

A comparative study on the prevalence of occupational respiratory symptoms age wise in male and female labourers of cement industries in Tadipatri Mandal of Anantapur District, Andhra Pradesh

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SUMMARY

Assessment has been made on the respiratory disorders in male and female labourers of age groups 20-35 (younger), 36-45 (middle) and 46-55 (older) years of cement industries in Tadipatri Mandal of Anantapur District. Clinical data were established with the case study on history and clinical symptoms. This clinical database was prepared based on the survey conducted among 18515 long-term exposed groups of labourers. Much attention was paid to bring the correlation between smoking habit and occupation exposure response of respiratory system among labourers of these three age groups. Major respiratory symptoms prevalent were dyspnea (78.79%), asthma (22.77%), and cough (productive and non productive cough) (23.50%). Dyspnea (23.50%) was identified as major symptom in males and asthma (28.04%) in females. Middle age group of male labourers (41.65%) and younger age group of female labourers (46%) were the major suffers due to repeated long term exposure; prevalence of developing asthma (69%) was more in younger and middle age group of male labourers. Current smokers of younger age group were at higher risk of developing chronic bronchitis and wheeze but not asthma. Chronic cough (13.53%) was the common symptom in both sexes exposed to dust and male labourers were at higher risk for developing productive cough and attacks of dyspnea. Incidences of respiratory symptom were high in females than men, after adjusting for age and smoking habit.

Key words :

Dyspnea,
Wheezing,
Asthma,
Productive and
non productive
cough

The cement industry in Anantapur district comprises mainly two major plants in private sector with an installed capacity of 2000 tones per day (tdp). The major raw materials required for the industry are limestone, clay, coke and gypsum. The raw materials are procured within the industry mining belt, except the coke. The major environmental issues of the cement industry are Gaseous emissions (from kiln containing particulate matter, CO₂, NOX, SO₂, etc.), Dust emissions (eaw mill, conveyor transfer points and packing unit), Fugitive emissions (refuse burning of tires and blasting of mines) and occupational safety and health

No studies have earlier been made on the occupational health hazards of the labourers of this industry. Hence, the present study was carried out in labourers of male and females of three age groups as 20-35, 36-45 and 46-55 attending Government Medical College Hospital, Anantapur. A hospital based survey was taken up to eliminate healthy workers effect (Helga and Levis, 1987). (Selection of workers with better health by pre-placement examination).

MATERIALS AND METHODS

The present study is a comparative study aimed to explore the respiratory morbidity in terms of symptoms in chronic exposed labourers working in cement industry for more than 11 years. All out patients N=18515 (Male: Female=9899:8616 attending Medical College Hospital in Anantapur district, Andhra Pradesh) were considered for the study during the period May 2006 to April 2008. The total strength of the labourers were categorized according to the age (Table 1, 2, 3 and 4) which included younger (20-35), middle (36-45) and older (46-55) (Table Fig. 1a and b). The ages of exposed subjects were comparable. Labourers having respiratory problems like chest pain, dyspnea, problems with nose and throat, cold, breathing problem, asthma, productive and non

Table 1 : Distribution of male and females in all three age groups [younger (20-35), middle (36-45), older (46-55)].

	Gender	
	Male	Female
Strength	9899	8616
Percentage	53.46	46.53
	Total 18515	

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	Strength	Percentage
Males	6929	70
Females	2585	30
Total affected: 9514		

productive cough and wheezing were included for the study (Fig. 2, 3, 4, 5, 6 and 7). Most of the subjects (87%) were with initial chest X-ray. Labourers were enquired about the respiratory problems and symptoms arisen due to their repeated occupational exposure by preparing a pretested, structured close ended questionnaire. Information was also collected regarding socio-economic status and working conditions. Other details like use of abuse substance and smoking history were carefully recorded. Later on, clinical data were analyzed in terms of disordered functions and potential causatives. With regard to socio-economic status, Kuppuswamy's Classification (Park and Park, 1979) were employed for the study.

RESULTS AND DISCUSSION

The comparative study on the prevalence of occupational respiratory symptoms, age wise in male and female labourers, data were collected based on the history and clinical symptoms. Nearly 70% of males and 30% of females were identified as respiratory suffers to the total surveyed strength of 18515 labourers (Table 2). Most

Age group	Strength	Percentage affected
20-35	1814	26.18
36-45	2886	41.65
46-55	2229	32.17

Total strength:18515
 Total males affected: 9899
 Percentage of males affected: 70

of the labourers were exposed to dust and fumes at an average of 8 hours per day for a period of 11 years.

Respiratory symptoms noticed were dyspnea (78.79%), asthma (22.77%), and cough (productive and non productive) (13.68%) in both sexes. Dyspnea (23.50%) was identified as major symptom in males and asthma (28.04%) in females. Middle age group of male labourers (41.65%) and younger age group of female labourers (46%) had recognized the major suffers due to repeated long term exposure (Fig. 3 and 7); prevalence of developing asthma (69%) was more in younger and

Age group	Strength	Percentage affected
20-35	1189	46
36-45	750	29
46-55	646	25

Total Strength:18515
 Total Males affected: 8616
 Percentage of Males affected: 30

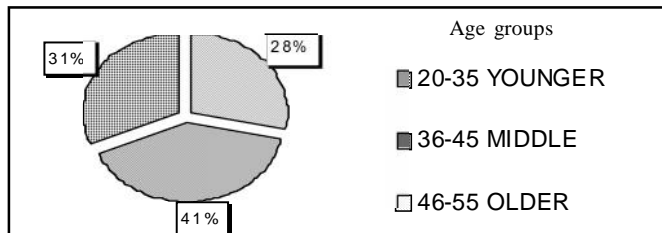


Fig. 1a : Age wise distribution of working in the cement industry

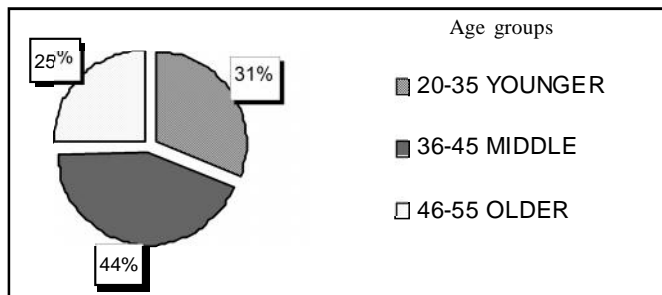


Fig. 1b : Age wise distribution of females working in the cement industry

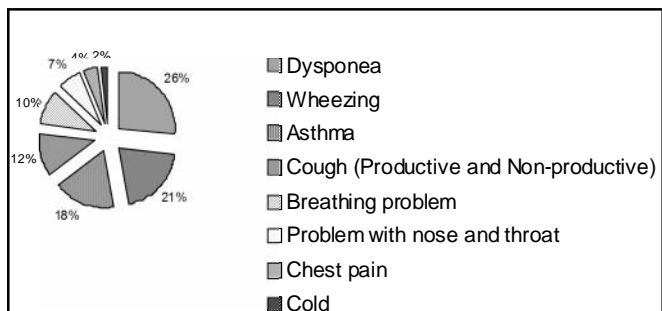


Fig. 2 : Age wise respiratory symptoms exhibited by the younger age group (20-35) in male labourers

middle age group of male labourers (Fig. 2 and 3). Current smokers of younger age group were at higher risk of developing chronic bronchitis and wheeze but not asthma. Chronic cough (13.53%) was the common symptom in both sexes exposed to dust and male labourers were at higher risk for developing productive cough and attacks of dyspnea. Women were at higher risk for developing

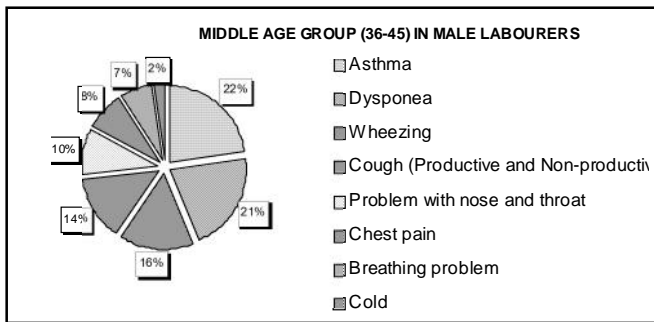


Fig. 3 : Respiratory symptoms exhibited by the younger age group (36-45) in male labourers

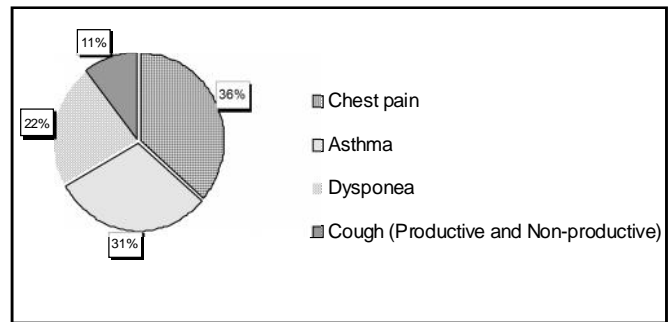


Fig. 7 : Respiratory symptoms exhibited by the younger age group (46-55) in female labourers

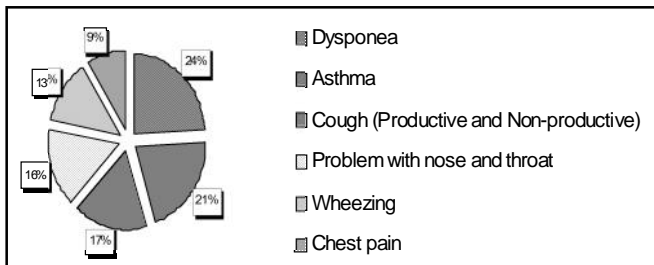


Fig. 4 : Respiratory symptoms exhibited by the younger age group (46-55) in male labourers

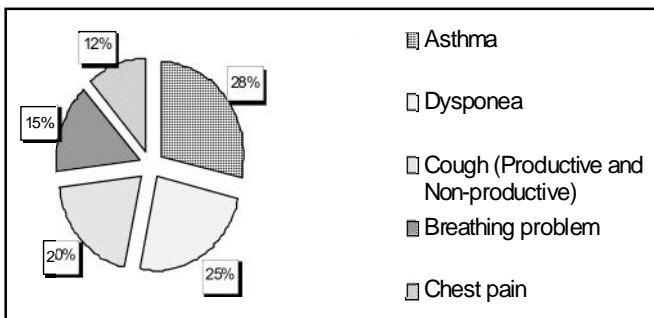


Fig. 5 : Respiratory symptoms exhibited by the younger age group (20-35) in female labourers

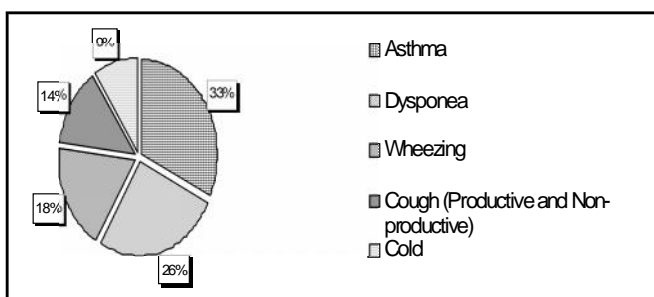


Fig. 6 : Respiratory symptoms exhibited by the younger age group (36-45) in female labourers

respiratory health. Elevated levels of particulate pollution had been associated with increased respiratory morbidity as measured by hospitalization for respiratory diseases (Sunyer *et al.*, 1991) and increased symptoms of pulmonary diseases (Schwartz *et al.*, 1991). Long term exposure to particulate pollution and gaseous fumes has been associated with increased risk of developing respiratory morbidity (Archer, 1990).

The major respiratory symptoms noticed during the survey included dyspnoea (78.79%), asthma (22.77%), and productive and non productive cough (13.68%). In this study there was an increased risk of developing respiratory symptoms and asthma if exposed to dust or fumes even after adjusting for age, sex, educational level and smoking habits during the follow up. Another subsequent source of particulate matter pollution in the surveyed industrial area included quarrying and mining, which were inherently dusty and high in quartz and mineral dust which contributed the risk for developing respiratory symptoms and asthma. Both mineral dust and quartz exposure were associated with higher risk of the cough symptoms and mineral dust exposure with a higher risk of attacks of dyspnoea and asthma. The prevalence for developing asthma was more in younger and middle age groups of male labourers as they were much more exposed to dust or fumes (Fig. 2 and 3). Majority of the male labourers were smokers (97.14%) and the cigarette smoking clearly was associated with asthma and asthma like symptoms. Current smokers of younger age group were at higher risk of developing chronic bronchitis and wheeze but not of asthma. The present study did not have that much evidence to study how smoking habit and occupational exposure may interact in relation to the occurrence of asthma and chronic asthma like symptoms. However, the increased asthmatics due to occupational exposure was mainly present among smokers. The studies (Korn *et al.*, 1987) have addressed the issue of the combined effect of smoking and occupational exposure

wheeze than unexposed. Incidences of respiratory symptoms were high in females than men, after adjusting for age and smoking habit. (Fig. 5, 6 and 7).

Particulate air pollution has direct implication on

on chronic respiratory symptoms. Viegi *et al.* (1991) reported that the effect of occupational exposure on several respiratory categories including wheezing and asthma was higher among smokers than among nonsmokers. Sex differences in the role of smoking in the occurrence of asthma and chronic wheeze have been controversial because of problems of diagnostic bias. In present investigations, females were more likely to report a doctor's diagnosis of asthma than males and males tended to have more asthma like symptoms without a specific doctor's diagnosis. This is very unfortunate, we have no data that would permit us to determine whether a physician's knowledge of a women's occupation influenced the diagnosis of asthma, chronic bronchitis or emphysema. Exposure is most important determinant in the development of occupational asthma (Viegi *et al.*, 1991). Higher degree of exposure was observed in younger and middle age group of both males and females, higher is the prevalence of developing asthma in them (Chan and Malo, 1995). In sensitized labourers, the main factor that influences the on set of symptoms is the degree of exposure (Venables *et al.*, 1990). However there is lack of information regarding the risk of sensitization at low concentration and existence of no-effect level (Nieuwenhuijsen, 2003). Some studies have shown that intensity of exposure is an important determinant of sensitization and asthma caused by respiratory antigens. A review of exposure-response relations for occupational inhaled allergens (Heederik and Huba, 2001) suggests that there are enough data for assessment of exposure-response relations for several occupational agents (Baur *et al.*, 1998). Concentration of an occupational allergen that sensitizes is quite different from one that provokes symptoms in workers already sensitized (Baur, 2003). Finding of concentration of an occupational agent below which sensitization is uncommon is relevant for prevention. Thus, the minimum concentration that induces sensitization is at least one order, and probably two orders, of magnitude greater than the minimum concentration that elicits symptoms. So, the permissible exposure limit (Swanson, 2003) for eliminating sensitization is easier for industry to achieve than the permissible exposure limit for eliminating asthmatic symptoms.

Sex plays a role in the distribution of occupational lung diseases, because there are sex differences in specific jobs and therefore differences in exposure to agents causing these diseases (Anonymous, 1983). Female labourers report significantly more exposure to dust during crushing of stones. In addition, one study reported that the risk of occupational asthma was higher for women (Wai and Tarlo, 2003) especially in loading and packing

sections of cement industry (Fig. 5, 6, and 7). A case-control study performed in Göteborg (a Swedish city) by Toren *et al.*, (1999) and in city of Sao Paulo (Mendonca *et al.*, 2003) showed that among women, the risk of adult asthma was increased after exposure to dust and fumes. Whereas among males, the risk of adult asthma was increased after exposure to flour dust, fumes and man-made mineral fibres. Because a strong association has been found between fume and dust related respiratory symptoms suggestive of occupational asthma. It has been proposed that welding metal fume fever be viewed as a premarker of welding-induced occupational asthma (Toren *et al.*, 1999).

Chronic cough was the most common symptom in both sexes exposed to dust and among men there was a higher risk for developing productive cough and attacks of dyspnea. Among women, there was higher risk for developing wheeze in those exposed to dust compared with unexposed. A Dutch longitudinal community study (El-Zein *et al.*, 2003) observed a higher incidence of chronic non-specific lung diseases in those occupationally exposed.

Previous studies on working groups have shown association between mineral dust exposure and air flow limitation (Heederik *et al.*, 1990). In present industrial work area, the most common situation was mixed exposure, samples have shown higher incidences of respiratory symptoms in women than men, after adjusting for age and smoking habits (Hanke, 1984). But most prevalence studies have reported no sex differences in the effect of occupational exposure (Xu and Christiani, 1993).

In respiratory diseased labourers, dyspnea was commonly associated condition in which respiratory drives were increased or respiratory system was excessively loaded. In affected middle age group of male labourers and younger age group of female labourers (Table VII-IX) it was characterized by perception of "air hunger" or increased effort of breathing. It was identified in labourers with airflow obstruction like bronchial asthma; chronic pulmonary diseases dyspnea was commonly associated.

In conclusion this case study showed that repeated, long term occupational airborne exposure in labourers of cement industry, increased the risk for developing respiratory symptoms and asthma. This effect was independent of sex, age and educational level. Smoking and occupational dust exposure act synergistically and can increase both severity of an occupational lung diseases and risk of developing respiratory symptoms.

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