime use. The scoring of substance use was based on the past 3-month usage. A person involved in moderate to high use of any one of the substances was considered in the moderate to high involvement category. The prevalence of substance use was calculated and mean

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Table 1. Prevalence of substance use and level of involvement (N = 1,630)

Type of substance	Prevalence of use (%)	Use in the past 3 months (%)	Substance involvement score among users		
			Low	Moderate	High
Tobacco	431 (26.4)	382 (23.4)	49 (11.4)	334 (77.5)	48 (11.1)
Alcohol	425 (26.1)	356 (21.8)	162 (38.1)	172 (40.5)	91 (21.4)
Cannabis	155 (9.5)	109 (6.6)	52 (33.5)	79 (51)	24 (15.5)
Cocaine	32 (2)	17 (1.0)	15 (46.9)	15 (46.9)	2 (6.3)
Amphetamine	31 (1.9)	16 (0.9)	15 (48.4)	11 (35.5)	5 (16.1)
Inhalant	35 (2.1)	17 (1.0)	9 (25.7)	23 (65.7)	3 (8.6)
Sedative	56 (3.4)	35 (2.1)	21 (37.5)	22 (39.3)	13 (23.2)
Hallucinogen	21 (1.3)	9 (0.5)	13 (61.9)	7 (33.3)	1 (4.8)
Opioid	92 (5.6)	73 (4.4)	10 (10.9)	31 (33.7)	51 (55.4)
Other drugs*	17 (1.0)	8 (0.4)	9 (52.9)	7 (41.2)	1 (5.9)

*Coollip, Dextromethorphan, Hans.

scores were calculated for substance involvement scores. Logistic regression was done to quantify the association between substance use and covariates such as age, sex, education, occupation, family history of substance use, socioeconomic status and family type. The association was expressed as odds ratio (OR) with a 95% confidence interval (CI). For multivariate regression in assessing both substance use and severity of involvement, adjustment was done for age, gender, type of family, residence, marital status, family history, category of state, education or employment status and the socioeconomic class (the model fit showed significant omnibus test and nonsignificant Hosmer and Lemeshow test values).

2.5 Ethical issues

Ethical clearance was obtained from the institutional ethics committee of both the primary institute (AIIMS, Gorakhpur) and of the individual sites. The WHO ASSIST in a clinical setting (v3.1) was used after obtaining permission from the World Health Organization (WHO) (request ID 390056). Written informed consent from adults and assent from accompanying parents in case of minors was obtained before enrolment into the study. If there was no parent accompanying, the study was explained to the minors and, if willing to participate, they were asked to come along with their parents to the PHC. The privacy of the participants was ensured during data collection. After data collection, a brief intervention was given based on the standard guidelines of ASSIST.

3. Results

The study was performed on a sample of 1,630 participants in the age group of 10–24 years from 15 states across India. The mean age of the participants was 19.5 ± 3.5 years. Around one-third (33%, 539/1630) of the participants belonged to the lower SES as per BG Prasad's classification. Substance use was observed in family members of 44.5% (726/1630). Tobacco was the most common (31.9%, 521/1630) substance used by family members, followed by alcohol (25%, 408/1630).

The overall prevalence of substance use was 32.8% (524/1630) (Figure 1). Females had a lower prevalence (12.2%, 80/656) of substance use. The mean age of initiating substances was 17.2 ± 2.7 years, with no significant difference between males (17.6 years) and females (17.2 years). Among the substance users, 24.6% (129/524) had started use before 16 years of age, and 75.5% (396/524) started before they completed adolescence (<20 years). Christians had a higher prevalence (50.3%, 163/324) of substance use, followed by Hindus (29.4%, 320/1088), people with "Other" religious beliefs (24.4%, 19/78) and Muslims (15.7%, 22/140) (Table 1). Mizoram had the highest prevalence of substance use (89%, 121/136), and Kerala the least (7.5%, 25/332) (Figure 1). In the northeastern states, 75.3% (150/199) were substance users; of them, 68.3% (136/199) were Christians. In other words, among Christians in northeastern states, 88.9% (121/136) were substance users.

People in the age group of 20–24 years, males, urban residents, northeastern residence, married, employed, those with a positive family history and falling under lower socioeconomic class had a significantly higher proportion of substance use (Table 2). Among the substance users, 67% had a positive family history of substance use. Though family type and marital status were significant on bivariate analysis, it was not so on adjusting for other variables (Table 2).

Nearly one-third reported that tobacco and alcohol products were easily accessible. One to three percent reported that substances, including cocaine, amphetamine, inhalants, sedatives, hallucinating drugs and opioids, were available within their premises (Table 3).

Family history of substance use, place of residence and type of family did not statistically affect the severity of tobacco score. Among the substance users, 437 (83.4%) were in the moderate or high involvement category for at least one of the substances, and 16.6% were in the low involvement category for all the substances they were using. Higher age, male gender and educational/employment status were significantly associated with the severity of substance involvement after adjusting for other variables (Table 4).

Among the substance users, 210 (40.1%) were willing to take help for quitting, and another 212 (19.5%) reported that they might consider taking help.

4. Discussion

The present study reports that the prevalence of substance use among people in the age group of 10–24 years is 32.8%.

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Table 2. Sociodemographic profile of substance users and non-users (N = 1,630)

Sociodemographic	Substance use (row %)	Non-use (row %)	Unadjusted OR (95% CI), p-value[#]	Adjusted OR (95% CI), p-value[#]
Age				
10–19 years	114 (16.4)	581 (83.6)	Ref	
20–24 years	410 (43.9)	525 (56.1)	**3.9 (3.1–5), *<0.01***	**1.7 (1.2–2.3), *<0.01***
Gender				
Female	80 (12.2)	576 (87.8)	Ref	
Male	444 (45.6)	530 (54.1)	**6.03 (4.6–7.8), *<0.01***	**4.6 (3.3–6.5), *<0.01***
Family type				
Nuclear	347 (29.8)	817 (70.2)	Ref	
Joint	165 (37.8)	272 (62.2)	**1.4 (1.1–1.7), *0.002***	0.8 (0.5–1.1), *0.2*
Other*	12 (41.4)	17 (58.6)	1.6 (0.7–3.5), *0.2*	1 (0.3–2.7), 0.4
Residence				
Rural	261 (26.6)	719 (73.4)	Ref	
Urban	263 (40.5)	387 (59.5)	**1.8 (1.5–2.3), *<0.01***	**1.7 (1.3–2.3), *<0.01***
Marital status				
Never married	391 (27.8)	1,014 (72.2)	Ref	
Currently married	111 (55.5)	89 (44.5)	**3.2 (2.3–4.4), *<0.01***	1.9 (0.4–8.7), *0.1*
Divorced/widowed	22 (88)	3 (12)	**19 (5.6–63.8), *<0.01***	1.5 (0.3–7.2), 0.3
Family history				
No	173 (19.1)	731 (80.9)	Ref	
Yes	351 (48.3)	375 (51.7)	**3.9 (3.1–4.9), *<0.01***	**3.3 (2.5–4.5), *<0.01***
State groups				
Other states	374 (26.1)	1,057 (73.9)	Ref	
Northeastern	150 (75.4)	49 (24.6)	**8.6 (6.1–12.1), *<0.01***	**6.6 (4.1–10.4), *<0.01***
Education/employment status				
Currently studying	160 (16)	841 (84)	Ref	
Employed	250 (60.1)	166 (39.9)	**7.9 (6.1–10.2), *<0.01***	**3.9 (2.6–5.9), *<0.01***
Unemployed and not studying	114 (53.5)	99 (46.5)	**6.1 (4.4–8.3), *<0.01***	1 (0.7–1.6), *0.14*
Socioeconomic status				
I (upper)	14 (23.7)	45 (76.3)	Ref	
II (upper middle)	70 (28)	180 (72)	1.2 (0.6–2.4),0.5	1.0(0.4–2.2),0.9
III (middle)	116 (29.3)	280 (70.7)	1.3 (0.7–2.5),0.4	1.1(0.4–2.3),0.8
IV (lower middle)	105 (27.2)	281 (72.8)	1.2 (0.6–2.2),0.6	0.8(0.4–1.9),0.8
V (lower)	219 (40.6)	320 (59.4)	**2.1 (1.1–4.1), 0.01**	**2.7 (1.8–3.9), *<0.01***

[#]Logistic regression.
*Broken families/have moved out of family/do not have family.
Bold: Statistically significant.

Corroborating with the current findings, the study by Baba et al. (2013) on college students showed a prevalence of about 31.3%. The prevalence rates in our study exceeded those found in studies on school children in Turkey (21.4%) (Pumariega et al., 2014) and Brazil (27.3%) (Malta et al., 2011) as well as a study on male adolescents in Aligarh (13.3% vs 45.6% males in the current study) (Ahmad et al., 2009). While the inclusion of higher age groups in our study may explain the variance, higher prevalence rates (58.7% and 53.8%) were observed in two Indian studies (Juyal et al., 2008; Hembram et al., 2015).

The current finding that more than a quarter (26.4%) of young people use substances was in accordance with the global GATS 2 reported prevalence (28.6%) among individuals aged 15 years and above (Centres for Disease Control and Prevention (CDC), 2016). Notably, GATS reports the initiation age for tobacco use at 20.9 years. Consequently, a meaningful comparison of the prevalence rates between the current study and GATS can be undertaken taking into account the age range and reported age of tobacco initiation in the respective studies. The 2019 GYTS also reported a slightly higher prevalence of tobacco users (8.5%) compared to the

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Table 3. Accessibility to individual substances (N = 1,630)

Type of substance	In a nearby store	On an online site	On their premises	Through a third person	From friends/social circle	Do not know how to access/not willing to disclose
Tobacco	534	9	512	2	61	641
	(32.8)	(0.6)	(31.4)	(0.1)	(3.7)	(39.3)
Alcohol	658	42	150	57	100	893
	(40.4)	(2.6)	(9.2)	(3.5)	(6.1)	(54.7)
Cannabis	262	45	111	35	70	1,324
	(16.1)	(2.8)	(6.8)	(2.2)	(4.3)	(81.2)
Cocaine	43	19	46	21	16	1,540
	(2.6)	(1.2)	(2.8)	(1.3)	(1)	(94.4)
Amphetamine	16	23	25	16	11	1,602
	(1)	(1.4)	(1.5)	(1)	(0.7)	(98.2)
Inhalant	30	22	17	10	13	1,555
	(1.8)	(1.3)	(1)	(0.6)	(0.8)	(95.3)
Sedative	39	23	16	13	11	1,582
	(2.4)	(1.4)	(1)	(0.8)	(0.7)	(97.0)
Hallucinogen	23	23	18	20	12	1,541
	(1.4)	(1.4)	(1.1)	(1.2)	(0.7)	(94.5)
Opioid	17	22	50	21	15	1,588
	(1)	(1.3)	(3)	(1.3)	(0.9)	(97.4)
Other drugs	41	22	26	12	11	1,599
	(2.5)	(1.3)	(1.6)	(0.7)	(0.7)	(98.1)

Note: Multiple choices were applicable, hence not mutually exclusive.

current prevalence (4.6%) among the same age group of 13–15 years (Government of India (GoI), 2019b). In a study on pre-university students (Bhojani et al., 2009), the prevalence of tobacco use was 15.7%. A study in one of the northeastern states among school children reported that 46% have ever used tobacco (Ningombam et al., 2011). This might be because of the high prevalence of substance use in the northeastern states. The current study reported a significantly higher prevalence (75.4%) of substance use in northeastern states, which was in accordance with other reports from northeastern India 54% (Ningombam et al., 2011) and 70.8% (Saikia and Debbarma, 2020). The higher prevalence in these states may be attributed to their porous borders, making legal enforcements more challenging, and more recreational tourism. The current study showed that tobacco was the most common substance used, followed by alcohol. Similar reports were evidenced in few other studies also although the source of samples for each of these studies was different (Ningombam et al., 2011; Hembram et al., 2015; Rahman and Tripathi, 2016; Mogan et al., 2020). Christians were the highest proportion of substance users, and of the total Christians, 74.2% are residing in northeastern states. A study among the students of Manipur (Ningombam et al., 2011) reported that substance use was significantly lower among children of Hindu/Jain religion. Hence, the prevalence among Christians was high probably due to the high representation of Christians in northeastern states, which had more substance users.

The prevalence of substance use was much lower in the current study among those actively enrolled in school or college, and this conclusion was validated by two other studies (Rani et al., 2003; Mogan et al., 2020) that also reported that tobacco use was inversely related to education. This can also be explained by the enforcement of the Cigarettes and Other Tobacco Products Act (COTPA) and other rules related to substance usage in educational institutes (Government of India (GoI), 2003). The current study reported that the prevalence was significantly high among those with a positive family history of substance use, and a similar report was provided by a substance use study in Manipur (Ningombam et al., 2011). In the current study, friends played a major role in the introduction of substances. The role of peers in adolescent behaviors, including substance use, is well established (Kobus, 2003; Ningombam et al., 2011; Stritzel, 2022). The current study reports a higher prevalence of cannabis use (9.5%) than a national survey done by National Drug Dependence Treatment Centre (NDDTC) of AIIMS Delhi (2.8%) (Government of India (GoI), 2019b). The NDDTC conducted a survey encompassing a population sample of over 4.5 lakh across all states, while the present study focused on only half of the states than included in the NDDTC survey. Delhi and Haryana, being one of the major cannabis consumers (Government of India (GoI), 2019b), reported only 4.3% (Mogan et al., 2020) and 8.5% (Qadri et al., 2010), respectively. In alignment with the higher overall substance use, though cannabis use was also higher (35.1%) in northeastern states, it was lower than that found by the study in Manipur (14%) (Ningombam et al., 2011). The difference might be because of the study population, as the latter (Ningombam et al., 2011) exclusively studied school population. Though Kashmir also has hurdles in legal enforcement (Baba et al., 2013), it reported lower cannabis use (4.4%).

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Table 4. Overall severity score for substance across the sociodemographic profile of participants (*N* = 524)

Sociodemographic	Moderate to high involvement in any of the substances	Low involvement in all substances (%)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age				
10–19 years	88 (77.2)	26 (22.8)	Ref	
20–24 years	349 (85.1)	61 (14.9)	**1.7(1.0–2.8), *0.04***	**1.1(1.6–2), *0.08***
Gender				
Female	46 (57.5)	34 (42.5)	Ref	
Male	391 (88.1)	53 (11.9)	**5.4(3.2–9.2), *<0.01***	**4.9(2.7–8.8), *<0.01***
Family type				
Joint	140 (84.8)	25 (15.2)	Ref	
Nuclear/single parent	297 (82.7)	62 (17.3)	1.2(0.7–2.0), *0.4*	0.9(0.5–1.7), *0.9*
Residence				
Rural	213 (81.6)	48 (18.4)	Ref	
Urban	224 (85.2)	39 (14.8)	1.3(0.8–2.1), *0.27*	1.5(0.9–2.6), *0.09*
Marital status				
Never married	318 (81.3)	73 (18.7)	Ref	
Ever married	119 (89.5)	14 (10.5)	0.6(0.3–1.16), *0.1*	1.2(0.6–2.5), *0.5*
Family history				
No	138 (79.8)	35 (20.2)	Ref	
Yes	299 (85.2)	52 (14.8)	1.5(0.9–2.3), *0.1*	1.2(0.7–2.2), *0.5*
State groups				
Other states	303 (81)	71 (19)	Ref	
Northeastern	134 (89.3)	16 (10.7)	**1.9(1.1–3.5), *<0.01***	1.8(0.9–3.5), *0.1*
Education/employment status				
Currently studying	113 (70.6)	47 (29.4)	Ref	
Employed	224 (89.6)	26 (10.4)	**3.5(2.1–6.1), *<0.01***	**2.4(1.2–4.6), *0.01***
Unemployed and not currently studying	100 (87.7)	14 (12.3)	**2.9(1.5–5.7), *<0.01***	**2.7(1.3–5.7), *0.07***
Socioeconomic status				
I (upper)	14 (3.2)	0 (0)	7.7(0.4–132.7), *0.2*	1.2(0.3–4.6), 0.8
II (upper middle)	60 (85.7)	10 (14.3)	1.5(0.8–3.4), *0.2*	0.7(0.3–1.7), *0.5*
III (middle)	100 (86.2)	16 (13.8)	1.6(0.8–3.1), *0.2*	0.7(0.3–1.7), *0.6*
IV (lower middle)	90 (85.7)	15 (14.3)	1.5(0.8–3.0), *0.1*	0.8(0.3–1.9), *0.8*
V (lower)	173 (79)	46 (21)	Ref	

Bold: Statistically significant.

On regression analysis, the current study reported that higher age group, male gender, place of residence, family history of substance use, geographical area, education or employment status and lower socioeconomic status were all found to be significantly associated with substance use. A study on similar population of young people attending rural health centers showed an association between substance use and male sex, lower socioeconomic level and family history of substance use (Mogan et al., 2020). Male gender, higher age group and urban predominance of substance use were also reported in another study (Qadri et al., 2010). Though too few studies (Qadri et al., 2010) showed that substance use was more common in nuclear families, our study reported that it was significantly higher in joint families and broken families. The higher prevalence in the male gender and higher age group may be due to the increased social exposure in this group. The current relation of substance use with a positive family history was also supported by other literature (Singh and Gupta, 2006; Saxena et al., 2010; Pramod and Narayan, 2019). This reinforces the fact that family has an important role in determining the lifestyle/habits of children.

Tobacco use was significantly higher among those over 19 years of age, men, those who had never been married, people of the low socioeconomic group and those who were not living with family currently (Supplementary file 3). Literature shows that an increased incidence of cigarette use was seen among people in the lower socioeconomic group (Rani et al., 2003; Mogan et al., 2020). This might be due to a lack of awareness about the ill health effects of

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tobacco among the lower socioeconomic group. The study could have been further expanded to assess the reason for starting substance use, associated injuries, adverse events on the road or sexual and mental behavior. Both the proportion of users and the degree of involvement were high in male gender. This might be due to social norms and stigmatization of female substance users in the Indian society. However, underreporting among females might also be a possibility. More number of people in the 20–24 years group age had higher substance involvement scores. This might indicate that the chances of addiction are higher as age increases and that interventions should be planned for younger people.

While the present study provides valuable insights into the determinants of substance use among young people, there are limitations inherent in the study design. The present study was done on those attending healthcare centers and also used a convenient sampling technique to select the study sites. Hence, this may have introduced selection bias, limiting the generalizability of the findings. The study relied on self-reported data collection, which could have introduced bias affecting the accuracy of responses to certain questions related to substance use. Due to the cross-sectional design, the study was unable to establish the temporality and specificity of associations observed between determinants and substance use, thus limiting its ability to establish causality. Further research with robust study designs and more diverse samples is warranted to better understand the complex dynamics of substance use in this region.

5. Conclusion

Our findings show that one-third of young people attending primary health centers engaged in substance use, with two-thirds of them initiating substance use before completing adolescence. The role of family and peers is crucial in the initiation of substance use, as two-thirds of substance users had at least one parent using substance. Notably 90% of substance users reported being introduced to these substances by friends. Higher age, male gender, urban residence, a positive family history, residing in a northeastern state and belonging to a lower socioeconomic class were determinants of substance use. To effectively combat substance use, the study recommends a multifaceted approach. Early intervention programs targeting adolescents should instill awareness and coping mechanisms against peer pressure. Comprehensive educational campaigns emphasizing the risks of substance use, particularly regarding tobacco and alcohol, are crucial. Stricter access control measures, especially in high-use regions, are recommended, including restricting underage access. Community-based initiatives promoting a healthy environment and positive peer influences should be established. Parental education programs to recognize signs of substance use and enhance communication are vital. Increased accessibility to counseling services, research and monitoring, employment opportunities, evidence-based policies and collaborative efforts between stakeholders will further contribute to mitigating substance use.

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Competing interest. The authors declare none.

Ethical approval and consent to participate. The ethics committee of the primary institute (AIIMS, Gorakhpur: IHEC/AIIMS-GKP/BMR/89/2022) and that of each site participating center provided approval. The World Health Organization granted clearance for the use of WHO ASSIST v3.1 (request number 390056). There are no competing interests. Before enrolment, adults and kids provided written informed consent, and the confidentiality of participants was maintained while collecting the data. Following data collection, a brief intervention was conducted as per ASSIST's standard operating procedures.

Consent for publication. Written consent from study subjects was obtained for publication.

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Original Research Article

A cross sectional study on knowledge, attitude and practice regarding Covid vaccination among health beneficiaries

Naveen S Nair[1,*], Karavadi Sri Sai Vidusha[2], Saad Jamal[1]

[1]*Dept. of Community Medicine, Mount Zion Medical College, Adoor, Kerala, India*
[2]*Dept. of Community Medicine, Raja Rajeswari Medical College, Bengaluru, Karnataka, India*

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ABSTRACT

Background: In 2020, the whole world was taken aback by the emergence of a new viral disease – novel Corona Virus Disease (nCoViD-19), and soon the WHO declared it a pandemic. In India, two vaccines were developed and almost immediately approved for use, namely the Covishield and the Covaxin. These new vaccines and their fastened approval stirred a mixture of reactions both among the health care providers and the general public.
Objective: This pioneer study was conducted to assess the Knowledge, Attitude and Practice regarding CoViD vaccination among various beneficiaries.
Study Design: A cross-sectional questionnaire based study was conducted among various beneficiaries from January 25^{th} to April 12^{th} 2021.
Materials and Methods: Employing the stratified random sampling technique, 1000 study subjects were selected. After obtaining written informed consent, one to one interview was conducted. Knowledge, attitude and practice of CoViD vaccination was assessed using a grading system.
Results: 99.95% of Doctors and 49.0% of paramedical health care workers in contrast to 72.8% of general citizens had a good practise regarding vaccination and the pandemic in general. 64% of male study subjects had enrolled for vaccination on their self interest, in contrast with 75% of the 365 female study subjects. There was no statistically significant association between Gender and scores >60% in Knowledge, Attitude and Practice regarding CoViD vaccination among the subjects. There was a statistically very high significance between Knowledge regarding vaccination and the independent decision to get vaccinated.
Conclusions: Majority of the study population was willing to be vaccinated and the main reason attributed to this willingness was the belief that the vaccine is safe.

1. Introduction

Coronavirus disease (n-CoViD 19) is an ongoing pandemic caused by corona virus. Due to its rapid spread and high rate of mortality and morbidity worldwide it has turned out to be a global calamity.

During December 2019, an outbreak of a viral pneumonia was reported from the city of Wuhan, in Hubei province, China. Soon the disease spread to other parts of China and several countries to become a pandemic. By 9 January 2020, it was established that the disease was caused by a novel coronavirus, 2019-nCoV or SARS-CoV-2 and was named COVID-19.[1] Later, during the first half of January 2020, the Chinese researchers shared the genome sequence of the virus, followed by an international response triggered to develop a prophylactic vaccine to provide acquired immunity against COID-19. By April 2020, over hundred institutes and companies in 19 countries

* *Corresponding author*.
E-mail address: dr.naveennair@ymail.com (N. S. Nair).

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were working on the vaccine for COVID-19.[1]

In India, various vaccines were under development to combat the COVID-19 and have been modelled on the original strain. On 3 January 2020, India's top drug regulator issued emergency approval for two vaccines for restricted use against covid-19, even though phase III clinical trials for Covishield and Covaxin were still ongoing in India. In a nation with the-then second highest number of infections worldwide and more than 150 000 covid-19 deaths, the panic driven by news of new virus variants fuelled approval.[2,3]

Of the two vaccines approved, Covishield is the better known. It's a version of the Oxford University-AstraZeneca vaccine, made by the world's largest vaccines manufacturer-the Serum Institute of India, and was found to have an average efficacy of 70.4% in a peer reviewed study. Covaxin is India's first home produced vaccine developed by Bharat Biotech in collaboration with the Indian Council of Medical Research and the National Institute of Virology. On 21 January, *The Lancet* published Covaxin's phase I trial data, giving it a green light for safety and stating that it generates adequate immune response, but said further efficacy trials were warranted.[3] It was thought that a target to vaccinate 75 percent population was likely to attain localised herd immunity.[4]

The vaccine was initially offered to people at high risk for the disease and healthcare workers, followed by stratified population based on their risk. At a later stage it was made available to the entire population aged 18 years and more through the nation's largest known vaccination campaign. However, the hope of benefiting from the vaccine, to the extent that the vaccine may be the only way to tide over and control the COVID-19 pandemic, was accompanied by considerable opposition among the public against COVID-19 vaccination, including the vaccine hesitancy.

As evident from other surveys conducted by the print and electronic media nationwide, some people were understandably concerned that the speed of both development and vaccine approval could have compromised safety, despite the manufacturers' assurances. This triggered our interest in conducting this study with an objective to assess the level of knowledge, attitude and practice regarding the vaccination among selected beneficiaries in central Kerala and also to identify the various factors attributed.

2. Materials and Methods

This was a descriptive KAP study conducted among beneficiaries registered for CoViD vaccination at a tertiary health care setting at Pathanamthitta, Central Kerala in the first 6 months of 2020. From the total of 1960 beneficiaries registered, 1000 randomly selected beneficiaries belonging to various strata of the population – Health Care Workers and Front Line Workers, Citizens aged > 60 years, Citizens aged 45-60 years, and Citizens aged 18-45 years were studied following Stratified Random Sampling method. The data was collected using a pre tested and validated questionnaire consisting of 26 questions (12 questions on knowledge, 08 questions on attitude and 06 questions on practise). Scoring 60% and above in any category was considered as a "good" score and 40% or less was considered as a "poor" score. Informed written consent from the participants and approval from the Institution Ethics Committee was obtained before the start of the study. The data collected was analysed using SPSS version 20.1 and appropriate tests of significance were employed.

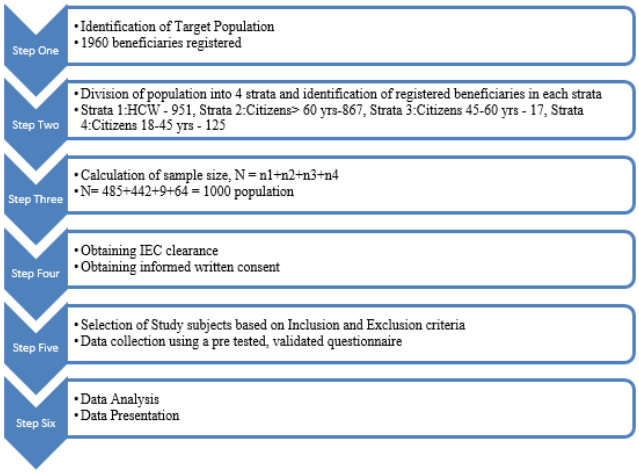

Fig. 1: Flowchart of the methodology used

3. Results

A total of 515 general citizens and 485 health care workers were studied. Majority (61%) of study subjects belonged to the age group 18-45 years including 64 citizens and 260 Health care workers. 26.5 % of study subjects belonged to the age group 45-60 years which included 209 health care workers and 9 citizens. 12.5% of the study population included 442 citizens and 16 health care workers.

Among the 485 health care workers analysed, 68.6% had a satisfactory knowledge about the dose, site, type, contraindications and possible adverse effects of the vaccination. However, among the 442 citizens aged > 60, only 12.7% had satisfactory knowledge about the vaccination. Among the 64 citizens aged 18-45 years, 66% had satisfactory knowledge and among the 9 citizens aged between 45-60 years, 55.6% had satisfactory knowledge on the vaccination.

Among the 485 health care workers analysed, 86% had a good attitude about being vaccinated and considered vaccination as one of the strongest pillars in the fight against the pandemic. They did not believe in any alternate methods to control the epidemic including the Hand Wash

– Face mask – Social Distancing norms. However, among the 442 citizens aged > 60, only 12.7% had a good attitude regarding the vaccination. Among the 64 citizens aged 18-45 years, 28.2% had a good attitude whereas among the 9 citizens aged between 45-60 years, 88.9% had a good attitude regarding the vaccination.

92% of the total study subjects registered for vaccination had done it on their own decision and hence had a good practice score regarding CoViD vaccination. However, 8% had registered for vaccination owing to parental/ peer pressure and hence scored low on the Attitude Likert Scale.

Among the 1000 beneficiaries registered for vaccination, 140 (14%) reported that they were pressurized by media and family to get vaccinated despite them not being completely interested. Among these 140 beneficiaries, 108 (77.14%) were health care workers. This appeared to the investigators as a matter of serious concern as health care workers are considered to be the backbone of the health care system and alleviating their concerns are to be addressed primarily.

78% (780) of the study subjects believed in other methods for control of the pandemic – various methods included Social Distancing norms, Use of soap, masks and sanitisers, lockdown measures by the Government etc.

Among the 515 general citizens, 88% (453 in no.) had come up for vaccination on their own accord and not influenced by media or peer and family pressure. This was a strikingly interesting observation as 21.5% of health care workers were influenced by peer and family pressure or media on their positive attitude towards vaccination in contrast to 12% of the general population.

When asked about the reasons for their willingness to get vaccinated, the study subjects revealed numerous reasons, the most prominent being the belief that the vaccine is safe (74%) followed by the realisation that CoViD could be a fatal disease (41%). 15% of study subjects also quoted that they just agreed upon the views of the Government and other national institutions supporting vaccination.

When asked about the concept of herd immunity, 87.3% of the health care workers reported that they were familiar with it and also knew that developing herd immunity could be one of the few ways to tide over the pandemic. However, only 21.4% of the general citizens knew or understood the concept of herd immunity. This also could be viewed as a matter of concern, as understanding the concept of getting vaccinated to protect themselves as well as their community is important to enhance vaccine acceptability among the general public.

A striking observation regarding the nCoViD-19 disease was that 92. % of the 1000 study subjects covered believed that concerned organisations and researchers would develop a medicine more effective than the vaccination to combat the pandmeic like in the case of other viral diseases like Chicken Pox, Dengue etc. Among these 920 study subjects, 810 (88%) were general citizens and the remaining 12% were health care workers.

Out of the total, 635 male study subjects, 64% had enrolled for vaccination on their self interest, in contrast with 75% of the 365 female study subjects. This association between gender and willingness to get vaccinated was found to be statistically significant. It was also seen that there was a statistically very high significance between Knowledge regarding vaccination and the independent decision to get vaccinated (Chi square value: 71.7337, p value < 0.001) (Table 1)

It was observed that there was a statistically highly significant association between the Occupation of study subjects and safe practises with regards to both vaccination, and he pandemic. 99.95% of Doctors and 49.0% of paramedical health care workers in contrast to 72.8% of general citizens had a good practise regarding vaccination and the pandemic in general. (Table 1)

It was observed that there was no statistically significant association between Gender and scores >60% in Knowledge, Attitude and Practice regarding CoViD vaccination among the 1000 study subjects. However, there was a statistical association between age and scores >60% regarding knowledge and attitude regarding the vaccination among the study subjects. There was also a statistically significant association between scores >60% regarding Education and Knowledge, Attitude and Practice regarding CoViD 19 vaccination among the 1000 study subjects.(Table 2)

4. Discussion

The effectiveness of any vaccination campaign depends on the population coverage, since in the case of a low vaccination rate, herd immunity will not be developed, and the most vulnerable population groups will not be protected against the concerned disease. So, it is important that the public awareness and attitude towards vaccination is understood beforehand, so that public health officials have the time to design and implement targeted interventions to raise the awareness of general population about the importance of vaccination.

Our results revealed that out of the 1000 study subjects, 88% were willing to be vaccinated and 12% were not willing to be vaccinated. Among those who were willing, 74 believed that the vaccine is safe, 41 stated their reason as the covid 19 was dangerous to their health and 15 stated as other reasons. Among the people who were not willing to be vaccinated 11 stated the vaccine was not safe, 1 stated their reason as covid 19 was not dangerous and 8 stated other reasons. Comparing the willingness rate of our study(88%) with that of similar studies conducted in the UK(60%).[3] European countries(73.9%),[5] USA(53.6%)[6] and another global survey(71.5%),[7] it seems that our study population are less hesitant against CoViD 19 vaccination. A majority of our study population contain health workers which might

Table 1: Association between knowledge, practice and gender and willingness to get vaccinated (N= 1000)

Gender	**Willingness to vaccinate on self interest**		**Total**	**Chi Square**	**p value**
	No	Yes			
Male	229(36.1%)	406 (63.9%)	635(100.0%)		
Female	91 (24.9%)	274(75.1%)	365(100.0%)	0.00028	<0.05
Total	320(32.0%)	680(68.0%)	1000(100.0%)		
Knowledge regarding vaccination	Willingness to vaccinate on self interest		Total	Chi Square	P value
	No	Yes			
Poor	47(39.2%)	93(10.6%)	140(14.0%)		
Good	73(60.8%)	787(89.4%)	860(86.0%)	71.7337	<0.001
Total	120(100.0%)	880(100.0%)	1000(100.0%)		
Practice	Willingness to vaccinate on self interest			Chi Square	P value
	Doctors and Paramedics (N=485)	General Citizens (N=515)	Practice (N=593)		
Poor	187(38.6%)	140(27.2%)	327(32.7%)		
Good	298(61.4%)	375(72.8%)	673(67.3%)	105.8075	<0.001
Total	485(100.0%)	515 (100.0%)	1000(100.0%)		

Table 2: Association between socio demographic variables and KAP scores > 60% regarding vaccination

Gender	**Score > 60%: Good score**		
	Knowledge (N=860)	**Attitude (N=920)**	**Practice (N=593)**
Male	593	634	409
Female	267	286	184
Chi square	0.0082	0.0009	0.0035
P value	0.927	0.975	0.953
Age	Score > 60% :Good score		
	Knowledge (N=860)	Attitude (N=920)	Practice (N=593)
18-45 years	278	298	192
45-60 years	188	200	130
>60 years	394	422	271
Chi square	21.6575	44.4359	4.8674
P value	<0.00001	<0.00001	0.0877
Education	Score > 60% :Good score		
	Knowledge (N=860)	Attitude (N=920)	Practice (N=593)
Professional	417	446	287
10th pass	201	215	139
<10th pass	242	259	167
Chi square	27.0876	55.0067	5.9264
P value	<0.0001	<0.0001	0.0416

be the reason behind lesser vaccine hesitancy.

Vaccine hesitancy is a multifaceted, complex issue rooted in multiple values: particularly liberty, risk perception, and distrust.[2] We found a statistically significant association between occupation and practises regarding n –CoViD-19 among our study population. 99.95% of Doctors and 49.0% of paramedical health care workers in contrast to 72.8% of general citizens had a good practise regarding vaccination and the pandemic in general. This was in striking contrast with observations made in a research titled "Acceptance and attitudes toward COVID-19 vaccines: A cross-sectional study from Jordan'[6] which observed that employed participants (OR = 0.542, 95CI% = 0.405–0.725, p < .001) were less likely to accept COVID-19 vaccines compared to unemployed participants. It is, hence, suggested that people in all kinds of occupation should be provided with enough knowledge about n-CoViD and CoViD vaccine. This will avoid many of the misconceptions about vaccine and its safety issues and can lift the confidence of the population which will in turn reduce vaccine hesitancy and increase herd immunity.

In our study, it was found that among the 442 citizens aged > 60, only 12.7% had satisfactory knowledge and willingness about the vaccination and among the 64 citizens aged 18-45 years, 66% had satisfactory knowledge and were willing to get vaccinated. Among the 9 citizens aged between 45-60 years, 55.6% had the will to get vaccinated. This was in league with the observations made in Jordan[7] where the results of a research indicated that the older age groups (>35 years old) were less likely to

accept for COVID-19 vaccines compared to younger age groups (OR = 0.376, 95CI% = 0.233–0.607, p < .001). However, this result was in contrast to a research conducted in Europe[7] where the study subjects who were unwilling to get vaccinated tended to be younger with the largest share of 12% among the 18–24 year olds.

In our study, Out of the total 635 male study subjects, 64% had enrolled for vaccination on their self interest, in contrast with 75% of the 365 female study subjects. This was strikingly dissimilar to the study conducted in Europe,[8] where a significantly higher proportion of men were willing to get vaccinated (77.94%, Chi-squared, p<0.001) than women and also to a study conducted in the US[4] where reporting being undecided or unwilling to vaccinate was more likely among those with lower levels of education and income, females, Black (African American) and younger adults.

Public awareness campaigns tailored to specific community needs have proven most effective in raising vaccination rates for other outbreaks.[9] Hence it is suggested that people in all kinds of occupation should be provided with enough knowledge about n CoViD -19 disease and its vaccine. This will avoid many of the misconceptions about vaccine and its safety issues and can lift the confidence of the population which will in turn reduce vaccine hesitancy and increase herd immunity. This study is expected to provide useful insights to government agencies, health care workers and other authorities to mitigate the impact of vaccine hesitancy. Considerable policy efforts may be required to make the transition from making a vaccine available to adequate vaccination rates.

5. Ethical Approval

Obtained from the Institutional Ethics Committee, Mount Zion Medical College

6. Author Contributions

Conceptualization- NSN, SJ.; Formal analysis-NSN, KSSV.; Methodology-NSN, KSSV.; Visualization-NSN, SJ.; Writing—original draft-NSN, SJ; Writing—NSN;Review and editing-KSSV, SJ

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None.

8. Conflict of Interest

The authors have no conflicts of interest associated with the material presented in this paper.

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Author biography

Naveen S Nair, Associate Professor

Karavadi Sri Sai Vidusha, Associate Professor

Saad Jamal, Junior Resident

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Original Article

Effect of Coronavirus Disease 2019 Lockdown on Eating Habits and Lifestyle Behavior

Vidusha Karavadi[1], Kanumalee Pruthvi Ganesh[1], Naveen Sukumaran Nair[2], Sudhir Rao[3]

[1]Department of Community Medicine, Rajarajeswari Medical College and Hospital, Bengaluru, Karnataka, India, [2]Department of Community Medicine, Mount Zion Medical College Hospital, Pathanamthitta, Kerala, India, [3]Department of Anesthesia, MS Ramaiah Medical College, Bengaluru, Karnataka, India

Abstract

Background and Aim: The outbreak of coronavirus disease 2019 (COVID-19) affected the lives of all sections of society, as people were asked to self-quarantine in their homes to prevent the spread of the virus. The confinement and lockdown caused many lifestyle changes for Indian citizens, especially with diet and physical activity. The aim of the study was to assess the effect of COVID-19 lockdown on the dietary pattern and lifestyle behaviors in India. **Materials and Methods:** An online survey was conducted from July 2021 to September 2021 using a validated semi-structured questionnaire. The "snowball sampling" procedure was used to recruit the participants. The questions focused on changes experienced by the participants in their lifestyle before and during the lockdown. **Results:** Among the 624 study participants, the mean age was 25.81 ± 9.7 years. Nearly 71.8% (448) reported that their diet and consumption patterns changed during the lockdown. The mean body mass index before the lockdown was 24.11 ± 4.43, and after the lockdown was 23.46 ± 4.51. The change in sleep duration was reported by 494 (79.1%). **Conclusion:** These unprecedented circumstances provide an opportunity to better understand the negative impact of strict lockdown measures on lifestyles, and at the same time, help identify and initiate positive behavioral changes, which if consolidated, may improve chronic disease outcomes in the long run.

Keywords: Coronavirus disease 2019, eating habits, lifestyle, physical activity, quarantine

Introduction

The outbreak of coronavirus disease 2019 (COVID-19) has plunged the world into an unprecedented public health crisis.[1]

Various protective measures have been recommended to prevent the spread of the virus, including strict social distancing, school and university closures, home quarantine, and the use of protective measures.[2] "Lockdown" was implemented to stop virus propagation and maintain all containment precautions. However, the lockdown led to the shortage of resources and staff. This problem has had a detrimental effect on people's lifestyles. Most of us have a circadian rhythm that is disturbed by sleep disorders and eating habits.[3]

The subcontinent witnessed the second wave of coronavirus infection, which was more serious because of the high transmission and death rate when compared to the first one.[4] The first wave of COVID-19 in India was subdued during the 1st week of November 2020.[4] Lockdowns during the first wave of COVID-19 were imposed in four phases by India's Government. During the second wave of lockdown, India's Government urged the state governments to take individual measure to stop the virus in the respective states by enforcing lockdown.[5]

As a result of lockdown, a sudden, drastic change in behavior, habits, and lifestyles of the population is anticipated. Self-isolation and physical distancing have had a profound effect on the lives of citizens, affecting normal daily behavior.[6]

COVID-19 lockdown has reduced the number of hours allowed for outside physical activity, fresh food accessibility, and

Address for correspondence: Dr. Sudhir Rao, Department of Anesthesia, MS Ramaiah Medical College, M S Ramaiah Nagar, Mathikere, Bengaluru - 560 054, Karnataka, India.
E-mail: dr.sudhirsrao16@gmail.com

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previous studies have shown that elevated stress, which is expected during a pandemic, can have a severe impact on an individual's lifestyle behavior.[7] This new condition may also have an effect on maintaining a wholesome and varied diet, as well as getting daily physical activity. For instance, limiting access to daily purchases can lead to reduced consumption of fresh foods, especially fruits, vegetables, and fish, in favor of highly processed varieties, such as convenience foods, snacks, and instant cereals, which tend to be high in fat, sugar, and salt. It is widely known how experiencing negative emotions can cause overeating, so-called "emotional eating."[5] Further, emotions of boredom can arise while staying at home for a long time, often associated with overeating as a way to escape monotony.[5]

The nutrition of an individual affects the overall health and the risk of certain ailments. Food and nutrition affect the way our immune system works against infectious diseases such as influenza and the new SARS-Cov-2 virus. The initial research by a few authors discovered that self-isolation may be related to the shift in selected eating habits, including snacking or overeating. This could be due to staying at home or reduced physical activity that altered energy requirements.[8]

In addition, it has been reported that lockdown may be associated with stress and boredom as this situation plunges the world into unknown waters. Such events may be the result of a change of routine and reduced social and physical contact.[9] Studies have shown that sleep is important and vital for emotional, psychological, and mental well-being and helps to deal with stress and anxiety.[10,11]

Aside from the fact that restrictions and lockdown have their benefits in "flattening the curve," there are potential drawbacks, including limited access and availability to a variety of nutritious foods and health services, lifestyle changes, increased stress, and reduced physical activity.[12,13]

The lockdown has resulted in a vicious cycle because, in addition to stress and anxiety, it may cause excessive eating which can act as an anti-stress self-medication. This unhealthful eating behaviour may cause obesity.[14,15]

Undoubtedly, these kinds of prevailing restrictions may have been related to sleep patterns, exercise, eating dietary habits, and mental stress, leading to a deterioration in both physical and mental health among the rank and file.[16]

Lifestyle is referred to the characteristics of inhabitants of a region in special time and place. It includes day-to-day behaviors and functions of individuals in job, activities, fun, and diet.[17]

According to the WHO, 60% of related factors to individual health and quality of life are correlated to lifestyle.[18]

Today, wide changes have occurred in life of all people. Malnutrition, unhealthy diet, smoking, alcohol consuming, drug abuse, stress, etc., are the presentations of unhealthy lifestyle that they are used as dominant form of lifestyle.[17]

There were two major changes that occurred when people were quarantined and stayed home and did not practice normal life. The first change includes lifestyle is a reduction in physical activity due to restrictions on travel and sports. Homestay could have led to substantial changes in lifestyle including more sedentary lifestyle, sleeping, and smoking behavior. These changes might adversely affect health.[19]

In light of the above, this study was done to assess the effect of COVID-19 lockdown on the dietary pattern and lifestyle behaviors in India.

Materials and Methods

A cross-sectional web-based study was carried out on the general population during July 2021 to September 2021. To evaluate the effect of COVID-19 lockdown on lifestyle changes such as physical activity, diet, and sleep pattern, a pretested semi-structured questionnaire was used. An online survey was conducted after obtaining approval from the Institutional Ethical Committee (RRMCH-IEC/12/2021).

The questionnaire was created using Google forms which was circulated through e-mail and social media applications. A study invitation message along with the link to the online survey was shared among the participants who visited the urban health center in the field practice area. The snowball sampling procedure was used where we asked the participants to share the study link to their friends to increase the study participants, which proved be especially helpful during the pandemic. The study included all the participants above age of 18 years who were willing to participate in the study. Younger participants (age <18 years), duplicates, and invalid entries were excluded from the study.

The Google form was shared for a limited time window during which all the responses were considered for the study. A total of 624 people responded to the shared Google Form link.

The questionnaire had a short description of the study, its purpose, and the declaration of confidentiality and anonymity. Before completing the questionnaire, all participants provided electronic informed consent. The questions were primarily based on the changes or adjustments experienced by the participants in their lifestyle before and at some point, during the lockdown. Individuals who completed the forms and clicked "submit" at the end of the questionnaire were included in the survey.

Survey questionnaire

The questionnaire is divided into two sections: Section A which includes sociodemography of the population, followed by dietary-related questions, lifestyle changes, self-reported anthropometric data, and questions about weight change during the COVID-19 lockdown. Participants were asked about the current weight during the survey (which was considered weight after lockdown) and the weight before the lockdown. Body mass index (BMI) was calculated according to the data obtained.

Section B consists of two parts consisting of 24 items each. Part A assesses the lifestyle-related behaviors and Part B examines the changes in various lifestyle-related behaviors such as eating habits, exercise, and sleep patterns during the pandemic. The domain on eating behavior consists of questions about meal patterns, frequency, food group eating pattern, eating during stress, and consuming "high fat, salt, and sugar foods, and sugar-sweetened beverage consumption."

The part on physical activity pattern focused on the various components of activity such as exercises, engaging in domestic work, leisure activities, and screen time. Questions also included the assessment of sleep habits, daily stress levels, and addictive behaviors such as smoking and alcohol consumption.

Smoking status at the time of the survey was collected with the question: "Do you currently smoke?" with three response options: "Yes, I smoke cigarettes,/No, I do not smoke." Respondents who reported that they currently smoke cigarettes were classified as smokers. Smokers were then asked about the number of cigarettes smoked/day (for cigarette users) as well as the change of their consumption with the question: Has your smoking behaviour changed since prelockdown? There were three options for answers: "It has increased/remained the same/decreased."

Alcohol consumption was directly reported for the entire sample with the question: "Compared to prelockdown, has your alcohol consumption, including beer, wine, cider, spirits, champagne, or other types of alcohol, changed?" Four possible responses were possible: "It has increased/it has remained stable/it has decreased/I never drink alcohol."

Participants were asked if they felt more anxious and stress and were there any changes in the stress levels before and after lockdown. Section C contained questions regarding the perceived reasons for changes in lifestyle-related behaviors. Once completed, every form was transferred to the database which was downloaded as a Microsoft Excel spreadsheet.

Data analysis

The data collected were analyzed using descriptive and inferential statistics, using statistical software IBM Statistical Package for the Social Sciences (SPSS) Statistics for Windows, Version 20.0. Armonk, New York, United States IBM Corp. version 20.0 and MS Excel spreadsheet. By descriptive statistics, all data were summarized and expressed as frequency and percentage, and continuous data were expressed as mean and standard deviation. *Z*-test was used to analyze the changes in the supplement intake before and after lockdown. Chi-square test was used to analyze behavioral changes during the COVID-19 pandemic. Paired sample *t*-test was used to determine the impact of lockdown on BMI. The statistical analysis was carried out at 5% level of significance and $P < 0.05$ was considered statistically significant.

Results

A total number of 624 individuals responded to the questionnaire. Table 1 shows the socio demographic profile of study population where three hundred and seventy (40.7%) participants were females, and 254 (40.7%) of the participants were aged between 18 and 30 years. Mean age of the participants was 25.81 ± 9.7 years.

In regard to the qualification, 314 (50.4%) were graduates, 130 (20.8%) were educated till postgraduation, and 139 (22.3%) participants were married [Table 1]. Among the participants, 133 (21.31%) had chronic health problems such as diabetes mellitus, hypertension, and asthma. Out of 624 study participants, 235 (37.66%) suffered from COVID-19 in the past.

The majority of the participants, i.e., 71.8% (448) reported their diet and eating habits changed during the lockdown. Among the study participants, 298 (47.7%) reported having an increased craving for various food items. Concerning individual food groups [Figure 1], 59.1% and 71.2% of the participants expressed that there was an increase in the consumption of fruits and vegetables. There was also a decrease in the intake of soft drinks (28.8%). It is observed that egg consumption increased to 58.5% and meat and meat group to 52.2% [Figure 1].

Table 1: Sociodemographic profile of the study population (*n*=624)

Variable	Frequency (%)
Age (years)	
18–30	482 (77.2)
31–40	44 (7.1)
41–50	60 (9.6)
51–60	27 (4.3)
>61	11 (1.8)
Gender	
Male	254 (59.3)
Female	370 (40.7)
Marital status	
Single	473 (75.8)
Married	139 (22.3)
Widow/separated/divorced	12 (1.9)
Education	
Primary	78 (12.5)
High school	102 (16.3)
Graduate	314 (50.4)
Postgraduate	130 (20.8)
Residence	
Rural	52 (8.3)
Urban	112 (17.9)
Semi-urban	460 (73.7)
Employment status	
Informal sector	34 (5.4)
Formal sector	191 (30.6)
Student	374 (59.9)
Unemployed	25 (4.0)

Table 2 shows the changes in the consumption of vitamin and mineral supplements before and after lockdown. The supplements most frequently consumed were combinations of Vitamin C (46.6%), Vitamin D (33.3%), and multivitamins (35.9%). Consumption of herbal concoctions was reported by 41.5% of the study participants. Two hundred and two participants (74.8%) reported increased consumption of immunity-boosting foods [Table 2]. It was observed that, in comparison to females, significantly higher percentage of males consumed Vitamin D after lockdown as compared to before lockdown ($P < 0.0001$). Similar results were observed in females where significantly higher percentage (40.3%) of females consumed Vitamin D supplements after lockdown in comparison to before lockdown ($P < 0.00001$). Similarly, the consumption of herbal concoctions, omega-3 fatty acids, and Vitamins C showed a significant increase among both males and females after lockdown.

Table 3 shows participants' responses to questions about their physical activity levels, smoking, alcohol, and sleep habits before and after the COVID-19 lockdown. Among 624 study participants in the study, 63 had habit of smoking cigarettes among whom 40 (63.4%) individuals reported increase in smoking. Alcohol consumption was reported among 140 individuals where 81 (57.8%) reported decrease in consumption. Among 528 participants who reported to have physical activity, most of them were females (314) when compared to male (214). Increase in physical activity was reported among 223 (42.2%) participants. The majority of females (46.5%) reported increase in physical activity after lockdown when compared to males (36%). The gender difference of physical activity before and after lockdown was found to be statistically significant ($P < 0.05$). Changes in sleep duration were shown in Table 3, where among 624 participants, 494 (79.1%) reported change in sleep duration. The majority of the female participants, i.e., 304 (82.2%) have reported a change in sleep duration in comparison to males (74.8%), and the difference was statistically significant ($P < 0.05$). Daily sleep hours for <6 h were reported by 64 (10.3%) study participants. Sleep duration of more than 10 h was reported by 48 (7.7%) study participants.

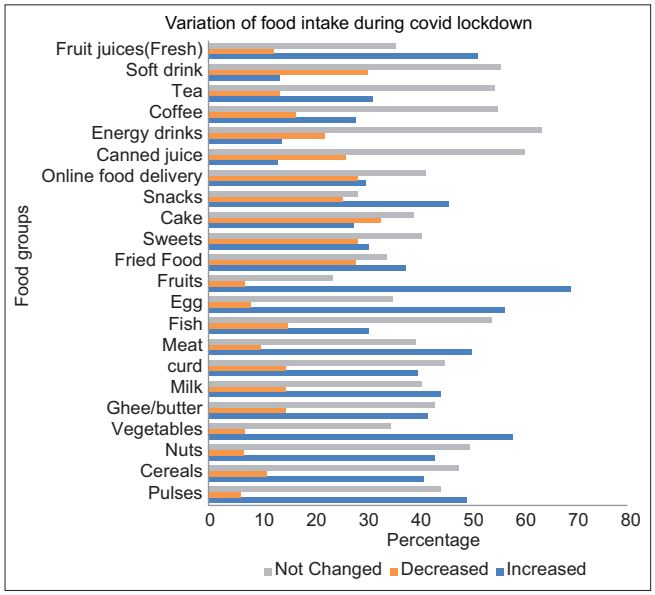

Figure 1: Effect of COVID-19 lockdown on consumption of various food groups ($n = 624$) COVID-19: Coronavirus disease 2019

Table 4 shows that the mean BMI before the lockdown was 24.15 ± 4.5 and after the lockdown was 23.51 ± 4.5 [Table 4]. The paired sample *t*-test (*t*-test value = 10.98) showed that there was a decrease in perceived body weight when comparing pre- and post-lockdown ($P < 0.001$).

Regarding the source of procurement of food products, the participants stated no change in the areas of purchase before and after lockdown; however, online purchases of food products are increased to 43.9%. Out of 624 study participants, 109 (40.4%) had fear of contracting COVID-19 infection through the food products. Among the study participants, 22.2% and 15.6% of them reported having increased stress and anxiety, and 35.2% reported consumption of junk food when they were distressed.

Discussion

During the first COVID-19 outbreak, many countries put in place preventive measures to reduce cases. Although these protective measures reduced the number of positive cases, shocking media coverage of cases and deaths, loss of jobs, and restrictions on individual freedom have adversely affected the mental, emotional well-being, negatively affected lifestyle, and eating habits of individuals.

Diet

Regarding the effects of lockdown on diet and consumption patterns, participants reported an increase in fruit and

Table 2: Changes in the supplement intake ($n = 624$)

Variable	Male				Female			
	Before(%)	After(%)	*Z*-test	*P*	Before	After	*Z*-test	*P*
Vitamin D supplements	31 (12.2)	59 (23.2)	-4.174	<0.00001	41 (11.1)	149 (40.3)	-11.080	<0.00001
Vitamin C supplements	27 (10.6)	105 (41.3)	-9.6011	<0.00001	38 (10.3)	186 (50.3)	-13.984	<0.00001
Multivitamins	34 (13.4)	76 (29.9)	-5.6633	<0.0001	64 (17.3)	148 (40.0)	-8.158	<0.00001
Omega 3 Fatty acids	6 (2.4)	34 (13.4)	-6.261	<0.00001	27 (7.3)	68 (18.4)	-5.948	<0.00001
Herbal Concoctions	15 (5.9)	48 (18.9)	-9.7989	<0.00001	18 (4.9)	130 (35.1)	-16.772	<0.00001

vegetable consumption and a decrease in cold drinks. The study also showed an insignificant increase in the macronutrient utilization; similar results have been observed in the studies conducted by Al-Saleh *et al*.[20] This could be a response to health education and clinical advice that a healthy diet and a high-fluid diet may contribute to reducing the risk of infection. However, consumption patterns among the participants from Zimbabwe[21] show different results, showing that there was a significant reduction in fruit and vegetable consumption that may be due to the procurement of food and different lockdown regulations between countries.

Recent review emphasizes that a healthy diet, which can keep the immune system strong, is important in preventing and controlling viral infections.[22] Considering that there were no effective preventive and pharmacological therapies against COVID-19 available at the time of this study, healthy eating habits are crucial and elective micronutrient supplementations (e.g., vitamins, trace elements, nutraceuticals, and probiotics) may be particularly beneficial for people at risk.[5]

Because of their apparent effect on strengthening the immune system, some studies recorded increased intake of herbal tonics, vitamins, ginger, garlic, and multivitamins among participants.[23]

Table 3: Description of behavioral changes during coronavirus disease 2019 pandemic among the study participants (*n*=624)

Variable	Frequency (%)		χ^2	*P*
	Male	Female		
Physical activity				
Increased	77 (36.0)	146 (46.5)	8.9859	0.0111
Decreased	84 (39.3)	86 (27.4)		
Same	53 (24.8)	82 (26.1)		
Smoking				
Increased	7 (17.1)	3 (13.6)	6.017	0.111
Decreased	23 (56.1)	17 (77.3)		
Same	11 (26.8)	2 (9.1)		
Alcohol				
Increased	23 (24.7)	5 (10.6)	3.9037	0.142
Decreased	51 (54.8)	30 (63.8)		
Same	19 (20.4)	12 (25.5)		
Change in sleep duration				
Yes	190 (74.8)	304 (82.2)	4.945	0.026
No	64 (25.2)	66 (17.8)		

Effect on body mass index

Weight gain may adversely affect the physical and mental well-being of individuals and their immune system. Recent research has confirmed that viral infections of COVID-19 can be very severe among obese people.[24]

A study done by Saleh *et al*.[18] found that one-third of the participants had put on weight during lockdown which could be a result of prolonged stay at home and the fact that people are more sedentary. Several other studies have reported similar results.[21,23,25] However, in the present study, data showed decrease in BMI after lockdown. This could be due to the increase in the consumption of healthy diet such as fruits and vegetables and may be slight decrease in junk food consumption. Physical activity among the participants increased during lockdown which might be the reason for weight loss.

Sleep

Regarding sleep, approximately 10.3% of respondents reported sleeping <6 h a day. Sleep deprivation was significantly higher for women than for men. Many explanations can be given, like, working from home might translate into an increased screen use which has been linked with a sedentary lifestyle, weight gain, as well as decreased and poor-quality sleep. Conflicting results were reported in the study done by Al Saleh MM *et al*.,[20] where it was observed that men did not sleep better than women. A study by Singh *et al*.[6] revealed an increase in sleep duration due to a complete decrease in work-related stress.

Stress

COVID-19 lockdown has led to increasing anxiety levels among the study participants. Many other studies[6,21,26] show similar results, suggesting that they have been psychologically affected by the COVID-19 pandemic and lockdown-related restrictions.

Smoking and alcohol consumption

A complete reduction in the frequency of smoking was observed in the participants during the lockdown. Di Renzo *et al*.[5] reported similar results in their study conducted in Italy where smoking habits were reduced during the lockdown.

The number of factors considered could account for this decrease. These include (1) no access to neighboring shops due to the closure of places and the unavailability of cigarettes due to the closure of all businesses; (2) discouragement from smoking in the company of close-knit family during extended time period of home isolation; and (3) fear of increased risk of respiratory distress and mortality from COVID-19.[6]

Table 4: Influence of lockdown on Body Mass Index (BMI) of the study participants (*n*=624)

	BMI		Standard error mean	95% Confidence Interval of the Difference		*t*-test	df	*P*
	Mean	S.D.		Lower	Upper			
Before lockdown	24.11	4.43	0.177	0.534	0.766	10.98	623	0.000
After lock down	23.46	4.51	0.180					

S.D.=Standard Deviation. df=degrees of freedom. "*P*"<0.05 indicates significance. BMI=Body Mass Index

Alcohol consumption decreased before and during the lockdown. Some studies reported in the literature support our findings[19,21] and others do not.[14,27-30]

The limitation of this study was unequal participation from geographical areas, age group, and occupational groups as well as the self-reported questionnaire, which could lead to poor data reporting. Due to the unequal participation of age and occupational group, this study cannot be representing the general population.

Therefore, further research is needed to confirm these effects on the large number of participants and the equal participation of cities and age groups. Particularly, the pandemic is ongoing and still influencing communities.

Conclusion

This study focused on the effect of COVID-19 lockdowns had on dietary changes and lifestyle among participants. The current analysis identified that, after lockdown, there was an increase in the consumption of fruits and vegetables. There was a significant increase in meat and decrease in the intake of soft drinks. The majority of the participants reported increased consumption of immunity-boosting foods. Smoking and alcohol consumption decreased, whereas physical activity among the individuals increased. This increase in physical activity was seen more among females. The study reported a decrease in BMI after lockdown. Individuals should be encouraged to continue practicing healthy behaviors. Regular assessments of these behaviors need to be conducted. Health awareness and messages need to be conveyed to the population that value the importance of following healthy dietary patterns, lifestyle, adequate physical activity whenever possible, and promoting resilience at the individual and group level.

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Conflicts of interest

There are no conflicts of interest.

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Research Article

A CROSS SECTIONAL STUDY ON THE PREVALENCE AND PATTERNS OF COVID 19 BREAKTHROUGH INFECTION AMONG PATIENTS ATTENDING A TERTIARY CARE CENTRE IN CENTRAL KERALA

*[1] Naveen Sukumaran Nair[1], Akhil George[2], Meenu Vijay[2], Aksah Johnson[2], Aswin R[2]

[1]- Associate professor, Mount Zion Medical College

[2] – Resident Intern, Mount Zion Medical College

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ABSTRACT

COVID-19 is an infectious disease caused by the SARS-CoV-2 virus. CoViD 19 breakthrough infection is defined as the detection of SARS –CoV 2 RNA or antigen in a respiratory specimen from a person more than or equal to 14 days after they have completed a recommended doses of an authorized CoViD-19 vaccine. Causes of breakthrough infections include biological factors in the recipient, improper administration or storage of vaccines, mutations in viruses and blocking antibodies.There are very few studies conducted all over the country to evaluate the prevalence of breakthrough infections in the country. Hence, this study aimed at finding out the prevalence of breakthrough infection among CoViD 19 positive patients and the factors which determine its occurrence.

INTRODUCTION

COVID-19 is an infectious disease caused by the SARS-CoV-2 virus. Most people infected with the virus will experience mild to moderate respiratory illness and recover without requiring special treatment.

CoViD 19 breakthrough infections is defined as the detection of SARS –CoV 2 RNA or antigen in a respiratory specimen from a person more than or equal to 14 days after they have completed a recommended doses of an authorized CoViD-19 vaccine.

Causes of breakthrough infections include biological factors in the recipient , improper administration or storage of vaccines, mutations in viruses and blocking antibodies. In India, the COVID-19 vaccination campaigns were originally conducted using the ChAdOx1nCoV-19 vaccine (popularly known in India as Covishield) and BBB-152 (Covaxin) [1].

The vaccine effectiveness against hospitalization due to COVID-19 from day 22, after the first dose was 100%. Current data regarding the efficacy and the immunogenicity of the vaccine against the SARS-CoV-2 and the emerging variants propounds an overall efficacy of more than 65% in the majority of the studies [2-4].

World Health Organization has published standard interim guidelines for evaluating the effectiveness of COVID-19 vaccines [5]. According to the Ministry of Health and Family Welfare and ICMR, the breakthrough infection rates with the ChAdOx1 nCoV-19 vaccine were limited to 0.02% - 0.04% [6].

There are very few studies conducted all over the country to evaluate the prevalence of breakthrough infections in the country. Hence, this study aims at finding out the prevalence of breakthrough infection among CoViD 19 positive patients and the factors which determine its occurrence.

METHODOLOGY

STUDY DESIGN

A cross sectional study among CoViD 19 patients admitted in a tertiary care center in Central Kerala.

STUDY PARTICIPANTS

All patients having received two doses of an ICMR approved CoViD-19 vaccination and tested positive for novel Corona Virus disease.

Inclusion criteria

1) All patients having proof of being administered with two doses of ICMR approved CoViD-19 vaccination and diagnosed as CoViD-19 positive.

Exclusion criteria:

A study subject shall be excluded from the study if:

a. They received a COVID-19 vaccine that is not authorized or approved by ICMR.
b. The specimen that was positive for SARS-CoV-2 RNA or antigen was collected <14 days
after completing the primary series of vaccination.
c. He/ She is not available after 3 attempts to contact
d. He/she doesn't give consent for the study.

*Corresponding author: **Dr. Naveen Sukumaran Nair**
Associate professor
Dept of Community Medicine, Mount Zion Medical College
Email : dr.naveennair@ymail.com

SAMPLING METHOD:

Simple Random Sampling

SAMPLE SIZE:

Taking an expected prevalence of 40.6 (according to technical report published by Govt. of Kerala in the year 2021)[23], Sample size was calculated using the formula, $n= 4pq \div L^2$. A total of 260 study subjects were interviewed.

STUDY TOOL:

A pretested, semi structured questionnaire will be given to the participants/caregivers and responses recorded through a one to one telephonic or personal interview technique.

RESULTS:

Among the 300 people interviewed, 252 were admitted to the ward, out of which 66 (26.19%) were of 60 and above age group and 4 (1.5%) were in the age group of 11-19. There was a statistically significant association between age group and type of admission.

Out of the 300 study subjects, 278 have shown to recover completely from the disease. The association between age and outcome of the disease was found to be statistically significant.

71.6% of the total 300 people interviewed received full course of vaccination, 22.6% were partially vaccinated and 5.6% did not receive any dose of the vaccine. 32.09% of those who got completely vaccinated were of the 60 and above age group.

Table No. 1- Socio-demographic details of study subjects

Age Group In completed years		**Frequency**	**Percent**
11-19		4	01.3 %
20-29		21	07.0 %
30-39		58	19.3 %
40-49		57	19.0 %
50-59		57	19.0 %
≥60		103	34.3 %
Gender		**Frequency**	**Percent**
MALE		155	51.5 %
FEMALE		145	48.5 %
Type of Vaccine		**Frequency**	**Percent**
Covishield		17	05.6 %
Covaxin		279	92.7 %
Others		4	01.6 %
Site of Admission		**Frequency**	**Percent**
Ward		252	84.0 %
ICU		26	08.7 %
On Ventilator		22	07.3%
Outcome of disease		**Frequency**	**Percent**
Death	Vaccinated	18	06.0%
	Not vaccinated	4	01.3%
Cured	Vaccinated	265	88.3%
	Not vaccinated	13	04.3%
Total		**300**	**100.0%**

Among the female patients ,141 (96%) recovered from the disease in contrast to 137 (89.5%) male subjects who recovered from the disease. There was a statistically significant association between gender and outcome of the disease.

The death rate among Covid-19 patients who participated in the study was only 7%. Out of the 278 study subjects who were declared cured at the end of treatment 199 were fully vaccinated. This association between vaccine dose and Covid-19 infection was found to be statistically significant.

TABLE 2 - Association between age & type of IP admission

Age group (in years)	Type of admission			Total
	Ward	ICU	Ventilator	
11-19	4(1.5%)	0(0%)	0(0%)	4(1.3%)
20-29	21(8.3%)	0(0%)	0(0%)	21 (7%)
30-39	55(21.8%)	1(3.8%)	1(4.5%)	57(19%)
40-49	53(21.03%)	2(7.7%)	2(9.1%)	57(19%)
50-59	53(21.03%)	2(7.7%)	2(9.1%)	57(19%)
≥60	66(26.19%)	21(80.7%)	17(77.2%)	104(34.7%)
Total	252(100%)	26(100%)	22(100%)	300(100%)

$\chi 2$ value 51.606 df – 10 $p<0.05$

Out of the 300 study subjects interviewed, 22 (7%) succumbed to the disease. Among the 22 people who died of Covid-19 Infection 20 (91 %) had reported with breathing difficulty as a major symptom.

This association between breathing difficulty and outcome of Covid-19 infection was found to be statistically significant.

TABLE 3- Association between age and Outcome of the disease

Age group (in years)		Outcome		Total
		Death	Better	
	11-19	0(0%)	4 (1.4%)	4(1.3%)
	20-29	0(0%)	21(7.5%)	21(7 %)
	30-39	0(0%)	57(20.5%)	57(19%)
	40-49	0(0%)	57(20.5%)	57(19%)
	50-59	2(9.1%)	55(19.7%)	57(19%)
	≥60	20(90.9%)	84(30.2%)	104(34.7%)
Total		22 (100%)	278 (100%)	300 (100%)

$\chi 2$ value 34.25 df – 5 $p<0.05$

Out of the 300 subjects interviewed, 215 were completely vaccinated, out of which 173 (80.5%) were admitted to the ward , 26 (12.1%) were admitted to the ICU and only 16(7.4%) required ventilator support. In contrast , among the 17 unvaccinated subjects, 3 (17.7%) required ventilator support. Hence the association between vaccination status and type of admission is statistically significant.

TABLE 4 - Association between age and vaccination status

Age group (in years)	Vaccine Doses Taken			Total
	0 dose	1 dose	2 dose	
11-19	3	1	0	4(1.3%)
20-29	0	8	13	21(7%)
30-39	3	11	43	57(19%)
40-49	2	10	45	57(19%)
50-59	0	13	44	57(19%)
≥60	9	25	70	103(34.7%)
Total	17 (5.6%)	68 (22.67%)	215 (71.7%)	300 (100%)

$\chi 2$ value 48.171 df – 10 p <0.05

TABLE 5 - Association between gender and outcome of the disease

Gender	Outcome		Total
	Death	Better	
Male	16 (10.5%)	137 (89.5%)	153 (100%)
Female	6 (4.0%)	141 (96.0%)	147 (100%)
Total	22 (7.4%)	278 (92.6%)	300 (100%)

$\chi 2$ value 4.416 df – 1 p<0.05

TABLE 6- Association Between Vaccination status and Outcome of the Disease

Vaccine Doses	Outcome		Total
	Death	Better	
0 dose	4 (18.2%)	13 (04.7%)	17 (05.6 %)
1 dose	2 (09.1%)	66 (23.7%)	68 (22.67%)
2 dose	16 (72.7%)	199 (71.6%)	215 (71.67%)
Total	22 (100.0%)	278 (100.0%)	300 (100.0%)

$\chi 2$ value 8.473 df – 2 p < 0.05

TABLE 7- Association between Breathing difficulty and Outcome of the disease

Breathing Difficulty	Outcome		Total
	Death	Better	
Yes	20 (91%)	277 (99.6%)	297(99.0%)
No	02 (9%)	01 (0.4%)	03(1.0%)
Total	22 (100%)	278(100%)	300 (100.0%)

$\chi 2$ value 15.638 df – 1 p < 0.05

Out of the 300 study subjects interviewed, 22 (7%) succumbed to the disease. Among the 22 people who died of Covid-19 Infection 20 (91 %) had reported with breathing difficulty as a major symptom. This association between breathing difficulty and outcome of Covid-19 infection was found to be statistically significant.

TABLE 8 -Association between type of IP admission and vaccination status

Vaccination status	Type of admission			Total
	Ward	ICU	Ventilator	
0 Dose	14 (82.3%)	0 (0%)	3(17.7%)	17 (100%)
1 Dose	65 (95.6%)	0(0%)	3(4.4%)	68 (100%)
2 Dose	173(80.5%)	26(12.1%)	16 (7.4%)	215 (100%)
Total	252 (84%)	26 (8.67%)	22 (7.3%)	300 (100%)

$\chi 2$ value 14.95 p < 0.05

DISCUSSION

The mean age of the study participants in our study was 50 years. This was comparable to the mean age of study participants in a study conducted by Tyagi K, Ghosh A, Nair D, Dutta K, Bhandari PS, Ansari I A, Misra A where the mean age was 42 years[15] . However, the mean age of the study participants was contrasting to that observed in a study conducted on Breakthrough infection with SARSCoV-2 and its predictors among health care workers in a medical college and hospital Complex in Delhi, India where the mean age was 29.1 years [9] and Breakthrough Infections among the Healthcare Workers Post-Vaccination With ChAdOx1nCoV-19 Vaccine in the South Indian State of Kerala where the mean age was 34.09 years [20].

The total participants in our study was 300 this was comparable to the participants in the study conducted by Sharma P, Mishra S, Basu S, Tanwar N, Kumar R where the total participants were 325[9] and Tyagi K, Ghosh A, Nair D, Dutta K, Bhandari P S, Ansari IA, MisraA where the total participants were 123 [15] and AleenaIssac, Jose J Kochuparambil, Linu Elizabeth. SARS-CoV-2 where the total participants were 324 [20]. However the total participants in the study was contrasting to that observed in the study conducted on COVISHIELD (AZD1222) Vaccine Effectiveness among health care and frontline Workers of Indian Armed Forces where the participants were 1.59 million [12] and Vaishya R, Sibal A, Malani A, Hari Prasad K on SARS-CoV-2 infection after COVID-19 immunization in health care workers where the participants were 3235 [21]

The total percentage of females who participated in our study was 49 % . This was comparable to the total percentage of females participating in the study conducted on Breakthrough COVID19 infections after vaccinationin health care and other workers in a chronic care Medical facility in NewDelhi, India.

Diabetes & Metabolic Syndrome with 39.02% female participants [ref15] and study on Washington state breakthrough cases with 53.7% female participants[ref 24] , in contrast to the study conducted on Breakthrough infection with SARSCoV-2 and its predictors among health care workers in a medical college and hospitalComplex in Delhi, India where the female participants constituted 35.07% [ref 9] and Breakthrough Infections among the Healthcare Workers Post-Vaccination With ChAdOx1nCoV-19 Vaccine in the South Indian State of Kerala with 83% female participants [ref 20]

The total percentage of male participants in our study was 51% % . This was comparable to the total percentage of males participating in the study conducted by Tyagi K, Ghosh A, Nair D, Dutta K, Bhandari P S, Ansari IA, MisraA on where males made 61% [ref 15] and study on washington state breakthrough cases with 44 % male participants [ref 24] in contrast to the study conducted by SharmaP, MishraS, BasuS, Tanwar N, Kumar R on Breakthrough infection with SARSCoV-2 and its predictors among health care workers in a medical college and hospitalComplex in Delhi, India with 65 % male participants [ref 9] and AleenaIssac, Jose J Kochuparambil, Linu Elizabeth where males were 17 % [ref 20].

The total percentage of breakthrough cases in our study was 71.67% . This was in striking contrast to the total Percentage of breakthrough cases in the study conducted by Sharma P, Mishra S, Basu S, Tanwar N, Kumar R on Breakthrough infection with SARSCoV-2 and its predictors among health care workers in a medical college and hospital Complex in Delhi, India with only 11.4% breakthrough cases [9], Cucunawangsih C, Wijaya R S, Lugito N P, Suriapranata I.

CONCLUSION

The prevalence of breakthrough infection in our study is 71.6**%.**

The factors that affected vaccination status of our subjects were Age , gender ,symptom status, occurrence of fever ,Whereas the contributory Factors to the prognosis of the disease among breakthrough infection include Vaccination status, breathing difficulty, symptomatic status and age,

Mortality among breakthrough infections as per our study was 7.1% which was comparable to statistics nationwide and worldwide. Our results are in line with the WHO findings that the vaccination will significantly reduce the morbidity and mortality among Covid-19 patients

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