To Evaluate Pulmonary Function and Exercise Capacity in Smokers, Non-Smokers and Passive Smoker at Community Level - Observational Study

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Abstract: _Background and purpose:_ _Cigarette smoking is an important worldwide health problem worldwide disability adjusted life years (DALY) recorded as 6.3 million deaths in developing countries. Smoking leads to many problems in Pulmonary Function Cigarette Smoking Carries major health risks with the most cause specific mortalities being those of respiratory and cardiovascular disease._ _Aim & objective:_ _To evaluate pulmonary function and exercise capacity in smokers Vs nonsmokers at community level._ _Methodology:_ _The subject of current smoker and non-smokers was be evaluated in and around Chandragiri. subject was be made to walk six-minute walk test in a corridor precaution was be taken._ _Outcome measures:_ _Physical outcome - upper limb strength, Biomechanical evaluation outcome – chest expansion, Physiological outcome - peak expiratory flow meter, Functional outcome six-minute walk test._ _Result:_ _Chi square test was done for all variables; The results shows that there is a significant association with the smoking status. The p-value p<0.001._ _Conclusion:_ _In the present study to Evaluate pulmonary function and Exercise capacity in smokers, Nonsmokers and Passive smokers. it's found that significant Association in smokers' group in all variables BMI, chest expansion, PEFR,6 MWT and Repetitive Maximum._

Keywords: 6MWT, PEFR, BMI, Chest expansion.

1. Introduction

Cigarette smoking is an important worldwide health problem[1]. worldwide disability adjusted life years (DALY) recorded as 6.3 million death. In developing countries, on average 48% adult men 7% women are smokers. Smoking rate is increasing about 3.4% WHO report cigarette kills 100 million people worldwide by the 20 century. If warned that it would kill one billion people around the world in the 21 century. There are approximately 120 million people smokers in India[2]

According to WHO, India is a home to 12% of world smokers More than 10 million people die every year due to tobacco related illness. As per 2015, the number of men smoking tobacco in India has to rise to 108 million an increase of 36% between 1998&2015 Prevalence is according to a 2002 WHO estimate, 70% adult males in India are smoker. Among adult females the figure is much lower at between 13-15% About 90% of children under the age of 16 years have used some forms of tobacco in the past & 70% are still using tobacco products. 26.6% of people in Jammu & Kashmir smoke, the highest rate in the country The highest no of beedi smokers are in Uttarkhand[3].

Cigarette smoking risk factors for Lung cancer, Coronary heart disease, Stroke, increase blood pressure, heart rate and myocardial contractility Cigarette smoke is a complex mixture of more than 4000 chemicals, many of which exert toxic effects on cellular function[4].

The respiratory function test may indicate deterioration of respiratory function prior to clinical symptoms, and its results can be used to prevent or reduce the incidence of respiratory diseases. Also, the respiratory function test can be conducted in a number of ways, such as measurement of chest expansion, lung volume or flow with spirometry), and respiratory muscle strength). Chest expansion as measured by circumference and diameter is simple and inexpensive.[5,6,7]

There is an established link between heart rate (HR) and cardiovascular health.HR is a very important non-invasive and easy-to-measure index of myocardial work[8,9].

The lung health component of smoker is evaluated through complete heamogram, chest X-ray, sputum, PFT. Apart from above peak exploratory flow meter and six minute walk test done to evaluate the pulmonary function and exercise capacity of smokers. Another parameter which helps to evaluate the strength of respiratory exercises. The strength of upper limb will be evaluated through one repetition maximum[10].

2. Need of the Study

Smoking leads to many problems in Pulmonary Function Cigarette Smoking Carries major health risks with the most cause specific mortalities being those of respiratory and cardiovascular disease, 6 min walk test is useful to determine functional capacity or changes in functional

capacity due to an intervention in patients with these diseases and measuring the response to medical intervention in patient with moderate to severe heart or lung disease).

So such information can be used to illustrate the harm of smoking and should be encourage young people to quit or avoid cigarette smoking a study done by Rakesh kumar et.a al found that smokers have pulmonary function test was decreased FVC and FEV1 but they have not done exercise tolerance the other parameters

So, Till now the studies have been done on to evaluate the pulmonary functions of smokers.

Paucity of studies are on functional capacity upper limb strength, chest expansion, evaluation in smoker and how it has its impact on lung function compared to normal individual.

Aim
To evaluate pulmonary function and exercise capacity in smokers, nonsmokers and passive smokers at community level
Physical outcome ------------- --------upper limb strength
Biomechanical evaluation outcome------chest expansion
Physiological outcome--------peak expiratory flow meter
Functional outcome-------------------six-minute walk test

Objectives
1) To find out exercise capacity through six minute walk test measuring VO2 peak in smokers, non smokers and passive smoker at community level
2) To find out pulmonary function through , peak expiratory flow rate in smokers,non smokers and passive smokers at community level
3) To find out chest expansion of lung by measuring the inch tape in smokers,non smokers and passive smokers at community level
4) To find out the upper limb strength through measuring one repetition maximum (RM) in smokers,non smokers and passive smokers at community level
5) To find out the body mass index by weighing machine

3. Methodology

Study subjects: 20-60 years smokers, non smokers and passive smokers.

Study Design: Observational study

Study Setting: Rural Community Based

Study duration: One year

Sample Size: 150 members

Inclusion criteria:
- Smokers Non-smokers and passive smokers (the involuntary inhaling of smoke from other people's cigarettes, cigars, or pipes.)
- Age ranges from 20-60 years old
- Participations average duration of smoking ranges between 2-5 years
- Occasionally-not daily
- Light-under 10 cigarettes per day
- Moderate-11 to 20 cigarettes per day
- Heavy-21 or over cigarettes per day
- Stopped all smoking for at least 1 year
- Education and awareness to the subjects regarding smoking

Exclusion criteria:
- Women
- Any history of allergic or respiratory diseases
- Severe cardiac diseases
- Thoracic deformity (scoliosis, kyphosis, hyperlordosis) which can effect pulmonary function
- Severe peripheral arterial disease (intermittent claudicating)
- Severe neurological diseases (epilepsy, stroke multiple sclerosis)
- History of thoracic surgery
- Those subjects who did not give consent
- Past history of smoking and TB from the study.

Ethical Aspect:
The study was cleared by the S.V.Medical college and written informed consent was obtained from each participant IEC number Lr.No.48/2019,Dated 01/06/2019

Outcome Measures:
Body mass index, peak expiratory flow rate and chest expansion, six minute walk test and repetition maximum

Methodology:
All the subjects who meant the inclusion criteria are taken for the study baseline parameters was evaluated body mass index by weighing machine subjects was asked to blow PEFR by mouth chest expansion was measured by the inch tape at nipple level (axillary nipple) xiphi sternal, then find out the repetition maximum subjects was given weight cuffs of 1/2 kg initially then incremental increase of weight 1kg,2kg according to tolerance level. Finally, subjects were asked to walk 6 MWT in corridor with hard surface that is seldom travelled with in comfortable weather. Precaution was taken during walking.

4. Result

Distribution of study subject as per BMI

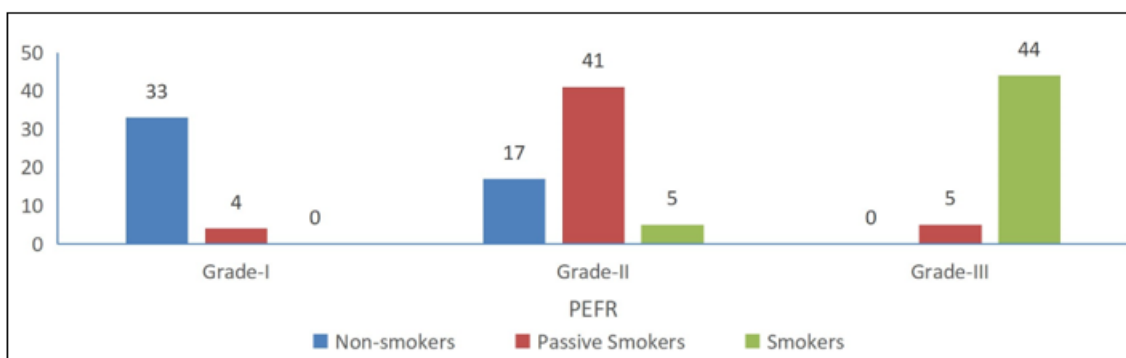| Parameter	Grades	Non Smoker	Passive Smoker	Smoker	Total
BMI	1	37	8	0	45
	2	13	42	11	66
	3	0	0	38	38
Total		50	50	49	149
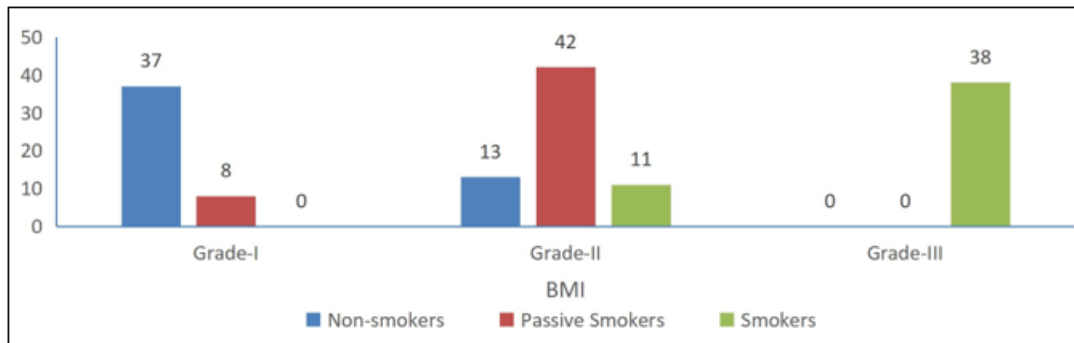
Analysis of BMI has been observed in non- smokers, passive smokers and smokers.

Chi square test was done for all variables, The results shows that there is a significant association with the smoking status. The p-value p<0.001

Distribution of study subject as per PEFR

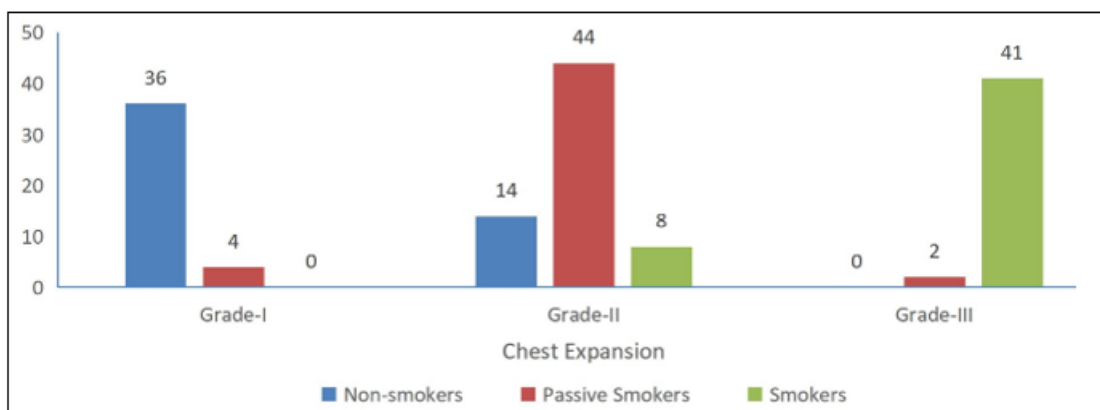| Parameter	Grades	Non Smoker	Passive Smoker	Smoker	Total
PEFR	1	33	4	0	37
	2	17	41	5	63
	3	0	5	44	49
Total		50	50	49	149

Analysis of PEFR has been observed in non- smokers, passive smokers and smokers.

Chi square test was done for all variables, The results shows that there is a significant association with the smoking status. The p-value p<0.001

Distribution of study subject as per Chest Expansion

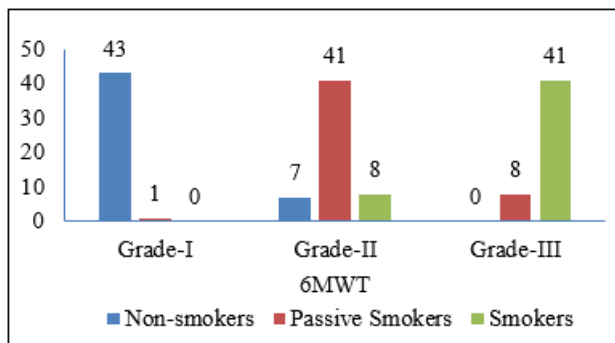| Parameter	Grades	Non Smoker	Passive Smoker	Smoker	Total
Chest Expansion	1	36	4	0	40
	2	14	44	8	66
	3	0	2	41	43
Total		50	50	49	149

Analysis of Chest Expansion has been observed in non smokers, passive smokers and smokers

Chi square test was done for all variables, The results shows that there is a significant association with the smoking status. The p-value p<0.001

Distribution of study subject as per 6MWT

Parameter	Grades	Non Smoker	Passive Smoker	Smoker	Total
6MWT	1	43	1	0	44
	2	7	41	8	56
	3	0	8	41	49
Total		50	50	49	149

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6MWT

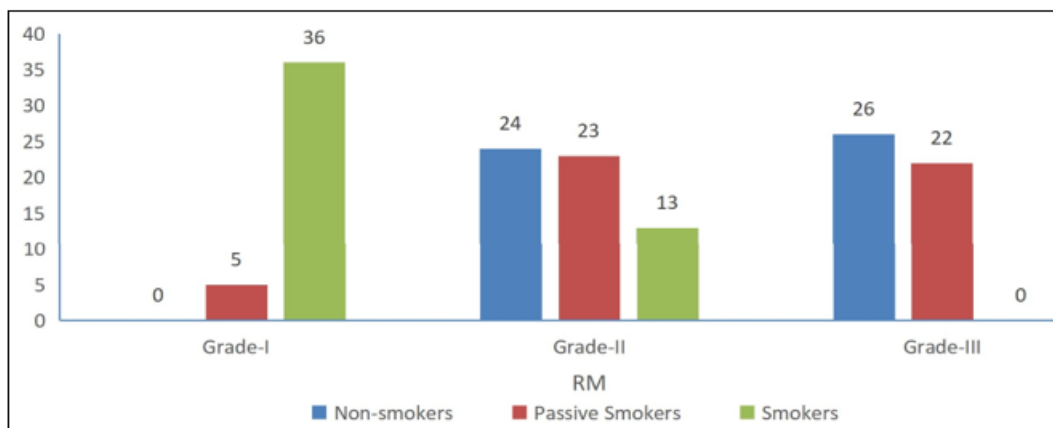Analysis of 6MWT has been observed in non- smokers, passive smokers and smokers.

Chi square test was done for all variables, The results shows that there is a significant association with the smoking status. The p-value p<0.001

Distribution of study subject as per RM

Parameter	Grades	Non Smoker	Passive Smoker	Smoker	Total
RM	1	0	5	36	41
	2	24	23	13	60
	3	26	22	0	48
Total		50	50	49	149

RM

Analysis of Repetitive has been observed in non- smokers, passive smokers and smokers.

Chi square test was done for all variables, The results shows that there is a significant association with the smoking status. The p-value p<0.001

5. Conclusion

In the present study to Evaluate pulmonary function and Exercise capacity in smokers, Non- smokers and Passive smokers. its found that significant Association in smokers group in all variables BMI, chest expansion, PEFR,6 MWT and Repetitive Maximum.

Acknowledgements

References

[1] Bureau of Tobacco Control. Department of Disease Control, Ministry of Public Health, National Statistical Office (NSO) and Faculty of Public Health, Mahidol University: Global Youth Tobacco Survey (GATS): Thai- land Country Report. Bangkok, Thailand 2009.

[2] WHO report: Tobacco could kill one billion by 2100. Science Daily, 2008 Aug; 24:71.

[3] Horn D. Behavioral aspects of cigarette smoking. Journal of Chronic Diseases 1963;16: 383-39.

[4] Nawafleh HA, Abo Zead S, Al-Maghaireh D F. Pulmonary function test: The value among smokers.

[5] Moll JM, Wright V: An objective clinical study of chest expansion. Ann Rheum Dis, 1972, 31: 1-8. [Medline] [CrossRef] 5

[6] Miller MR, Hankinson J, Brusasco V, et al.: Standardisation of spirometry. Eur Respir J, 2005, 26: 319-338. [Medline] [CrossRef]

[7] Evans JA, Whitelaw WA. The assessment of maximal respiratory mouth pressures in adults. Respir Care, 2009, 54: 1348-1359, [Medline]

[8] Perret-Guillaume C, Joly L, Benetos A. Heart rate as a risk factor for cardiovascular disease. Prog Cardiovasc Dis. 2009; 52:6-10.

[9] Astrand PO, Rodahl K, Dahl HA, Stromme SB. Textbook of work physiology. Physiological basis of Exercise. Champagne, IL: Human Kinetics, 2003. pp.134-176.

[10] Feenstra TL, van Genugten ML, Hoogenveen RT, Wouters EF, Rutten-van Molken MP. The impact of aging and smoking on the future burden of chronic obstructive pulmonary disease: a model analysis in the Netherlands. Am J Respir Crit. Care Med. 2001; 164: 590-6