



Prevalence of Skin and Respiratory Diseases in the Workers of Bird Markets

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ABSTRACT

Occupational health and safety is concerned with the safety, health and welfare of people engaged in work or employment. The majority of workers are facing occupational health problems in developing as well as in developed countries. Workers of bird markets are at higher risk of suffering from occupational skin and respiratory diseases. The present study was conducted to find out the prevalence of skin and respiratory diseases in the workers of bird markets. Study was based on survey, data collection through questionnaire and checklist, measurement of environmental parameters and also of lung function test of workers. Physical hazards, chemical hazards and ergonomic hazards were also observed. About 80% workers reported skin, and 77.7% reported respiratory diseases. Lung function test values (Mean FEV1% in summer: 57.9%, Mean FEV1/ FVC (%) in summer: 76.3%) (Mean FEV1% in winter: 53.2%, Mean FEV1/ FVC (%) in winter: 68.6%) were lower as compared to standard values. Majority of the workers were identified with restrictive defects which indicated prevalence of respiratory hazards in the bird markets. Workers health worsens during winter as they did not use the personal protective equipment. The present study may provide a baseline for further studies in this field.

INTRODUCTION

Occupational health and safety is concerned with the health, welfare and safety of people who are involved in work or employment. This involves protection of workers from diseases, injuries, illnesses and deaths. Proper working conditions and proper working environment should be provided to the workers so that the risk of diseases can be minimized. All work activities should be safe at the workplace which may include safe handling, storage and transportation of materials, and also provide adequate education, training and supervision in those activities (Baksh et al. 2015).

Work-related diseases have multiple causes, where factors in the work environment may play a role, together with other risk factors, in the development of such diseases (Elsby et al. 2008). For example, workers of bird markets are exposed to many airborne contaminants which are present in the bird markets. The dust in the air is comprised of many components which include skin debris, broken feathers, insect parts, aerosolised feed and faeces. Different types of bacteria and their endotoxins are also found in the organic dust. Rylander introduced the different types of respiratory diseases which are caused by this type of organic dust, i.e. toxic pneumonitis, irritation of mucous membrane, bronchitis, granulomatous pneumonitis, rhinitis and asthma (Hnizdo & Vallyathan 2003).

The skin is exposed to organic dust and other many pathogens in the bird markets which may cause different types of irritation and also may cause severe skin diseases.

These skin diseases include skin allergies, acne, contact dermatitis, eczema, wart and onychomycosis (Slominski et al. 2008).

Poultry dust is a mixture of bird feed, bedding material e.g. wood shavings/shreds or straw, bird droppings, feathers and dander (dead skin), dust mites and storage mites, and microorganisms such as bacteria, fungi (moulds) and endotoxins (cell wall components of bacteria). This dust causes skin problems among workers of bird markets. External agents tend mostly to come into contact with the hands and forearms, so around 95% of work-related skin diseases occur in this area. The majority of the remainder are on the face. Most work-related skin diseases are contact dermatitis. External agents are involved in an important minority of other work-related skin diseases (Gibbs 1996).

It has previously been shown that workers on poultry farms and bird markets are exposed to high levels of organic airborne dust contaminated with endotoxins, experienced symptoms of airway irritation and also a slight diurnal decrease of FEV 1. Exposure to poultry dust also occurs at poultry slaughter-houses (Hagmar et al. 1990).

Pet birds can also cause many respiratory diseases due to the biological contaminants present in their droppings. So the diseases are transferred from birds to human and then also from human to human (Hagmar et al. 1990). A virus which causes avian influenza found in the droppings of birds, which is a severe respiratory disease. Avian influenza virus affects the health of birds and humans by cough, fever,

upper respiratory tract infection and symptoms of gastro intestine, which may lead to death (Krauss et al. 2003). Influenza A viruses that reside naturally in wild bird species comprise all known subtypes and provide viral genes from which influenza viruses that infect both domestic poultry and mammalian species, including humans, arise (Harris 1991).

Histoplasma capsulatum is a fungus which causes histoplasmosis. *Histoplasma capsulatum* inhabits the digestive tract of birds, pollutes the soil through bird droppings, and mainly affect human lungs (Swayne & King 2003). Human infection most often results in conjunctivitis. Chills, fever, and lethargy are exceptionally rare (Deepe et al. 2005).

Another important respiratory disease which is caused by the organic poultry dust or poultry products is Salmonellosis. This disease caused by non-typhoidal bacteria known as *Salmonella* which is found in the bird markets (Capua 2004). A parasite which is known as *Giardia* is also found in the droppings of birds and causes the Giardiasis which is a protozoal infection of intestine. This infection can cause diarrhoea, abdominal pain, bloating, belching, nausea, and vomiting in humans. Cryptococcosis pulmonary disease is another disease caused by birds to humans, which is a severe respiratory disease. *C. neoformans* fungus which is found in dropping of pigeons triggered this respiratory disease (Hohmann 2005).

STUDY AREA

Three bird markets of Lahore city were selected for the study, these are Tollinton bird market, Dharampura bird market and Sammanabad bird market.

MATERIALS AND METHODS

Data collection: The present study was conducted for the assessment of prevalence of skin and respiratory diseases among the workers of bird market. It is based on risk factor identification, evaluation of general health profile and assessment of skin and respiratory diseases in workers of bird market. Questionnaires, checklist and spirometer were used for the collection of primary data. The study was conducted in the bird markets located in Lahore in the month of August and November 2016. The workers who are directly or indirectly exposed to multiple hazards on a daily basis were selected as a target group.

Survey: Questionnaires were filled from 45 workers of bird market and 5 workers of control group. Face to face interviews were held and questionnaires were administered. For the convenience of the workers, questions were asked in Urdu and Punjabi.

Measurement of lung function: Spirometry tests were performed to assess lung function and respiratory health of poultry farm workers. Spirometry test involved measurement of volume and flow of pulmonary inhalation and exhalation. The results of spirometry tests show normal, obstructive patterns, restrictive patterns and a combination of both obstructive and restrictive patterns. The normal spirometry readings result vary with weight, height and age.

All the tests were performed on standing worker as per standard procedure (Spirometry User Manual Version 2014). Nose clips were used by workers during the test. The workers were given some instructions to ensure the accuracy of the test results. Some of the instructions include taking a deep breath prior to the test; mouthpiece of spirometer should be closed properly by putting in mouth to obtain the correct values.

The lung function test was measured with the help of Geratherm Blue Cherry USB spirometer which is highly intuitive Windows-based software. This software was installed in the laptop through a CD. It is easy to handle and low in power consumption. It contains USB like structure which is known as Spirostick which is connected to a laptop or computer. SVC (slow vital capacity) test and the FVC (forced vital capacity test) test were conducted with the help of a spirometer which was displayed on the laptop screen. In FVC (forced vital capacity test), it displayed further values of forced expired volume in one second (FEV1%) and the ratio of forced expired volume in one second (FEV1%) to the forced vital capacity (FEV1/FVC%).

Measurement of temperature and humidity level: For the determination of the effects of temperature and humidity change on skin diseases and lung functions of workers, ambient air temperature and humidity were also measured in the bird market. Worker's health is directly affected due to changes in temperature and humidity. Indoor temperature and humidity were measured by digital temperature/humidity/clock that give accurate reading.

RESULTS

Results of checklist: A wide range of hazards was examined in the bird markets which include physical, chemical and ergonomic hazards. Poor waste management was also a big issue that was present in the workplace. Waste related to birds include droppings of birds, feathers, dander, slaughter waste, etc. So that is why poor waste management leads to growth of flies and insects on the waste and ultimately causing many diseases in the workers. In the backyard, heaps of waste were found, which causes bad smell.

High noise level was also observed in some areas of bird market, which is a physical hazard. Slippery floors,

Table 1: Lung function measurement of the workers of bird market and control group in summers (August) and winters (November).

Name	Age	BMI	Smoker	FEV ₁ FVC (%)	August FEV ₁ / Pattern	Lung Function	FEV ₁ FVC (%)	November FEV ₁ / Pattern	Lung Function
Worker 1	45	25.7	No	77	89	Restrictive	74	81	Restrictive
Worker 2	13	21.8	No	81	88	Normal	79	80	Restrictive
Worker 3	13	24.5	No	84	112	Normal	71	68	Obstructive
Worker 4	19	23.0	No	75	84	Restrictive	74	81	Restrictive
Worker 5	17	17.4	No	77	81	Restrictive	73	81	Restrictive
Worker 6	23	23.5	No	38	73	Restrictive	28	63	Obstructive
Worker 7	21	23.2	No	81	111	Normal	79	92	Restrictive
Worker 8	54	22.3	Yes	42	77	Restrictive	38	71	Restrictive
Worker 9	51	19.6	Yes	56	73	Restrictive	54	68	Restrictive
Worker 10	54	21.7	Yes	36	59	Obstructive	34	55	Obstructive
Worker 11	16	19.6	No	99	112	Normal	81	81	Normal
Worker 12	33	28.4	No	37	58	Obstructive	36	53	Obstructive
Worker 13	35	23.8	Yes	44	74	Restrictive	42	71	Restrictive
Worker 14	55	23.7	No	56	75	Restrictive	55	73	Restrictive
Worker 15	23	21.7	Yes	26	38	Obstructive	24	37	Obstructive
Worker 16	19	21.8	No	67	109	Restrictive	28	69	Obstructive
Worker 17	23	22.3	No	51	69	Obstructive	33	70	Restrictive
Worker 18	26	23.3	No	52	59	Obstructive	27	53	Obstructive
Worker 19	33	24.4	No	34	58	Obstructive	31	54	Obstructive
Worker 20	26	26.6	No	36	57	Obstructive	33	54	Obstructive
Worker 21	31	20.8	Yes	27	39	Obstructive	28	37	Obstructive
Worker 22	31	23.2	Yes	19	33	Obstructive	17	34	Obstructive
Worker 23	37	22.5	No	74	78	Restrictive	65	74	Restrictive
Worker 24	39	21.6	No	34	55	Obstructive	32	52	Obstructive
Worker 25	31	22.7	No	64	78	Restrictive	61	71	Restrictive
Worker 26	19	21.3	No	81	112	Normal	81	92	Normal
Worker 27	54	22.6	Yes	36	54	Obstructive	35	52	Obstructive
Worker 28	41	21.5	No	52	67	Obstructive	50	61	Obstructive
Worker 29	35	22.4	No	65	77	Restrictive	63	72	Restrictive
Worker 30	37	23.5	No	58	70	Restrictive	50	65	Obstructive
Worker 31	13	20.3	No	86	119	Normal	84	109	Normal
Worker 32	31	24.2	No	44	78	Restrictive	39	67	Obstructive
Worker 33	45	25.6	No	74	86	Restrictive	70	81	Restrictive
Worker 34	28	23.7	No	52	66	Obstructive	53	61	Obstructive
Worker 35	28	22.6	No	64	78	Restrictive	60	74	Restrictive
Worker 36	21	23.2	No	84	110	Normal	81	93	Normal
Worker 37	26	22.5	No	54	73	Restrictive	52	67	Obstructive
Worker 38	54	21.8	Yes	35	59	Obstructive	33	57	Obstructive
Worker 39	35	22.5	No	60	76	Restrictive	61	74	Restrictive
Worker 40	19	20.4	No	84	87	Normal	80	87	Normal
Worker 41	13	24.3	No	76	81	Normal	71	67	Normal
Worker 42	42	23.5	No	54	68	Obstructive	52	66	Obstructive
Worker 43	26	26.5	No	61	78	Restrictive	61	72	Restrictive
Worker 44	12	22.6	No	90	99	Normal	87	96	Normal
Worker 45	31	24.3	No	38	57	Obstructive	34	54	Obstructive
Control Group	27	18.4	No	82	111	Normal	81	101	Normal
Control Group	34	22.3	No	80	86	Normal	78	85	Normal
Control Group	34	21.6	No	83	84	Normal	81	82	Normal
Control Group	32	24.5	No	85	99	Normal	81	99	Normal
Control Group	39	28.6	No	92	114	Normal	90	110	Normal
Standard Value				80	70.0		80	70.0	

FEV₁: Forced expiratory volume (1st second)FEV₁/FVC: Ratio of forced expiratory volume (1st second) and forced vital capacity

Table 2: Lung function measurements (mean) of workers of bird market and control group in summers and winters.

	Season 1 (August)		Season 2 (November)	
	Mean of FEV1%	Mean of FEV1/FVC (%)	Mean of FEV1%	Mean of FEV1/FVC (%)
Target Group	57.9<80	76.3>70	53.2<80	68.6<70
Control Group	84.4>80	98.8>70	82.2>80	95.4>70

Table 3: Lung function patterns in the workers of bird market.

Frequency of workers	August		November	
	Frequency of workers	Lung function pattern	Frequency of workers	Lung function pattern
19		Restrictive defect	16	Restrictive defect
16		Obstructive defect	22	Obstructive defect
10		Normal variant	7	Normal variant

poor hygiene and other safety problems were also found in the workplace. Some of the shops in market use the chemicals as cleaning detergents, therefore, chemical hazards were less. Other workers washed their shops with water only, and they did not use any chemicals. Majority of workers were not using the personal protective equipment, as they were not aware about the use of PPE's.

Results of questionnaire: Workers of bird market also filled the questionnaires which comprised of demographics, general health status of workers, assessment of skin and respiratory diseases and also information regarding personal protective equipment and safety measures (Table 1).

Demographic data of workers of birds market: The results of demographic data showed that the 60% of workers were in the age between 20-40 years, while 22.3% were below 20 and 17.7% were above 40. Next question in this section was about their marital status. Most of the workers (60%) were married while 40% were unmarried. According

Table 4: Correlations of different variables.

Sr. No.	Correlations	Pearson's Coefficient	Significance (<i>p</i> value)
1.	Correlation between working hours and respiratory problems.	0.51	0.04
2.	Correlation between work experience and respiratory problem	0.77	0.02
3.	Correlation between use of personal protective equipment and respiratory problems.	0.62	0.03
4.	Correlation between smoking and respiratory problems.	0.87	0.01
5.	Correlation between use of personal protective equipment and skin problems.	0.61	0.02

to the education level, 35.6% respondents were illiterate. Only 6.7% respondents have done intermediate, while 20% workers have done 10th class..

As we know that daily working hours and work experience play a crucial part in the incidence and severity of disease, so these questions were also asked from the workers of bird market which showed that majority of the workers (40%) working in bird market were from 5-10 years. While 6.6% respondents had the working experience of above 20 years, 28.8% had the experience of 11-20 years and 24.4% workers were working here for less than five years.

Results of monthly income showed that the monthly income of 11.1% workers was below Rs. 10,000, 13.3% workers were having income between 10,000-20,000, 62.2% workers earned rupees 21,000-40,000 and the income of 17.7% workers was above Rs 40,000. The results of working hours revealed that majority of workers (51.1%) spent more than 8 hours in the bird market. 33.3% of workers worked more than 8 hours, while only 13.3% workers spent less than 8 hours in their working area.

General health status: Body mass index (BMI) of workers of the bird market was also calculated. Results revealed that the BMI of most of the workers (75.6%) was between 18-24 kg/m². 4.4% and 24.4% were having the BMI below 18 kg/m² and above 24 kg/m² respectively. Smoking habit of workers of bird market was also asked. The results found that 84.4% workers were nonsmoker while 15.6% workers were smoker. Question related to experience of vaccination was also asked from the workers which showed that only 8.8% respondents had the experience of vaccination, while others (91.2%) had not.

Skin disease assessment: Question related to skin diseases were also asked. Results revealed that 80% respondents said that they have skin diseases and 20% respondents said that

they do not have any skin disease symptoms. Out of 80% workers having skin diseases, 39% were having eye irritation, 66.6% were having skin allergy, 68.8% had acne, only 20% were having symptoms of wart and 15.6% respondents were having the symptoms of eczema.

Among 80% of workers, only 6.6% workers knew the reason of skin problem, while others (73.4%) did not know the reason. Only 17.7% workers used medicine for their skin problems. Among 80% workers, 22.2% workers said that their job is responsible for skin problems, while 57.8% said no. Family history regarding skin diseases was also asked. Results revealed that only 4.4% worker's families were also suffering from skin diseases. Majority of workers (74.6%) said that they face the skin problems in summers more as compared to winters.

Respiratory disease assessment: Respiratory diseases are also very common in the workers of bird market. So the questionnaire also contained the question regarding respiratory diseases which were asked from the workers. 77.7% workers said that they have respiratory diseases while 22.2% workers said they did not have respiratory disease. Among 77.7% workers having respiratory diseases, the percentage of workers facing the problem of breathing, cough, chest tightness, asthma, wheezing and nasal problem was 73.4%, 71.1%, 51.1%, 33.3%, 51.1% and 28.9% respectively.

Results about the family history of workers regarding respiratory diseases showed that only 6.6% worker's families were suffering from respiratory diseases. 71.1% workers said that they feel more respiratory problems when they work in their workplace, and when they move away or go home, they feel better. 11.1% respondent said that the reason behind their respiratory diseases is seasonal changes while others (66.6%) said it is due to dust allergy that is present in the bird market. Majority of respondents (53.3%) said that these respiratory diseases become more severe in winters, 17.7% workers said that respiratory problems become more severe in summer, while others (6.6%) said that they face these problems all over the year.

Safety measures: Safety measures play an important role in the incidence and severity of work-related diseases. Question regarding safety measures were asked from the workers of bird market. Results revealed that most of the workers (80%) were not using the personal protective equipment; only 20% respondent said that they used the personal protective equipment. Results also showed that all the workers among the 45 workers of birds market, washed their hands after completing their work. For good health, regular bath is very important for workers. Questions regarding regular bath were also asked which showed that only 37.8% workers

took bath regularly. Cleanliness of workplace is also very important as the disease incidence can increase if the workplace is not cleaned. So the results showed that 48.9% workers of bird markets said that they cleaned their working area while 51.1% respondents said no.

Temperature and humidity: Temperature and humidity were also measured during survey in both the seasons for the determination of effect of different seasons on lung functions of bird market workers. First of all, monitoring was done in August and later in November. In the month of August, average temperature was 32°C while in the month of November it was 27°C. Average humidity in August was 89% while in November it was 77%.

Results of spirometer: The results of spirometer were also obtained through Blue Cherry USB spirometer, which displayed the forced expired volume in one second (FEV1%), and the ratio of forced expired volume in one second (FEV1%) and forced vital capacity (FEV1/FVC %). It was found that the percentages of FEV1 and FEV1/FVC were lower in the workers of bird markets as compared to control group and standard values. According to mean of the pulmonary function test data obtained from spirometer, respiratory function of workers of bird market (FEV1%: 57.9%, FEV1/FVC (%): 76.3%) was not in acceptable limit as compared to the control group (FEV1%: 84.4%, FEV1/FVC (%): 82.2%). According to average pulmonary function test data of two seasons (summers and winters), the respiratory function of the workers of birds market in summers (FEV1%: 53.2%, FEV1/FVC (%): 76.3%) was better than in winters (FEV1%: 57.9%, FEV1/FVC (%): 68.6%) (Table 2 & 3 and Figs. 1-3). One of the studies was carried out in Egypt to assess the effect of exposure to organic dust on respiratory symptoms and lung function of exposed workers. It showed that respiratory symptoms such as cough, expectoration, wheezing, and shortness of breath were significantly higher among exposed workers as compared to unexposed. Moreover, the results of spirometer showed that FEV1%, FVC% and FEV1/FVC% parameters were also declined in the exposed workers (Siddique et al. 2012).

Correlations: Bivariate Pearson's correlation was run to check the correlation between different variables.

So the results revealed that *p* values of correlations between working hours and respiratory problems, work experience and respiratory problems, use of personal protective equipment and respiratory problems, smoking habit of workers and respiratory problems and use of PPE and skin problems are 0.04, 0.02, 0.03, 0.01 and 0.02 respectively (Table 4).

According to the results, workers were facing more respiratory problems in winters as compared to summers as the

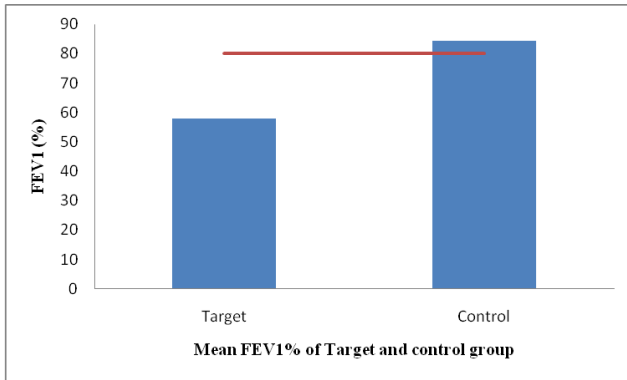


Fig. 1: Comparison between workers (target group) and control group about the mean of FEV1% in summers.

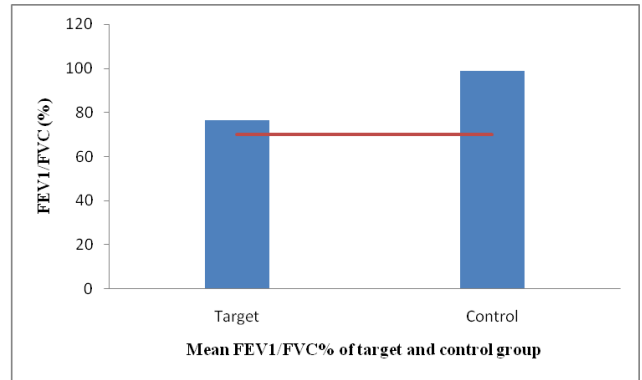


Fig. 2: Comparison between workers (target group) and control group about the mean of FEV1/FVC% in summers.

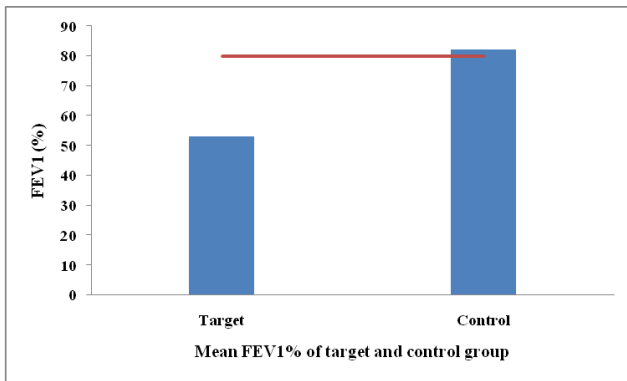


Fig. 3: Comparison between workers (target group) and control group about the mean of FEV1% in winters.

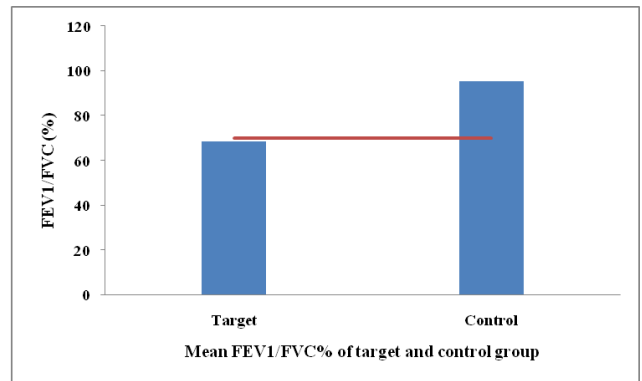


Fig. 4: Comparison between workers (target group) and control group about the mean of FEV1/FVC% in winter.

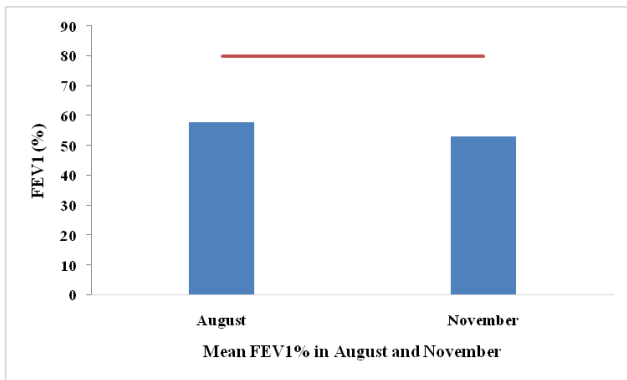


Fig. 5: Comparison of mean FEV1% in August and November.

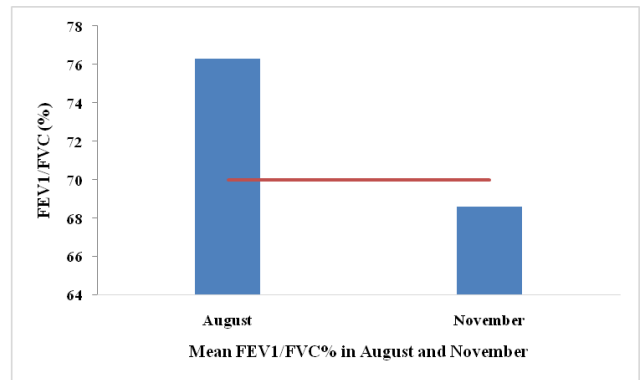


Fig. 6: Comparison of mean FEV1/FVC% in August and November.

FEV1% and FEV1/FVC% values were lower in the workers in winter as compared to summers. According to average pulmonary function test data of the two seasons (summers and winters), the respiratory function of the workers of bird market in summers (FEV1%: 57.9%, FEV1/ FVC (%): 76.3%) was better than in winters (FEV1%: 53.2%, FEV1/ FVC (%):

68.6 %) (Figs. 4-6). These results are supported by a study which confirmed that there were more moderate negative effects on lung function and the immune system during winter than during summers in bird market workers. In winter, concentrations for inhalable endotoxin for all animal types were usually higher than in spring or summer.

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