

## WORK-RELATED ALLERGIC DISORDERS AMONG FLOUR MILL WORKERS

Narjis A.H. Ajeel, Asaad K. Al-Yassen

### ABSTRACT

A cross-sectional comparative study was carried out to study the prevalence of occupational allergic disorders among flour mill workers. In this study the flour mill workers from three major flour mill industries in Basrah (study group) were compared to non exposed group from dairy products and pepsi cola industries (comparative group). The results showed that the prevalence of work-related allergic conditions as reported by workers and diagnosed by one of the investigators was significantly higher among the study group than that in the comparison group.

### INTRODUCTION

Occupational allergic disease is defined as the presence of symptoms induced by allergens present in the work environment<sup>[1]</sup>. Workers in the flour milling industry are exposed to flour dust in the workplace. Flour dust is taken to be the finely ground particles of cereal or pulses (*including contaminants*) which result from any grinding process and from any subsequent handling and use of that flour<sup>[2]</sup>. Flour dust is a hazardous substance; it is a respiratory sensitizer and is known to cause allergic rhinitis and occupational asthma. It is also an irritant and may give rise to short term respiratory, nasal and eye symptoms. It may provoke an asthmatic attack in individuals with pre-existing disease and lead to chronic bronchitis<sup>[2]</sup>. In UK, the review of flour dust began in the early 1990s as a result of findings from the surveillance of Work related and Occupational Respiratory Disease Scheme and the survey of Scottish bakeries which showed that bakery workers suffered widespread occupational ill health related to significant levels of flour dust exposure<sup>[2]</sup>. Although there are numerous studies on occupational allergens, there is still little information available regarding the epidemiology of allergic sensitization in the flour industry<sup>[1]</sup>.

In Basrah, several studies on occupational diseases were carried out<sup>[3,4]</sup>; however, none of them involved workers in the flour milling industry. Therefore, the present study was carried out to study the prevalence of occupational allergic disorders among flour milling workers.

### SUBJECTS AND METHODS

The study is a cross-sectional comparative study involving 185 flour milling workers from three

major flour milling industries in Basrah (study group), & 215 non exposed workers from dairy product industry and Pepsi cola industry (*comparison group*). A clinico-occupational questionnaire was developed for the purpose of the study, which contains items related to personal and family history of allergy, tobacco smoking habit, existence of nasal, ocular, respiratory and skin symptoms, relation of symptoms to any given area within the factory (*place of work*) chronology of symptoms (*daily, weekend, holidays*), duration of employment at the factory, use of protective measures, and previous occupations. The questionnaire was filled through direct interview. Then each worker was fully examined by one of the authors. The medical examination included: examination of respiratory system, eyes, and nose for any signs of allergic diseases. The clinical examination was done two hours after starting work.

Chi-squared & Fissure exact tests were used to determine associations between different variables &  $P < 0.05$  was considered to be statistically significant.

### RESULTS

A total of 400 workers were included in this study, 185 flour milling workers (exposed to flour dust in the work place), & 215 workers (un exposed to such hazard, comparison group).

All workers included in the study were males, the age of the flour milling workers ranged between 16-74 years with a median of 32 years, while the age of the comparison group ranged between 16-70 years with a median of 36 years. There were no significant differences between the two groups with respect to smoking habit and family history of atopy. (Table-1).

**Table 1. Characteristics of the study population**

	Total number of workers	Median age / year	Family history of atopy *		Smokers	
			No.	%	No.	%
Flour milling workers	185	32	48	25.9	60	32.4
Comparison group	215	36	57	26.5	82	38.1
<b>P - value</b>			<b>NS</b>		<b>NS</b>	

\*Atopy: Have definite family history of allergic symptoms.

Overall 51.9% of flour milling workers reported having one or more symptoms of allergy compared to 16.7% of the comparison group. Of the 96 workers who reported allergic symptoms 87(90.6%) mentioned that the allergic symptoms increase on starting and during work and improve after leaving the workplace, during weekends and on holidays. While symptoms

reported by the comparison group were unrelated to the working environment. (Table-2).

Flour milling workers complained mainly from nasal allergic symptoms (47%), followed by respiratory symptoms, and eye allergic symptoms, (45.9% and 41.6% respectively). (Table-2)

**Table 2. Prevalence of Work-Related allergic disorders among flour mill workers and the comparison group.**

	Study group (185)		Comparison group (215)		P-Value
	No.	%	No.	%	
Symptoms related to allergy*	96	51.9	36	16.7	<0.001
Symptoms related to starting work	87	47.0	0	0.00	<0.001
Respiratory symptoms	85	45.9	22	10.2	<0.001
Eye symptoms	77	41.6	18	8.4	<0.001
Nasal symptoms	87	47.0	32	14.9	<0.001
Symptoms improved on leave & weekend	81	43.8	0	0.00	<0.001

\*Symptoms related to allergic disorders in general (respiratory, nasal, or eye allergy)

Duration of employment was found to be an important epidemiological factor that influenced the prevalence of allergic symptoms. Workers with a longer duration of employment reported a higher prevalence of symptoms (62.6%) than those with shorter duration (10.5%). Furthermore a statistically significant (P<0.01) association was detected between presence of allergic symptoms and site of work (which

determines the level of exposure to flour dust). The study showed that 65.2% of those with a high level of exposure to flour dust in the workplace (packing unit) had symptoms of allergy compared to 31.5% in those with a low level of exposure (all other units). While no significant association was found with positive familial or personal history of allergy, nor with tobacco smoking. (Table-3)

**Table 3. Prevalence of work-related allergic disorders among the study group according to selected risk factors.**

Risk factors		Total No.	% with symptoms	P-value
Age/years	<40	151	56.3	<0.01
	40+	34	32.4	
Duration of employment / years	<5	38	10.5	<0.01
	5+	147	62.6	
Family history of atopy	+ve	48	50.5	NS
	-ve	137	52.6	
Smoking	+ve	60	53.3	NS
	-ve	125	51.2	
Level of exposure to flour dust (based on site)	High	112	65.2	<0.01
	Low	73	31.5	

Furthermore, a significantly and markedly higher percentage of flour milling workers as compared to comparison group showed positive

physical signs of allergic conditions (40.5% and 10.2% respectively). (Table-4)

**Table 4. Distribution of the Flour mill workers & the comparison group according to presence or absence of physical signs.**

Physical sign	Study group		Comparison group		Total	
	No.	%	No.	%	No.	%
Positive*	75	40.5	22	10.2	97	24.2
Negative	110	59.5	193	89.8	303	75.8
Total	185	100.0	215	100.0	400	100.0

P-value < 0.01

\*Presence of at least one sign of allergy (respiratory, nasal, or eye allergy)

## DISCUSSION

There is large number of studies regarding occupational allergens, the causatives of allergic sensitization. However, one of the most important and among the best studied occupational allergic diseases is occupational asthma<sup>[1]</sup>. More than 200 agents have been established as causes of occupational asthma, and numerous studies have indicated that work-related factors account for >10% of cases of adult onset asthma<sup>[5]</sup>. One of the most prevalent occupational asthma is baker's asthma, frequently caused by sensitization to cereal flour allergens<sup>[6]</sup>. In the present study, the prevalence of work-related allergic symptoms among flour mill workers was 51.9%. This figure is broadly comparable to those reported by other similar studies. In Norway a study was conducted on bakery workers to investigate the relationship between flour dust exposure and work related allergic symptoms. The study found that 62% of bakery workers examined had symptoms which could be work related<sup>[6]</sup>. In UK, a cohort study was carried out to estimate the incidence of allergic symptoms among bakery and flour mill workers. The estimated incidence rates for work related eye/nose and chest symptoms were 11.8 and 4.1 cases per 100 person-year, respectively. It was concluded that although the average dust exposures were within UK occupational standards, the risks of development of upper and lower respiratory symptoms are clearly related to total dust and or/flour aeroallergen exposure<sup>[7]</sup>.

*In the present study* a correlation existed between the reported symptomatology and type of work performed. Furthermore 90.6% of the cases clearly related their symptoms to the exposure to the dusty environment in their occupational settings. The study also found that the longer the duration of employment the higher the prevalence of allergic symptoms. While family and personal history of allergy did not seem to influence the prevalence of these symptoms. These findings are similar to those reported in other studies<sup>[2,5,8]</sup>. It is interesting to note that advanced age was not associated with an increase in the prevalence of allergic symptoms suggesting that these symptoms are related to irritation and sensitization to flour particles at workplace rather than to chronic permanent damage. A study in India found that age had no influence on the incidence of cough and rhinitis in bakery workers, however, age significantly influenced the incidence of breathlessness<sup>[8]</sup>. Another interesting finding in our study is that there was no evidence of significant association between allergic symptoms and tobacco smoking. The Indian study found that smoking habit influenced significantly the incidence of cough but had no direct effect on breathlessness and rhinitis<sup>[8]</sup>.

*In conclusion;* the results indicated that flour mill workers had definite work-related allergic symptoms. Therefore, in practice all workers who are exposed to flour dust as part of their day to day work, whether working in a bakery or any other establishment using wheat flour must be under adequate health surveillance.

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