Explore smoking cessation effects on workplace health promotion

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ABSTRACT

This study is based on the National Tobacco Control Programme (NTCP) and aims to improve the health-related knowledge, attitude, and behavior of tobacco users. Hence, this study is being conducted to evaluate the effectiveness of health education in improving the knowledge, attitude, and behavior of tobacco users regarding the ill effects of tobacco. The study was conducted for a period of 6 months from Dec 2018 to June 2019 among the supporting staff of Rajya Vokkaligara Sangha (RVS) with the habit of smoking. We included study subjects who had a habit of smoking. The patient's demographic data and test results were recorded in a well-designed data collection form which included the study subject's name, age in years, sex, telephone number, and address. Study Instruments included the Fagerstrom Nicotine Dependence Scale (FTND) and Hematology Analyzer. Collected data were entered into a Microsoft Excel sheet and analyzed using Microsoft Excel versions. A total of sixty-one subjects were included in the study among which 31 were smokers and 30 were non-smokers. Our study proves that there is a significant increase in the PEFR level from the first to third follow-up. Hematological parameters like Hb, RBC, PCV, and MCHC levels were significantly increased in smokers when compared to nonsmokers. Provide information on employer-provided and publicly available tobacco cessation services to all employees and other workers at the work site, and offer and promote comprehensive tobacco cessation support to all the tobacco-using staff, and where feasible, to their dependents. In conclusion, a healthier workforce can be a safer workforce, and a safer workforce can be a healthier workforce.

Keywords: *Smoking, Pharmacist Role, Health Promotion, Tobacco Users.*

INTRODUCTION

Smoking is the act of inhaling and exhaling the fumes of burning tobacco that may occur occasionally or habitually as a consequence of physical addiction to some chemicals, primarily nicotine (1), including marijuana and hashish (2), but the act is most commonly associated with tobacco as smoked in a cigarette, cigar, or pipe. Tobacco contains nicotine, an alkaloid that is addictive and can have both stimulating and tranquilizing psychoactive effects (2).

Worldwide about 5 million people die each year from tobacco consumption, the second leading cause of death worldwide. In India, according to The Global Adult Tobacco Survey (GATS) is a global standard for systematically monitoring adult tobacco use (smoking and smokeless) and tracking key tobacco control indicators. GATS is a nationally representative survey, using a consistent and standard protocol across countries including India. GATS enhances countries' capacity to design, implement, and evaluate tobacco control programs. It will also assist countries in fulfilling their obligations under the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC) to generate comparable data within and across countries (3). To assist countries in meeting the WHO FCTC requirements, who introduced the empower, the package of selected demand reduction measures contained in the WHO FCTCP: M- Monitor tobacco use and prevention policies; P- Protect people from tobacco smoke; O-Offer help to quit tobacco use; W- Warn about the dangers of tobacco; E- Enforce bans on tobacco advertising, promotion and sponsorship; R-Raises taxes on tobacco (3).

Cigarette smoking is addictive because of nicotine and nicotine withdrawal causes many side effects of quitting smoking as well as nicotine itself usually increases cardiovascular risk. Smoking must be defined as chemical toxicities that can cause detrimental effects either acute or chronic type on different structures of the body some as the cardiovascular system, respiratory system, and epithelial glands target organs. Smoking also causes physical addiction, primarily due to nicotine, which adversely influences smoking cessation (1).

Smoking can lead to a variety of ongoing complications in the body, as well as long-term effects on your body

systems. While smoking can increase the risk of a variety of problems over several years, some of the bodily effects are immediate. Effects on different systems are as follows: Central nervous system (4, 5), effects of smoking on the respiratory system (6), cardiovascular system (4, 6), integumentary system (skin, hair, and nails) (4), digestive system (6), sexuality and reproductive system (4, 7), Cancer (2), Effects on pregnancy (2), etc.

Tobacco smoking in the workplace threatens health and well-being but also leads to decreased productivity, increased absenteeism, and workplace maintenance costs (8). Provide information on tobacco-related health risks and on the benefits of quitting to all employees and other workers at the work site. Provide employer information- provided and publicly available tobacco cessation services to all employees and other workers at the work site, offer and promote comprehensive tobacco cessation support to all the tobacco-using workers and, where feasible, to their dependents. Provide employer-sponsored cessation programs at no cost or subsidize cessation programs for lower-wage workers to enhance the likelihood of their participation (9).

This study is based on the National Tobacco Control Programme (NTCP) and aims to improve the health-related knowledge, attitude, and behavior of tobacco users. Hence, this study is being conducted to evaluate the effectiveness of health education in improving the knowledge, attitude, and behavior of tobacco users regarding the ill effects of tobacco.

MATERIALS AND METHODS

Study Site

The study was conducted among the supporting staff of Rajya Vokkaligara Sangha (RVS), Bengaluru.

Study Design

A Prospective observational study was conducted among the supporting staff of RVS with the habit of smoking.

Study Period

The study was conducted for a period of 6 months from Dec 2018 to June 2019.

Ethical Clearance

The complete study was carried out according to the permission granted by the Institutional Ethical Committee of Visveswarapura Institute of Pharmaceutical Sciences, Rajya Vokkaligara Sangha (RVS), Bengaluru.

Source of Data

1. *Information was obtained from the participant's interviews and also from their past medication history.*
2. *By measuring the study population's*
    - *Nicotine dependence by Fagerstrom test.*
    - *Tobacco control by WHO questionnaires.*

Study Criteria

Inclusion Criteria

1. *Supporting staff who are above 20 years of age.*
2. *Supporting staff who are smokers*
3. *Supporting staff with co-morbid conditions like Hypertension and type II Diabetes Mellitus.*

Exclusion Criteria

1. *Supporting staff who are unable to comprehend the health education provided i.e., visually impaired, auditory impaired, mentally challenged.*
2. *Supporting staff who are not willing to participate in this study by signing the informed consent.*

Methods and Materials Used for Collection of Data

We have followed WHO standard operating procedures for the academic project workplace health Promotion among the supporting staff of Rajya Vokkaligara Sangha, Bangalore, with a habit of smoking. A prospective, observational study was conducted. All the study subjects were the supporting staff of Rajya Vokkaligara sangha and were included based on the inclusion and exclusion criteria who signed the informed consent form and nonsmokers who volunteered to enroll themselves in the study were included and considered as a control group.

We included study subjects who had a habit of smoking. The patient's demographic data and test results were recorded in a well-designed data collection form which included the study subject's name, age in years, sex, telephone number, and address. Past medical history of various co-morbid conditions with the past medication history is taken. Their social habits were taken into consideration and the number of cigarettes they smoked/day was also recorded. The WHO questionnaire was used to assess their level of tobacco control. The Nicotine Dependence was also assessed using the Fagerstrom Nicotine Dependence scale.

The blood sample was drawn to assess Complete Blood count (CBC) values in the study subjects and non-smokers. Before drawing blood, the area from where the blood sample is withdrawn is made sterile using a cotton swab dipped in alcohol. A sterile atmosphere was upheld while withdrawing blood from each individual

respectively and the was analyzed for CBC at a Good Clinical Practice (GCP) certified Lab with Heamoautoanalyser (Lablife). A Mini Wright's Peak flow meter with disposable mouthpieces was used to assess the Peak Expiratory flow rate measure (PEFR) among the study subjects as well as non-smokers.
Smokers have explained the ill- -effects of smoking, complications, and lifestyle modifications that are essential for the improvement of their health status through PowerPoint presentations. The awareness about smoking cessation was done in the local/native language (Kannada) for their better understanding.
In the second follow-up awareness about smoking cessation was given using visual PowerPoint presentations keeping the Ill- effects of smoking, lifestyle changes to be made, and their work schedule into consideration. Study subjects were further evaluated for influence on the awareness created of participants' smoking behavior and improvement in their health at the workplace.

Study Instrument

Fagerstrom Nicotine Dependence Scale (FTND)

A Standard Nicotine Dependence scale called the Fagerstrom Nicotine Dependence scale (FTND) was given to the study participant, which was in both languages i.e. English as well as in the native/local language – Kannada, which has to be answered by the study participant. Permission was taken to use the FAGERSTROM NICOTINE DEPENDENCE SCALE in our study. This scale was used to assess the intensity of physical addiction to nicotine. The test was designed to provide an ordinal measure of nicotine dependence related to cigarette smoking. It contains six items that evaluate the quantity of cigarette consumption, the compulsion to use, and dependence.
In scoring the Fagerstrom Test for Nicotine Dependence, yes/no items are scored from 0 to 1 and multiple-choice items are scored from 0 to 3. The items are summed to yield a total score of 0-10. The higher the total Fagerström score, the more intense the patient's physical dependence on nicotine. In the clinic, the Fagerström test may be used by the physician to document indications for prescribing medication for nicotine withdrawal.
The Fagerstrom Tolerance Questionnaire was developed by Karl-OlovFagerström. This instrument was modified to the Fagerstrom Test for Nicotine Dependence by Todd Heatherton, et al. in 1991. The FTND is copyrighted by Taylor and Francis Ltd. but may be reproduced without permission, as available from the source reference (10).
Fagerstrom's Nicotine dependence score of 1-2 indicates low dependence, 3-4 low to moderate dependence, and 5-7 moderate dependence.

Hematology Analyzer

The hematology analyzers are being used predominantly for cell counts and differential leukocyte analysis, but in addition, these analyzers are capable of reporting many additional parameters and can provide much more information. CBC can be analyzed using Auto analyzers.
The study subjects were followed up on the 3rd, 6th, and 9th week of the study period. During the 3rd week of the study, a blood sample was drawn with the measurement of PEFR. During the second follow-up, the presentation was done on the Ill effects of smoking and it was digitally displayed to the study populations for the reason that pictorial representations will have a greater impact on participants and assist them in stopping smoking, PEFR was also recorded. Finally, at the end of the study during the 9th week, PEFR reading was taken for final assessment.

Statistical Analysis

Collected data were entered into a Microsoft Excel sheet and analyzed using Microsoft Excel versions. Mean and standard deviation were applied for quantitative data. Proportions were used to calculate categorical data and frequency distributions. An Independent t-test was used to compare differences in means of Hematological parameters, and PEFR among smokers and non-smokers. Analysis of Variance (ANOVA) was used to compare means of PEFR in different age groups among the groups.

RESULTS

A total of sixty-one subjects were included in the study among which 31 were smokers and 30 were non-smokers. Hematological and peak expiratory flow rate tests were done in 31 male smokers and compared with 30 male non-smokers and were analyzed for the results.

Table 1. Distribution of study subjects based on age in smokers.

AGE range (years)	No. of smokers (n = 31)	Percentage (%)
19-28	2	6.45
29-38	6	19.35
39-48	13	41.93

49-58	10	32.25
Total	31	99.98

Smokers were distributed based on their age as shown in Table 1. They were categorized into four different groups, two (6.45%) of the study subjects were under the age range of 19-28 years, six (19.35%) of them were under the age range of 29-38 years, the maximum subjects percentage i.e. 41.94% (13) of them were under the age group of 39-48 years and 32.26% (10) were under the age range of 49-58 years.

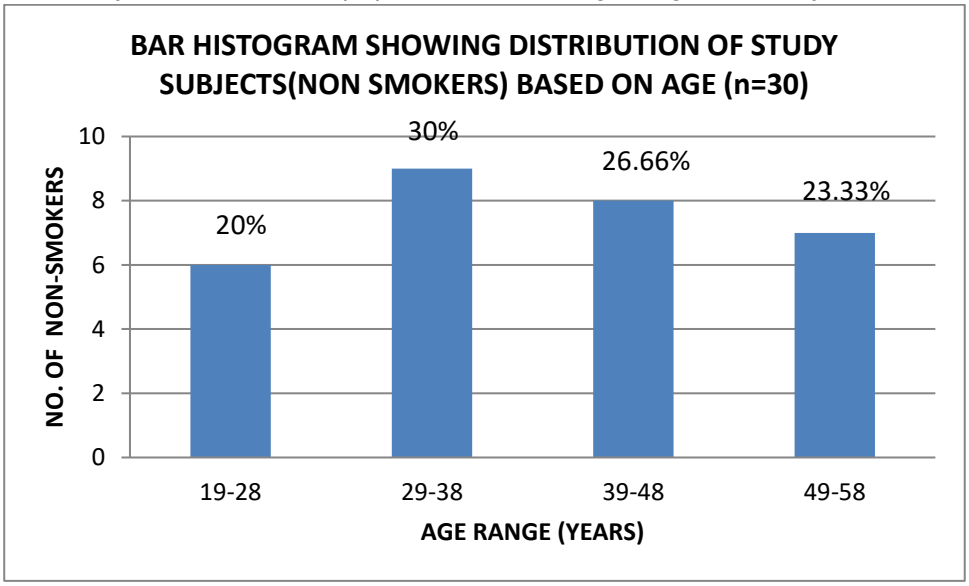

Figure 1. Bar histogram showing the distribution of study subjects based on age in nonsmokers.

Study Subjects of nonsmokers were distributed based on their age as shown in Figure 1. They were categorized into four different groups, six (20%) were under the age range of 19-28 years, nine (30%) were under the age range of 29-38 years, eight (26.66%) study subjects were under the age group of 39-48 years and, seven (23.33%) of were under the age sector of 49-58 years.

Based on the results of the study subjects of smokers were distributed based on their educational status, they were categorized into 4 different groups, out of which seven (22.58 %) of them were educated between 6^{th}-9^{th} standard, 20 (64.51 %) were educated with 10-12^{th} standard. Two (6.45 %) completed their graduation, other two (6.45%) had no education.

The nonsmokers were distributed based on their educational status. They were categorized into 4 groups, out of which six (20 %) of them were educated between 6^{th}-9^{th} standards and 17 (56.66%) study subjects were educated between 10-12^{th} standards. Study subjects who completed their graduation were four (13.33 %) and who had no education were three (10%) of the total population.

Smokers were distributed based on their habit of alcohol consumption and were categorized into two groups, 21 (67.74%) were under the group of alcoholic and 12 (32.25%) were under the group of nonalcoholic.

Non–smokers were distributed based on their habit of alcohol consumption and were categorized into two groups, 16 (53.33%) were under the group of alcoholic and 14 (46.67%) were under the group of nonalcoholic.

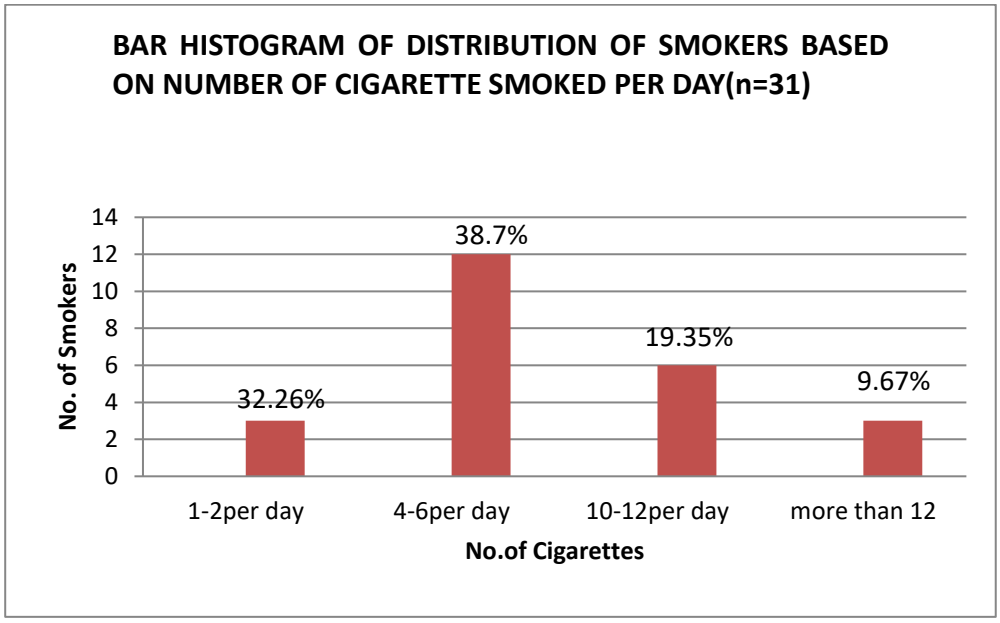

Figure 2. Bar histogram showing the distribution of study subjects based on the number of cigarettes smoked per day.

Smokers were distributed based on the number of cigarettes smoked per day as shown in Figure 2, and they were categorized into four different groups, 10 (32.26%) who smoked 1-2 cigarettes per day, 12 (38.70%) who smoked 4-6 cigarette per day, six (19.36%) who smoked 10-12 cigarette per day and three (9.68%) who smoked more than 12 cigarette per day of the total population.

*All Haematological parameters like Hb, RBC, PCV, and MCHC are significantly increased among smokers compared to nonsmokers and were found to be statistically significant with (p<0.001**, 0.001**, <0.001**, 0.052). There were no significant differences observed in mean Hematological parameters of TC, Platelets, MCV, and MCH among smokers when compared with non-smokers.*

Table 2. Comparison of PEFR between smokers and non-smokers.

PEFR	Smokers Mean ± SD (n = 31)	Non-Smokers Mean ± SD (n = 30)	t-Value	P Value
Follow up 1 PEFR	369.00±80.31	469.33±64.7	5.529	<0.001
Follow up 2 PEFR	373.67±78.49	469.33±64.7	5.082	<0.001
Follow up 3 PEFR	376.00±80.58	469.33±64.7	4.947	<0.001

During the first follow-up, the mean PEFR values were significantly different in smokers when compared with non-smokers (p< 0.001). During the second follow-up, the mean PEFR values were significantly different in smokers when compared with non-smokers (p< 0.001). During the third follow-up, the mean PEFR values were significantly different in smokers when compared with non-smokers (p< 0.001). The increased PEFR values in nonsmokers are significant as shown in Table 2.

Table 3. Comparison of PEFR in different age subgroups between smokers and non-smokers.

		Smokers			Non-Smokers			t Value	P Value
Group	Age	N1	Mean PEFR	Std. Deviation	N2	Mean PEFR	Std. Deviatio		

							n		
Follow up 1 PEFR	19-28 Years	2	390.00	183.848	2	425	77.782	0.602	0.655
	29-38 Years	6	445.00	63.797	6	460	100.797	0.308	0.766
	39-48 Years	13	365.38	59.614	12	480	59.848	4.794	<0.001
	49 – 58 Years	10	325.00	65.532	10	471	49.696	5.614	<0.001
Follow up 2 PEFR	19-28 Years	2	375.00	176.777	2	425	77.78	0.382	0.767
	29-38 Years	6	441.67	62.743	6	460	100.79	0.378	0.715
	39-48 Years	13	369.23	65.273	12	480	59.848	4.410	<0.001
	49 -58 Years	10	341.00	74.603	10	471	46.696	4.682	<0.001
Follow up 3PEFR	19-28 Years	2	390.00	183.848	2	425	77.78	0.248	0.845
	29-38 Years	6	436.67	55.377	6	460	100.79	0.497	0.636
	39-48 Years	13	381.54	71.732	12	480	59.848	3.737	0.001
	49 -58 Years	10	332.00	67.132	10	471	46.696	5.375	<0.001

**N1= No. Of Smokers, N2= No. Of Non-smokers*

PEFR levels are compared between smokers and non-smokers in different age groups, which reveals that the mean PEFR levels in Follow-up 1 were significantly different in the 39-48 years of age group with t value = 4.794 and p-value <0.001 and in 49 – 58 Years of age group with t value=5.614 and p-value <0.001. PEFR levels are compared between smokers and non-smokers in different age groups, which reveals that the mean PEFR Levels in Follow-up 2 were significantly different in the 39-48 years of age group with t value=4.410 and p-value <0.001 and in 49-58 Years of age group with t value=4.682 and p-value <0.001.

PEFR levels are compared between smokers and non-smokers in different age groups revealing that the mean PEFR levels in Follow-up 3 were significantly different in the 39-48 years age group with the t value=3.737 and p value =0.001 and in 49- 58 Years of age group with t value=5.375 and p value <0.001 as shown in Table 3.

Table 4. Comparison of PEFR in different educational status subgroups between smokers and non-smokers.

Educational Status	**Group**	**Follow up 1 PEFR Mean ± SD**	**Follow up 2 PEFR Mean ± SD**	**Follow up 3PEFR Mean ± SD**

6th -9th standard	Smokers	294.29±39.52	301.43±38.91	318.57±46.34
	Non-Smokers	336.67±85.48	345.00±79.44	346.67±83.11
		t= 1.116, P=0.301	t= 1.223, P=0.260	t= 0.736, P=0.482
10th -12th standard	Smokers	395.79±73.58	401.05±74.30	402.11±78.56
	Non-Smokers	372.35±87.36	377.06±85.71	384.12±85.08
		t= 0.865, P=0.393	t= 0.892, P=0378.	t=0.656, P=0.515.
Degree	Smokers	455.00±7.07	450.00±42.43	430.00±28.28
	Non-Smokers	395.00±42.03	392.50±42.72	387.50±45.73
		t= 2.777, P=0.069.	t= 1.561, P=0.259	t= 1.440, P=0.247.
no education	Smokers	290.00±14.14	290.00±14.14	275.00±35.35
	Non-Smokers	353.33±50.33	360.00±85.44	356.67±97.12
		t= 2.061, P=0.175.	t= 1.391, P=0.299.	t= 1.330, P=0.275.
	comparison between education groups	F=4.373	F=3.832	F=3.193
	Significance	P=0.008**	P=0.014**	P=0.030**

*During the first follow-up, the mean PEFR value was compared with educational status which was significantly different between smokers when compared to non-smokers with an F value of 4.373 and p= 0.008**. During the second follow-up, the mean PEFR value was compared with educational status which was significantly different between smokers when compared to non-smokers with an F value of 3.832 and p= 0.014**. During the third follow-up, the mean PEFR value was compared with educational status which was significantly different between smokers when compared to non-smokers with an F value of 3.193 and p= 0.030**. Whereas comparison of PEFR levels in follow-up 1, 2, and 3 between smokers and non-smokers in all education groups except for the Degree holders was found to be significant as shown in Table 4.*

Table 5. Correlation between years of smoking and PEFR.

Smoking years v/s Follow-up PEFR	Pearson Correlation Coefficient	Significance
Smoking years v/s Follow-up 1 PEFR	-0.510	0.003**
Smoking years v/s Follow-up 2 PEFR	-0.465	0.008**
Smoking years v/s Follow-up 3 PEFR	-0.439	0.013**

Reduction in PEFR levels was proportional to the increased number of cigarette smoking years. The correlation between PEFR levels during follow-ups 1, 2, and 3 was significant and negatively correlated (Table 5).

Table 6. Correlation between pack-years and PEFR.

Pack years v/s Follow-up PEFR value	**Pearson Correlation Coefficient**	**Significance**

Pack years v/s Follow up 1 PEFR value	-0.225	0.233
Pack years v/s Follow up 2 PEFR value	-0.234	0.213
Pack years v/s Follow up 3 PEFR value	-0.195	0.301

Pack years do not show any significant correlation with PEFR levels during Follow-ups 1, 2, and 3 (Table 6).

Table 7. Proportion of Fagerstorm nicotine dependence.

Fagerstorm score	Frequency	Percent
High	3	9.67
Mild	20	64.52
Moderate	8	25.80
Total	31	99.99

Smokers were distributed based on their Fagerstorm nicotine dependence score, they were categorized into three different groups, three (9.7%) of smokers were highly dependent on nicotine, 20 (64.5%) were mildly dependent on nicotine and eight (25.8%) were moderately dependent to nicotine (Table 7).

Table 8. Co-relation of study subjects based on educational status and Fagerstorm nicotine dependence.

Educational Status	Mild Dependence	Moderate Dependence	High Dependence
6^{th} to 9^{th} standard	4	2	1
10-12^{th} standard	17	2	1
Degree	0	2	0
No education	0	1	1
Total	21	7	3

Smokers were distributed based on their educational status and Fagerstorm nicotine dependence, they were categorized into four different groups, seven of the study subjects were educated 6^{th} to 9^{th} standard, four of the study subjects were mild, two of them was moderate and one of them was high to nicotine dependence, 20 of the study subjects who were educated 10-12^{th} standard, based on their nicotine dependence 17 of them was mild, two of them was moderate and one of them was high, two of study subjects who were graduated, two of them was moderate to nicotine dependence and two of study subjects who had no education of total population one of them was moderate and other one was high to nicotine dependence (Table 8).

Table 9. Correlation in smokers based on age and Fagerstorm nicotine dependence.

Age Range(Years)	Mild Dependence	Moderate Dependence	High Dependence
19-28	1	1	0
29-38	4	1	1
39-48	10	3	0
49-58	6	2	2
Total	21	7	3

Smokers were distributed based on their age and Fagerstorm nicotine dependence and they were categorized into four different groups, two of the study subjects were under the age range of 19-28 years one of them was mild and the other was moderate to nicotine dependence, six of the study subjects were under the age range of 29-38 years, four of them was mild, one of them was moderate and other was high to nicotine dependence. 13 of study subjects were under the age group of 39-48 years 10 of them was mild, three of them was moderate to nicotine dependence and 10 of study subjects were under the age sector of 49-58 years six of them was mild, two of them was moderate and other two of them was high to nicotine dependence (Table 9).

DISCUSSION

In our study, the distribution of Fagerstorm nicotine dependence among the study population of 31 smokers, was distributed as mild (20 (64.51%)), moderate (8 (25.80%)), and high (3 (9.67%)). A cross-sectional study conducted by Karl Fagerstorm (11, 12), showed that abstinence rates decreased with increasing dependence scores. Less dependent smokers may quit more easily and remaining dependent smokers may require intensive treatment, similar results have been obtained in our study where 31 smokers out of which three (9.67%) tend to be highly dependent and require intensive treatment like nicotine replacement therapies, eight (25.80%) were moderately dependent and 20 (64.51%) were mildly dependent and can quit easily.

PEFR compared between smokers and non-smokers in different age groups reveals that the mean Follow-up 2 PEFR was significantly different in the age group 39-48 years and in 49-58 years. PEFR compared between smokers and non-smokers in different age groups reveals that the mean Follow-up 3 PEFR was significantly different in the age group 39-48 years and in 49-58 years. The mean PEFR values at follow-ups 1, 2, and 3 were significantly different with educational status. Whereas comparison of PEFR values during follow-up 1, 2, and 3 between smokers and nonsmokers in all educational groups except for degree holders was found to be significant. The values of mean PEFR were a little higher in smokers than nonsmokers in the age group of 21-30 years, and this study showed an increase in mean PEFR values up to 40 years and a decrease in mean PEFR values with increasing age after 40 years in both smokers and nonsmokers. In a study conducted by Medabala et al. (13) and a study conducted by Chauhan et al. (14) PEFR levels v/s pack years showed a negative correlation which is compared with our study in which there is no significant correlation with follow-up PEFR 1, 2 and 3. Reduction in PEFR was proportional to the increased number of cigarette smoking years. The correlation between PEFR levels during follow-up 1, 2, and 3 was significant and negatively co-related.

Smoking is one of the important factors that increase the hemoglobin (Hb) concentration that is believed to be mediated by exposure to carbon monoxide. Carbon monoxide binds to Hb to form carboxyhemoglobin, an inactive form of hemoglobin having no oxygen-carrying capacity. Carboxyhemoglobin also shifts the Hb dissociation curve on the left side, resulting in a reduction in the ability of Hb to deliver oxygen to the tissue. To compensate for the decreased oxygen-delivering capacity, smokers maintain a higher hemoglobin level than non-smokers (15). Excessive carbon monoxide (CO) exposure may produce polycythemia in humans as well as in animals. The half-life of the CO in the body is 3-5 hours (16). RBC is termed polycythemia and very high RBC mass slows blood velocity and increases the risk of intravascular clotting, coronary vascular resistance, decreased coronary blood flow, and a predisposition to thrombosis (17). It has been established that fibrinogen levels are higher in smokers than in non-smokers, and it has been estimated that the increasing risk of cardiac disease in smokers may be associated with high fibrinogen levels through arterial wall infiltration and effects on blood viscosity, platelet aggregation, and fibrin formation (18-20). In cigarette smoking, carbon monoxide (CO) is produced by the incomplete combustion of carbon-containing material. CO has a very high affinity for hemoglobin relative to that for oxygen (approximately 200-fold) (21). Thus, CO displaces oxygen from hemoglobin in red cells to produce carboxyhemoglobin (COHb), which reduces the release of oxygen to tissues (22). Higher levels of hematocrit and hemoglobin have been demonstrated in smokers, and these increases are likely to be compensatory for exposure to CO (23). Increased hematocrit and hemoglobin concentrations observed in smokers may contribute to a hypercoagulable state (22, 24).

The study included data on 61 male subjects in the age group of 18-60 years divided into two groups consisting of 30 non-smokers and 31 smokers. Tobacco smoking has been correlated with several major morphological and biochemical problems in individuals.

The hematocrit and Hb levels were significantly higher in smokers and among the smokers, the RBC count was significantly increased as the intensity of smoking increased in the study conducted by Anandha Lakshmi et al. (16) and Whitehead et al. (25) in their study observed that hemoglobin concentration and hematocrit was significantly increased in those smoking more than 10 cigarettes per day.

An increase in hemoglobin concentration is believed to be mediated by exposure to carbon monoxide and some scientists suggested that an increase in hemoglobin level in the blood of smokers could be a compensatory mechanism. Carbon monoxide binds to Hb to form carboxyhemoglobin, an inactive form of

hemoglobin having no oxygen-carrying capacity. In our study, we found an increase in levels of RBC, Hb, PCV, MCHC and were significantly high in smokers as compared to non-smokers. We did not find any significant difference in TC, Platelets, MCH, and MCV levels.

Elevated levels of hemoglobin are correlated with increased numbers or sizes of RBCs. RBC values were significantly higher in smokers than those of non-smokers ($P \geq 0.001$) and are consistent with other investigations (26-28). It is reported that high levels of RBC, WBC, and Hematocrit are associated with blood viscosity and clotting in smokers (29-31). High level of PEFR is measured by peak expiratory flow meter which is a simple and relatively cheap device. It has a great diagnostic and prognostic value in patients with hyperactive airway disease (32).

CONCLUSIONS

It is often discussed yet workplace health promotion is the strategic and systematic integration of distinct environments, health and safety policies, and programs into the continuum of activities that enhance the overall health and well-being of the workforce and prevent work-related illness. In our study, the subjects were given awareness about smoking cessation by expending health information through video clips and presentations and also they were explained the importance of smoking cessation, and the lifestyle changes required based on their work environment to improve their quality of life in the workplace. Nicotine dependence level was evaluated based on the Fagerstrom Tolerance questionnaire. Our study proves that there is a significant increase in the PEFR level from the first to third follow-up. Hematological parameters like Hb, RBC, PCV, and MCHC levels were significantly increased in smokers when compared to nonsmokers. Our study provided information on tobacco-related health risks and on benefits of quitting to all employees and other workers at the work site. Provide employer information- provided and publicly available tobacco cessation services to all employees and other workers at the work site, offer and promote comprehensive tobacco cessation support to all the tobacco-using staff, and where feasible, to their dependents. In conclusion, a healthier workforce can be a safer workforce, and a safer workforce can be a healthier workforce.

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