



PREVALENCE OF CHRONIC RESPIRATORY SYMPTOMS AND ALTERED PEAK FLOW RATE IN AGRICULTURAL WORKERS IN SANGLI DISTRICT

¹Pooja Babu Pawar, ²Aakanksha Joshi.

¹Intern, College of physiotherapy, MMC, Wanless Hospital, Miraj, Maharashtra, India, ²Professor, College of physiotherapy, MMC, Wanless Hospital, Miraj, Maharashtra, India.

ABSTRACT

Background:

Agriculture is defined as embracing all forms of activity connected with growing harvesting and primary processing of all types of crops; and caring for animals; and with tending gardens and nurseries. Respiratory symptoms are common among farmers and exposure to big concentration of dust during agriculture works leads to high level of respiratory symptoms. Farmers are at increased risk of development of respiratory symptoms such as asthma, wheeze, and chronic bronchitis among agriculture workers.

Aim:

The purpose of this study was to find to the Prevalence of chronic respiratory symptoms and to identify altered peak flow rate among the farmers in Sangli district. by using BMRC RESIRATORY QUESTONNAIRE and PEFR device to rule out altered peak flow rate among agricultural workers.

Methodology:

Agricultural workers [n=362] of sangli district were included in this study. BMRC respiratory questionnaire was given for rule out chronic respiratory symptoms and PEFR was checked.

Outcome measures:

PEFR (peak expiratory flow rate), BMRC (British medical research council respiratory questionnaire)

Results:

There was decrease in PEFR values with increasing duration of farming, which was proved statistically significant [p=0.000].

Conclusion:

This study was done to check for the prevalence of chronic respiratory symptoms and altered peak flow rate among agricultural workers. Therefore the study concluded that there is altered peak flow rate with increasing duration of farming and prevalence of chronic respiratory symptoms.

Keywords:

Agricultural workers, farmers, altered peak flow rate, BMRC questionnaire, PEFR.

INTRODUCTION

Agricultural worker defined by the World Health Organization (WHO) in 1962 as any person engaged either permanently or temporarily, irrespective of legal status, in activities related to agriculture. Agriculture is defined as embracing all forms of activity connected with growing, harvesting and primary processing of all types of crops; and caring for animals; and with tending gardens and nurseries.¹

Agriculture has been the backbone of the Indian economy². Farmers are the backbone of the Indian agricultural economy³. Farmers and other individual involved in agriculture have potential inhalatory exposures to a very wide range of agents; inorganic dust from the soil; organic dust containing microorganism, mycotoxins, or allergens; decomposition gases; pesticides; etc.¹. Agricultural workers include farmers, farm owners, farm workers, field workers, growers, harvester, packers, graders, and sorters, as well as agricultural pesticides handler[mixers, loaders, cleaners, and sprayers].⁴

Farmers are at increased risk for development of respiratory symptoms compared to normal population.³ The food processing industries are one of the largest industries in India and it is ranked fifth in term of production, consumption, export, and expected growth. Majority of the agro-industries have been installed in the rural areas and most of them are owned by private entrepreneurs.⁵

Sangli is known as one of the major agriculturally developed districts in the western Maharashtra. The economy of the Sangli district is predominantly agriculture based. The western part of the Sangli district posses' possibility of water supply from Krishna river. Therefore, western part of sangli district has high proportion of land under sugarcane cultivation. Most of the area lies in the eastern part of the district to grow grapes and sugarcane crops. Jawar wheat, sugarcane, cotton, soybean, pomegranate and grapevine, etc. these are the important crops of Sanglidistrict².

Diversified form of agriculture, in term of cultivation of crops, is the main feature of the area. The Sugarcane and spice crops are mainly cultivated, specifically middle and western part of the study area, grape concentrate in central and eastern central part of the district where irrigation facilities are available and jawar and bajara are cultivated in the dry eastern part of the district.²

Agricultural workers exposed to variety of chemical, physical, and biological hazards in the process of cultivating and harvesting crops and or raising livestock.⁶ Dust is generated during processing rice, wheat, oilseeds, and tea. Dust emission is depends on the industrial setting, raw materials, processes involved, and equipment. Dust inhalation is a major occupational health hazard on respiratory system, skin, eyes to workers. Dust exposure can causes inflammatory reaction of the pulmonary tissues.⁴

There are a number of common exposures that will lead to respiratory illness. These include organic dusts, and other respiratory hazards that include inorganic dusts, pesticides and agrochemicals. Farmers and individuals involved in agricultural work have potential exposure to a very wide range of agents – inorganic dusts from soil, organic dusts from microorganism, mycotoxins, allergens, pesticides, etc. These exposures occurs during harvesting, processing or storing grains or other plant matter, or when soil, plant or stable are treated with chemical agents such as pesticides and disinfectants.⁷

Respiratory disease is widely recognised occupational problem among agricultural workers⁸. The prevalence of respiratory diseases such as asthma, chronic bronchitis, chronic obstructive pulmonary disease (COPD), accelerated lung function decline and organic dust toxic syndrome is higher among farmers than in general population³.

Major exposure conditions for this farmers include organic and mineral dust, agricultural activities, labor intensity and most notably, pesticides use.³

Chronic respiratory symptoms including chronic cough, phlegm, wheezing, shortness of breath, and chest tightness could be manifestations of chronic respiratory disease, which are mainly developed as a result of exposure to occupational hazards.⁸

Respiratory symptoms are common among farmers and exposure to high concentration of dust during agriculture works leads to high level of respiratory symptoms.⁸. Lung function can be assessed through several methods one of which is by peak expiratory flow rate {PEFR}. PEFR measures the maximum expiratory speed that can be achieved by someone and is expressed in litres per minute [Lper min] or liters per second [Lper sec].⁹

Peak expiratory flow rate (PEFR) is called as maximum rate at which the air can be expired after a deep inspiration.¹⁰. Peak expiratory flow rate use to measures ventilatory function test. PEFR is highly sensitive and accurate index of airway obstruction. The test which is measured by the peak flow meter, is very useful in predict the status of ventilator lung function.¹¹.

PEFR mainly reflects the flow in the large airways and depends on the conscious effort and muscle strength of the individual.⁹ All these studies that indicate that PERF can be use as diagnostic tool to find out the respiratory disorder¹¹. PEFR values are obtained by spirometry test or using a simple tool namely peak expiratory flow [PEF] meter.

PEFR examination with PEF meter is easier, simpler, cheaper, and quantitative. Difference in PEFR values among population can be caused by geographical factors, types of environmental and occupational exposure, socioeconomic status, and ethnic differences that affects variations between individuals.⁹

AIM

- To find out the prevalence of chronic respiratory symptoms and altered peak flow rate among agricultural workers.

OBJECTIVES

- To find out the prevalence of chronic respiratory symptoms like chronic cough, phlegm, wheezing, shortness of breath, and chest tightness among agricultural workers using British Medical Research Councils (BMRC), Respiratory questionnaire.
- To find out the prevalence of altered peak flow rate by using peak flow meter among agricultural workers.

METHODOLOGY

Study design: cross –sectional survey

Study duration: 6 months

Study setting: Sangli District, Maharashtra

Type of study: Prevalence study

Type of sample: Convenience sampling

Sample size: 362

MATERIALS

Writing materials like pen, paper

Consent form

Peak flow meter.

Measuring tape

Weighing scale

INCLUSION CRITERIA

- Both male and female farmers.
- Age group of 18 to 65 years.
- Subject working as farmers for more than 1 year.
- Subject willing to participate in the study.
- Presence of chronic respiratory symptoms like cough, chest tightness, wheezing, etc. at least 3 months in 1 year.

EXCLUSION CRITERIA

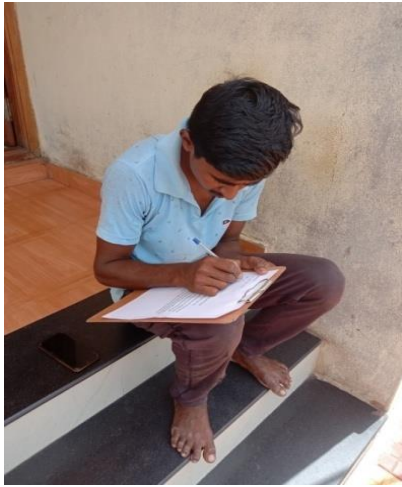
- Athletes
- Pregnant women
- History or presence of any cardio-pulmonary disease
- Other chronic disease e.g. Tumour or Carcinoma, DM, HTN, renal disease, etc.

PROCEDURE

The Ethical clearance is obtained. Subjects were recruited on the basis of inclusion and exclusion criteria. Informed consent was obtained from all the subjects. Detail medical history was noted from the study group and the questionnaire British medical research council (BMRC) respiratory questionnaire given to the subjects. The body weight (kg) was measured by weighing scale, and height (cm) was measured by measuring tape. Body mass index (BMI) was calculated by the formula below:

$BMI = \text{Weight (kg)} / \text{Height (m}^2\text{)}$.

PEFR was measured using the peak flow meter. The peak flow meter set to zero, the subjects is asked to sit comfortably while measuring PEFR. Ask subjects to take deep breath in and breath out as hard and as fast as possible into the device, then reading was taken. The process was repeated for 3 times and the highest reading was taken.



STATISTICAL ANALYSIS

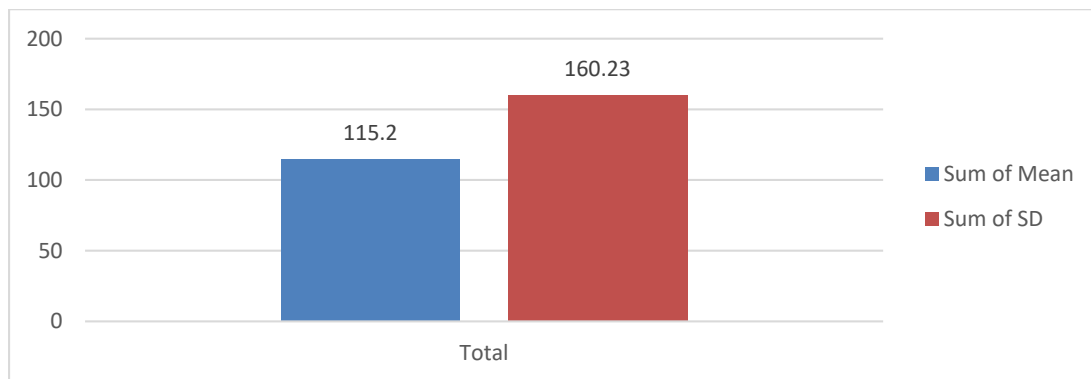
Statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) software 23. The level of significance was performed using Spearman’s test.

RESULTS

Data analysis was performed using Statistical Package for the Social Sciences [SPSS] software.

Variables		
N=362	Mean	SD
Age	115.2	160.23

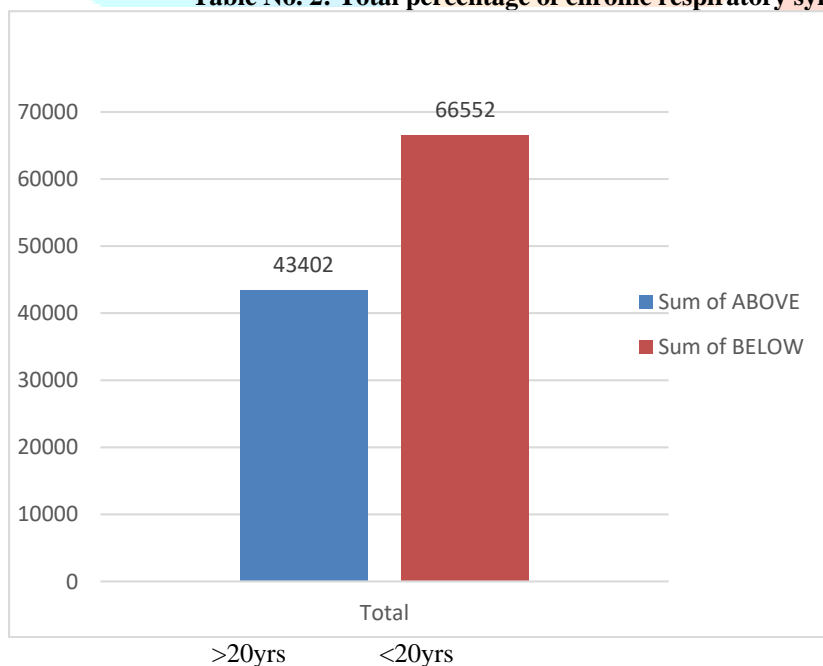
Table No.1: Shows Mean and Standard Deviation of Baseline Data [Age].



Graph No.1: Shows Mean of Baseline Data [Age].

Variables	Total percentage of respiratory symptoms
N=362	
Cough	58%
Phlegm	42.80%
Breathlessness	56%
Wheezing	59.10%
Chest illness	31%
Past illness	28.40%

Table No. 2: Total percentage of chronic respiratory symptoms



Graph No.2: Shows Mean of duration of farming vs. values of PEFr.

Variables	Total percentage
BMI	
Underweight	13.81%
Normal	51.39%
Overweight	21%
obesity	14.36%

Table No. 3: shows total percentage of subjects according to BMI.

Variables	Total percentage of duration of farming
Duration of farming	
Above 20 years	60.77%
Below 20 years	39.22%

Table No. 4: Total percentage of subjects according to duration of farming.

Result :

- The statistical analysis shows that the study has p-value less than 5% of significance level.
- On an average the study shows that there is 58% subjects have Cough, 42.80% have Phlegm, 56% s
- Study shows that there is altered peak flow rate with respect to the duration of the farming that is >20 yrs faming has reduced PEFR values than <20 yrs farming.
- Study shows that there is altered peak flow rate with respect to the BMI.

DISCUSSION

The person who is involved in agricultural activities such as growing, harvesting and primary processing of all types of crops; and caring for animals; and with tending gardens and nurseries leads to exposure to dust particles that causes various respiratory problems in agricultural workers. This study was intended to find out the prevalence of chronic respiratory symptoms and altered peak flow rate in agricultural workers.

Farmers and other individual involved in agriculture have potential inhalatory exposures to a very wide range of agents; inorganic dust from the soil; organic dust containing microorganism, mycotoxins, or allergens; decomposition gases; pesticides; etc. And prolonged exposure to dust leads to respiratory involvement in workers.

In the present study it was found that, Out of 362 subjects 58% subjects have Cough, 42.80% have phlegm, 56% have breathlessness, 59.10% have wheezing, 31% have chest illness, 28.40% have past illness. P-value of the study is 0.0, which is less than 5% level of significance. PEFR values shows significantly decreases in agricultural workers who is been involved for more than 20 years of farming activities.

Previous studies by Gashaw Garede wwoaldeamanuel et al, concluded that prevalence of chronic respiratory symptoms was higher in farmers than in controls, with significant difference for cough(20.5% vs. 9.0%, $p=0.001$) and phlegm (19.1% vs. 9.0%, $p=0.001$). chronic respiratory symptoms among farmers was associated with duration of agriculture exposure($p=0.014$). the mean values of all spirometric parameters were lower in farmers than in controls with significant difference for FVC, FEV1,FEF,AND PEFR. This study indicates that farmers are at high risk for the development of chronic respiratory symptoms and reduced pulmonary function indices. .

Furthermore, Gholam Hossein Halvani set al. concluded that there is significant reduction in respiratory capacity in the farmers group compared to non-farmers. In all three groups, the prevalence of respiratory symptoms in farmers was higher than non-farmers group and as the age increased, the prevalence of symptoms also increased.

Edah Omosco Charles, et al. concluded that increase exposure to poultry farming significantly decrease PEFR of both male and female subjects. This decrease was more severe in female subjects. Similarly, PEFR of poultry farmers increase with increasing BMI. The PEFR significantly decreased in female subjects at normal and overweight BMIs when compared to the male subjects. The mean PEFR of the male subjects exposed to poultry farming was >than that of the female subjects. So this study conclude that the PEFR decreases with increasing age and duration of exposure to poultry farming and it was more severe in female subjects.

Uk priyadharshini, et al. suggest that there was significant decrease in PEFR among farmers ($p<0.001$) compared to the controls. Conclusion of this study is chronic exposure to organophosphorus pesticides has an impact on PEFR among the farmers.

Respiratory diseases have long been recognized in association with work in farming. However, farmers are known to have morbidity and mortality from certain respiratory disease. Multiple exposure are common and some exposure can give rise to more than one specific disease. Furthermore, agricultural workers are exposed to wide range of occupational hazards, such as ergonomic stresses, sunlight, viruses, inorganic dust, pesticides, and other chemicals.

CONCLUSION

This study was done to check for the prevalence of chronic respiratory symptoms and altered peak flow rate among agricultural workers. .Out of 362 subjects 58% subjects have Cough, 42.80% have phlegm, 56% have breathlessness, 59.10% have wheezing, 31% have chest illness, 28.40% have past illness. P-value of the study is 0.0, which is less than 5% level of significance. Therefore the study concluded that there is presence of chronic respiratory symptoms among agricultural workers and altered PEFR values seen among agricultural workers.

LIMITATIONS AND SUGGESTIONS

➤ Limitations:

1. Proper distribution of age and working hours can be done.
2. The study can be done including the other occupations

➤ **Suggestions:**

1. Study can be done in other population.
2. Study can be done to compare male and female.
3. Experimental study can be done.

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