

Research Article

## Investigating the pesticides impact on mental health of exposed workers – Iran

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### Abstract

**Importance:** *Concern about occupational health and safety and the potential widespread effects of environmental contaminants has provided the impetus for research concerning the behavioral effects of organophosphate (OP) compounds.*

**Objective:** *In this study we evaluated the impact of pesticides on physical symptoms, Anxiety, and Sleep Disorders, Social Performance, and Depression in exposed workers.*

**DESIGN, SETTINGS, AND PARTICIPANTS** *This study was performed on workers in a pesticide factory. The tools of this research are a questionnaire. The questionnaire was distributed among 70 employees of the pesticide manufacturer. General Health Questionnaire (GHQ-28) was used in this study. This questionnaire, developed by Goldberg, is one of the most well-known screening tools for mental disorders. Data analysis was performed using SPSS statistical software version 26.0 (IBM Corp). The significance level was set at  $\alpha = .05$ , and all tests were 2-tailed.*

**Main Outcomes And Measures:** *The results show that there is no significant difference between educational level and physical symptoms ( $P$ -value=0.9), anxiety and sleep disorders ( $P$ -value= 0.2), Social Performance ( $P$ -value= 0.6), and depression ( $P$ -value=0.6). Statistical analyses show that there is a significant difference between age and depression( $P$ -value=0.09).*



**Results:** *The study shows "excessive" dreaming, nightmares, and somnambulism. Similar to other behavioral findings, occupational use of OP pesticides, in the absence of overt signs of toxicity does not result in sleep disturbance according to interview data. Integration of clinical and laboratory studies indicates that OP poisoning frequently precipitates a depressive syndrome and may reverse hypomanic symptoms.*

*The present study confirms other studies. Due to the effects of pesticides on physical symptoms, anxiety, and sleep, social functioning, and depression using advanced protectors in factory devices to prevent pesticide leakage, change the production process and the basis of the chemical formula of pesticides on public health. Protective measures such as the distribution and mandatory use of filtered masks and the use of personal monitoring devices, informing and educating staff about the effects of the pest on people who are exposed to it, reduce its effects on the face.*

## Introduction

Concern about occupational health and safety and the potential widespread effects of environmental contaminants has provided the impetus for research concerning the behavioral effects of organophosphate (OP) compounds. (1) Pesticides, which are a major form of OP compounds, have a particularly diffuse environmental impact Chlorinated hydrocarbon pesticides such as DDT are being substantially replaced by OP compounds, which have higher toxicity in humans following acute exposure. (1-3) The investigation of affective disturbances associated with OP toxicity has practical and theoretical implications. depression is viewed as a result of cholinergic predominance, whereas mania is considered an expression of adrenergic predominance. (2, 4, 5)

Sleep disturbance, a frequent manifestation of clinical depression, has also been noted in patients with OP poisoning. Case reports of toxic workers have documented insomnia and decreased rapid eye movement sleep. Acute and prolonged administration of an anticholinesterase to normal subjects has also been shown to produce insomnia. OP toxicity has also been associated. (6, 7)

with "excessive" dreaming, nightmares, and somnambulism. Similar to other behavioral findings, occupational use of OP pesticides, in the absence of overt signs of toxicity does not result in sleep disturbance according to interview data. (8, 9) Integration of clinical and laboratory studies indicates



that OP poisoning frequently precipitates a depressive syndrome and may reverse hypomanic symptoms. The possibility of subclinical depression in exposed individuals without obvious signs of toxicity has received scant attention, but the available evidence does little to support this view. (10, 11) Clinical observation has indicated that manifestations of anxiety and irritability are prominent effects of OP toxicity that may persist for several months after termination of exposure There is general agreement that anxiety and irritability often contribute to the clinical picture of OP toxicity. (10, 12, 13)

In this study, we evaluated the impact of pesticides on physical symptoms, Anxiety, and Sleep Disorders, Social Performance, and Depression in exposed workers.

## Method

### Study design

This study was performed on workers in a pesticide factory. The tools of this research are a questionnaire.

### Participant

The questionnaire was distributed among 70 employees of the pesticide manufacturer. Participants were assured that their information would remain confidential with the researcher. All questionnaires were completed and the researcher was instructed.

## Outcomes and Covariates

General Health Questionnaire (GHQ-28) was used in this study. This questionnaire, developed by Goldberg, is one of the most well-known screening tools for mental disorders. In this research, its 28-question form has been used, the questions of which include four subscales, each of which includes 7 questions. Questions 1-7 are related to the scale of physical symptoms and general health status. Questions 8-14 are related to the Anxiety Scale, questions 15 to 21 are related to the Social Dysfunction Scale, and questions 22-28 are related to the Depression Scale.

### 1- Scoring method:

There are two types of scoring methods for this test. One of the traditional methods is that the options are scored as (0-0-1-1) and the maximum score of the person will be 28. Another scoring method is the Likert method, in which the options are scored as (0-1-2-3). The maximum score of the subject with this



method in the mentioned questionnaire will be 84 (Lindsay and Powell, 2000). Likert is usually used in most studies. Also, if the scores obtained are not recoded, a higher score indicates greater mental health. In the present study, the Likert scoring method was used.

## **2- Validity and reliability of GHQ-28 test:**

The present questionnaire is standard and has been standardized in Iran and other countries. In one study, this questionnaire was measured simultaneously with a parallel test (MHQ) that the correlation coefficient of the two tests was 55 and the correlation coefficients between the subtests of this questionnaire with a total score between 0.72 to 0.87, which indicates its high validity. Also, this test has a high reliability that the calculated alpha value for all its items is 0.90(14).

## **Statistical Analysis**

Data analysis was performed using SPSS statistical software version 26.0 (IBM Corp). The significance level was set at  $\alpha = .05$ , and all tests were 2-tailed. The original scores of the 4 measurement tools were not normally distributed and so are presented as medians with interquartile ranges (IQRs). The ranked data, which were derived from the counts of each level for symptoms of job stress, are presented as numbers and percentages.

The nonparametric Mann-Whitney U test and Kruskal-Wallis test were applied to compare the severity of each symptom between 2 or more groups. To determine potential risk factors for symptoms of job stress between risk factors and outcomes are presented as odds ratios(ORs) and 95%CIs, after adjustment for confounders, including sex, age, marital status, educational level, working shift, working position.

## **Demographic Characteristics**

All participants in factory were male. The number of married people in the pesticide factory was 93%. The work experience in factory was 10 years. Also, the number of children in the factory was 2.1%.Twenty seven percent of participant were educated. (Table 1).

**Table1- Demographic Characteristics**

Number of children	marital status(%)		Gender(%)		Average work experience (years)	education		
	single	married	men	women		educated	un educated	
2.1	7	93	100	0	10	27	73	<b>Pesticide factory</b>

### Severity of Measurements and Associated Factors

The results show that there is no significant difference between educational level and physical symptoms (P-value=0.9), anxiety and sleep disorders (P-value= 0.2), Social Performance (P-value= 0.6) and depression (P-value=0.6). Statistical analyses show that there is a significant difference between age and depression(P-value=0.09).

**Table2- coloration between demographic characteristic and General Health**

		Physical Symptoms	Anxiety and Sleep Disorders	Social Performance	Depression
P value					
Education	un educated	0.9	0.2	0.6	0.2
	Under un educated	0.1	0.4	0.4	0.4
	educated	0.8	0.1	0.2	0.1
Marriage		0.2	0.5	0.6	0.3
Age	21-35	0.4	0.8	0.6	0.7
	36-50	0.3	0.7	0.7	0.8
	>51	0.1	0.4	0.9	0.09

### Discussion

Increasingly wide spread application of organophosphate pesticides has underscored the importance of studying their effects on human behavior (4). Clinical reports and laboratory investigations have



generally supported the assumption that neurobehavioral manifestations of organophosphate toxicity are attributable to accumulation of acetylcholine at central and peripheral synapses as a result of cholinesterase inhibition. Despite methodological shortcomings in many of the published studies, investigators generally agree on the presence of several behavioral sequelae of organophosphate poisoning: impaired vigilance and reduced concentration, slowing of information processing and psychomotor speed, memory deficit, linguistic disturbance, depression, and anxiety and irritability. The few studies of asymptomatic workers at risk for repeated exposure to organophosphate pesticides have produced only equivocal findings concerning the presence of less severe or latent forms of these behavioral abnormalities (6, 15, 16).

### LIMITATIONS

This study has several limitations. First, it was limited in scope. All participants were men. Second, not all employees were interested in completing the questionnaire.

### Conclusion

The study shows with "excessive" dreaming, nightmares, and somnambulism. Similar to other behavioral findings, occupational use of OP pesticides, in the absence of overt signs of toxicity does not result in sleep disturbance according to interview data. Integration of clinical and laboratory studies indicates that OP poisoning frequently precipitates a depressive syndrome and may reverse hypomanic symptoms.

The present study confirms other studies. Due to the effects of pesticides on physical symptoms, anxiety and sleep, social functioning and depression using advanced protectors in factory devices to prevent pesticide leakage, change the production process and the basis of the chemical formula of pesticides on public health. Protective measures such as the distribution and mandatory use of filtered masks and the use of personal monitoring devices, informing and educating staff about the effects of the pest on people who are exposed to it, reduce its effects on the face.

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