



# Journal of Medical Sciences

ISSN 1682-4474

**science**  
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***JMS (ISSN 1682-4474) is an International, peer-reviewed scientific journal that publishes original article in experimental & clinical medicine and related disciplines such as molecular biology, biochemistry, genetics, biophysics, bio-and medical technology. JMS is issued six times per year on paper and in electronic format.***

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## **Relationship Between Occupational Stress and Non-Insulin-Dependent Diabetes in Different Occupation in Hamadan (West of Iran)**

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To investigate the relation between occupation stress and the development of non-insulin-dependent diabetes mellitus (NIDDM), We selected 123 employees among 3229 people that diagnosed as NIDDM as subject group and also 150 people that has normal blood glucose as control group. First questionnaire was used to report characteristics of each subject and second questionnaire has 55 questions about work condition, job environment and personal feeling. The stress factors in study and control group were 151.8 and 128.1, respectively and a significant difference were seen between two groups ( $p < 0.005$ ). We have not seen any significant difference among occupations but drivers has more occupational stress than other occupations. This research suggested that occupational stress is related to the development of NIDDM and stress related to interpersonal relationship, physical demands and lack of job interest.

**Key words:** Occupational stress, occupation, NIDDM

## INTRODUCTION

Various factors including heredity, obesity, lack of exercise and sociopsychological factors have been implicated in the onset and aggravation of Non-Insulin-Dependent Diabetes (NIDDM) (Bennet *et al.*, 1992; Dowse *et al.*, 1991; Everhart *et al.*, 1992; Tsuchida *et al.*, 2001). Since many of these factors are influenced not only by personal circumstances but also by occupation and work environment. The association between working conditions and the risk of type 2 DM has been reported showing that air traffic controllers who engaged in a high demand job had a higher prevalence of diabetes than other researchers (Cobbs and Rose, 1973). It is reasonable to consider that occupation is related to the development of NIDDM. Insufficient studies have focused on the relation between the development of NIDDM and occupational stress.

Experimental studies in both animals and human have also reported that psychological stress increases blood glucose and decrease insulin activity that then could lead to glucose intolerances (Surwit *et al.*, 1992).

The stress in Iranian people is different to other people that living in other countries because of difference in the style of management, incoming of people, condition of job, culture etc., However to our knowledge there is no published study on the significance of work stress in association with type two diabetes in Iranian people.

The objective of this study was to examine the association of occupational stress with type 2 diabetes with control groups in (Hamadan) west of Iran.

## MATERIALS AND METHODS

The subjects of this study were 123 male employees people that registered in center of Diabetes in Hamadan City (West of Iran). Subjects were selected among 3229 people that diagnosed diabetes type two by health center and registered in Center of Diabetes. The selection of cases were based on inclination of each subject to participate in study, suffer from diabetes type two and refer to health center on regular. The characteristics and diseases history of each subject was reported in a medicine file at Diabetes Center. The 150 subjects that have normal blood glucose were used as control group. Control group were chosen among relatives of study group. The control group were matched with the exposed group based on age, weight, smoking, living area and job. All of the subjects in the control and studied groups were male. This study focused exclusively on the men because most of the women were housekeeper. The data collection was carried out between 2001 to 2002.

We used two questionnaires. The first, a short questionnaire containing questions about age, weight, height, occupation, history of diabetes, family history of diabetes, duration of employment, cigarette consumption and working condition. This questionnaire completed by each subject and refer to his medicine file.

Evaluation of occupation stress was carried out by second questionnaire that recommended by Rice (1998), Cooper (1983), Cordes and Dougherty (1993). This questionnaire was been tested in a sample of 275 school psychologists and the reliability was 0.921 (Cordes and Dougherty, 1993). This questionnaire has 55 question about work condition, job environment, personal feeling that workers encounter in their jobs. An index on each was created from scores that ranged from 1 to 5 points from a five-scale responding alternative, never, rarely, sometimes, often and most times. The scale markers ask subject, to judge, to the best of his knowledge, the approximate percentage of time the condition or feeling is true. The total scores for each subject compared to category scores for each kind of stress (Table 1).

The questions from 1 to 26 measures stress due to problems in interpersonal relationships and to job satisfaction or dissatisfaction question from 27 to 48 measures the physical demands of work that wear on the personal daily and finally the questionnaire from 49 to 55 measure job interest and involvement on each scale, a high score means more job related stress.

The statistical packages of SPSS was used to perform statistical data analysis. For comparing the family history of NIDDM in subjects with control groups, Chi-square test was used. Unpaired t-test was used to show difference of occupational stress scale between control and subject groups.

## RESULTS AND DISCUSSION

Results showed that there were not any significant difference in mean values of age, duration of employment and weight (Table 2). There was a significant difference between control and study group with t-student ( $p < 0.005$ ) (Table 3).

We have not seen any significant difference among different kind of occupations but the total stress in drivers was more than other occupations (Table 4).

The purpose of the present study was to evaluate whether the work environment stress is also related to development of NIDDM. The results of the present study was shown a significant difference between occupational stress in people diagnosed as NIDDM and control groups, results also shown a high stress condition in different job that related to problems in interpersonal relationship, physical demands of work and lack of job

Table 1: The category scores for each kind of stress (Cordes and Dougherty, 1993)

	Low stress	Normal stress	High stress
Interpersonal	39-46	51-57	62-75
Physical	35-44	48-55	58-67
Interest	13-17	18-21	23-27
Total	91-111	117-134	141-167

Table 2: Characteristics of all subjects and control group in west of Iran

	Study group		Control group	
	Mean	SD	Mean	SD
Age	50.74	14.97*	49.7	16.4*
Duration of employment	23.90	12.40*	25.2	13.5*
Weight	75.50	16.99*	71.8	11.6*

\*Significant difference with Chi-Square (p<0.01)

Table 3: The kind of stress in subject and control groups

Group	Kind of stress			
	Interpersonal	Physical	Interest	Total
Study				
Subjects	63.1	60.34	26.63	151.8*
Control group	54.0	53.10	20.90	128.1*

\* Significant difference with t-student (p<0.005)

Table 4: Kind of stress in NIDDM people with different occupations

Occupation	Kind of stress			
	Interpersonal	Physical	Interest	Total
Agriculture N=15	64.2	60.16	21.07	145.43
Teacher N=10	64.2	62.0	19.5	145.70
Business 28	56.6	61.8	25.52	144.92
Driver N=20	68.2	63.2	20.4	151.80
Army N=14	65.8	53.16	26.8	145.76
Laborer N=16	60.7	60.6	25.9	147.20
Staff at office N=20	57.5	60.4	28.5	146.40

interest. The high rate of stress in people is not only concern to job stress but also related to non-occupational stress such as social, economic problems.

In light of the hitherto established predisposing factors such as obesity, lack of exercise and sociopsychological factors, It is reasonable to suppose that the work environment influences the development of NIDDM.

Exposure to long-term stress affects the entire neuroendocrine system, activating the hypothalamo-pituitary adrenal (HPA) axis and/or the central sympathetic nervous system (Bjornorp, 2001). Increased cortisol levels following activation of the HPA axis could play a role in the development of the decreased glucose tolerance. Thus, cortisol has been shown to induce insulin resistance by increasing hepatic glucose production suppressing glucose usage and inhibiting insulin secretion (Surwit *et al.*, 1992; Delaunay *et al.*, 1997; McMahon *et al.*, 1988).

Agradh *et al.* (2003) carried out a study concern to relationship between work stress and low sense of coherence (SOC) is associated with type 2 diabetes in middle-aged Swedish women and concluded that stress factors such as low decision latitude at work and low SOC were associated with Type 2 diabetes in middle aged Swedish women.

Nakanishi *et al.* (2001) investigated about hours of work and the risk of developing impaired fasting glucose of type 2 diabetes mellitus in Japanese male office and concluded that longer overtime is a negative risk factor for the development of impaired fasting glucose or Type 2 DM in Japanese office workers

We have not seen any significant difference between stress in different jobs but stress rate in transport drivers was more than other occupations. In a study in Hong Kong, the prevalence rate and mortality rate of NIDDM have been reported to be high in managers workers in transport and in air traffic controllers. It has also been reported that the morbidity prevalence and mortality rates for cardiovascular disease were high in workers in transport, with this being attributed to the low level of physical activity irregular work schedules and high level of psychological stress characteristics of this occupation (Ng, 1988). These factors are also likely to influence the development of NIDDM.

Morikawa *et al.* (1997) have done a study in Japan for investigate the relation between occupation and the development of non-insulin-dependent diabetes mellitus (NIDDM). They concluded that incidence of NIDDM in workers in transport was higher than the laborers independently of the well-known etiologic factors such as obesity and family history.

A recent cross-sectional study (Mooy *et al.*, 2002) in the Netherlands has shown that stressful life events e.g., death of partner and moving from a house, are associated with the risk of type 2 diabetes.

The association between working condition and the risk of type 2 diabetes mellitus has been reported showing that air traffic controllers who engaged in a high demand job had a higher prevalence of diabetes than other workers (Cobbs and Rose, 1973). It was also reported that job strain and job stressors including a lack of work site social support were associated with increased concentration of glycosylated hemoglobin among non-diabetic populations (Netterstrom *et al.*, 1991; Kawakami *et al.*, 1989).

## CONCLUSIONS

Occupational stress cause to increased the NIDDM in different job among people that occupance in west of Iran. As there was a significant difference between stress

in study and control groups this study conclude that stress is an important and effective factor in aggravation of Non-Insulin-Dependent diabetes. The occupational stress is high in different jobs and it concerns interpersonal relationships, physical demands of work and lack of job interest.

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