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Work-Induced Stress, Accidents, Musculoskeletal Dysfunctions and Quality of Life of Egyptian Pharmaceutical Sales Representatives

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ABSTRACT

Background: Peripatetic sales staff constitutes a significant part of the pharmaceutical industry workforce, comprising between 5 to 20% of individual companies' workforces. ***Objectives:***1-Assessment of pharmaceutical sales representatives affection by some work-induced health problems: stress - accidents and musculoskeletal dysfunctions in comparison to an occupation of different nature 2-Identifying occupational risk factors that may predispose to these health problems 3-Categorization of their quality of life and lastly, providing an illustrative educational message dealing with prominent predictors of these health problems. ***Subjects and methods:*** Comparative cross sectional study among pharmaceutical sales representatives and drug providers of pharmacies. The sample was 216 pharmaceutical sales representatives and 216 drug providers who filled a self-structured questionnaire collecting information of socio-demographic data, occupational profile, history of work-related accidents, musculoskeletal dysfunctions and scales of stress and Quality of life. After analysis of the data, an occupational training session was arranged for introduction of educative message about identified health problems in the exposed group (pharmaceutical sales representatives). ***Results:*** This study showed that, more than three quarters of the studied pharmaceutical sales representatives (76%) suffer from severe stress. This stress was affected by job instability and bad relationship with the manager. Also, 89 % of the studied pharmaceutical sales representatives collectively had musculoskeletal complaints and some of it affect their normal activity the risk of musculoskeletal dysfunctions increased with driving, heavy bag load and severe stress. . The study showed also that, about two thirds of the studied pharmaceutical sales representatives (60.3%) had previous car accidents during work time. The risk of car accidents increased in those who work for long periods and those who have severe stress. Lastly, about two thirds of the studied pharmaceutical sales representatives (65.3%) expressed their quality of life as moderate. Their quality of life was affected by musculoskeletal dysfunctions, stress level and sex. ***Conclusion and recommendations:*** Egyptian PSRs suffer from severe stress and musculoskeletal dysfunctions.They are also in great danger for having car accidents .These problems affect their quality of life badly. So, enforced medical measures, control for predisposing factors and periodic training are needed to improve their health and quality of life.

Key words: workforce, pharmaceutical sales, health problems

Introduction

Pharmaceutical sales representatives main duties are to provide literature about different types of drugs manufactured by their employer and distributing information about these drugs to doctors, hospital nurses, medical technicians and other health care practitioners. They do not take drug orders from these health care practitioners but instead try to persuade doctors to prescribe more of their companies' drugs (Stringfellow, 2010). The working conditions of pharmaceutical sales representatives are relatively hard. Their daily work hours are fairly long. They drive long distances and carry heavy bags full of promotional products. The pharmaceutical policy is changing very often and most of them suffer from lack of job stability (Tandera *et al.*, 2007). Several problems are considered when assessing the occupational health problems associated with the sales force. The predominant issues fall into three categories: Car accidents; musculoskeletal disorders and stress (Harris *et al.,* 2003).

Aim and Objectives:

Aiming to improve health and quality of life of Egyptian pharmaceutical sales representatives, we need to:1- Assess their affection by some work-induced health problems: stress, accidents and musculoskeletal dysfunctions in comparison to control group of different occupation-2-identify occupational risk factors that may predispose to these health problems-3- categorize their quality of life and lastly, providing an illustrative educational message dealing with prominent predictors of these health problems.

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Subjects and methods

A comparative nested cross section study was conducted between pharmaceutical sales representatives and drug providers in pharmacies at Mansoura city- Dakahlia Governorate. It was followed by an occupational training session for the Target population. The sample size was calculated using Epi-Info 6.1 knowing that musculoskeletal dysfunctions prevalence among pharmaceutical sales representatives ranged from 2.7 to 55.4% in different body parts (Tandera *et al.,* 2007). So, a 29% (mean prevalence) of estimated problem at a CI of 95%, 80% study power and the average total PSRs population allover Egypt was 100,000 sales rep, so, estimated sample size was calculated to be 216 accounting for 20% non-response or drop out cases and an equal number from control was included.

Inclusion criteria: pharmaceutical sales representatives subjects who are assigned a full time and worked for duration not less than one year

Exclusion criteria: history of previous job, chronic diseases or less than one year work duration.

Sample selection: through a multistage sampling technique (dividing Egypt into 5 areas (pharmaceutical companies classification) yielding East Delta area with the main city (Mansora) which was clustered into 5 main meeting sites of pharmaceutical sales representatives meetings**: (**medical syndicate, engineering syndicate, Gezeret el- ward and another two private big restaurants .From each where, 40-45 pharmaceutical sales representatives were selected by a systematic random way with attendance dependent k interval.

Data collection

***A- First interview*:** five parts self-administrated questionnaire was used.

Part one: included questions about socio-demographic data.

Part two: included questions about occupational history

Part three: included questions about musculoskeletal dysfunctions based on Nordic Musculoskeletal Questionnaire (NMQ) proposed by Kuorineka *et al.* (1987).

Part Four: included questions about stress by using National Stress Awareness Day (NSAD) questionnaire proposed by British international stress management association (ISMA, 2007). It include 24 questions answered by yes or no with yes gives 1 point and no gives 0 point and according to the total score, the stress levels were classified into:4 points or less: Least likely to suffer from stress-related illness (mild stress), 5 - 13 *points:* More likely to experience stress related ill health either mental, physical or both (moderate stress), 14 *points or more:* Most prone to stress showing a great many traits or characteristics that are creating un-healthy behaviors and more likely to experience stress & stress-related illness e.g. diabetes, irritable bowel, migraine, back and neck pain, high blood pressure, heart disease/strokes and mental ill health such as depression, anxiety & stress (severe stress).

Part Five: included questions about Quality of life by using Short Form 36 questionnaire (SF-36) proposed by Mc-Horney *et al.*, (1993) which include 36 questions in 8 health concepts:

1-General health (GH). 2- Physical functioning (PF). 3- Social functioning (SF). 4-Role limitation due to physical problems (RP). 5-Role limitation due to emotional problems (RE). 6-Mental health (MH)**.** 7-Vitality (V). 8-Bodily pain (BP).

Likert scale with different dimension was used. It ranged from 3 points likert scale to 5 points likert scale. Some questions were reverse coded.

Total score are summed and relative frequencies were calculated. According to the relative frequency on each health concept and on total score, the quality of life classified into:

Bad Quality of life ≤ 50%.

Moderate Quality of life from 50 to ≤ 75 %.

Good Quality of life > 75%.

***B- Second interview*:** two months later, after data analysis, the results of comparison showed significant PSRs affection by studied parameters of work stress, high accidents rate, musculoskeletal dysfunctions and bad quality of life so, an occupational training session was arranged to be presented in the same places of pharmaceutical sales representatives meeting sites to improve their health and quality of life.

Included information was: 1-Stress coping and simple relaxation techniques to overcome stress at work (American Psychological Association, 2013) and key points of time management procedures (Morgenstern, 2004).

2-Safety tips of driving :fitness for driving, judgment of fatigue and its hazards, mobile phone using effects, safer speeds and vehicles, dangerous behaviors and good decision making (Government of south Australia-Department of planning, transport and infrastructure,2015).

3-Simple illustration of muscles groups, ergonomics, coordination, correct manual handling and needed group muscles exercises (Mark Middle Worth, 2014).

Data management:

The collected data were computerized and statistically analyzed using SPSS program (Statistical Package for Social Science) version 16.0. Qualitative data were represented as frequencies and percentages, Chi-square test (χ^2), and Fisher exact test were carried out for comparing the qualitative data .Analysis of regression was computed to evaluate significant predictors significance was considered when p-value <0.05.

Ethical considerations: Informed consent was obtained from all participants in the study after they were told about its objectives confirming confidentiality.

Results:

Table 1: Occupational characteristics of studied pharmaceutical sales representatives and their control group.

Variables	PSRs		Control		X^2	P
	N=216	%	N=216	%		
Cumulative working period:						
Median = 7056 hs - Range (1200-48384)						
≤ 7056	108	50.0	88	40.7	3.74	0.053
> 7056	108	50.0	128	59.3		
Job stability:						
Stable	84	38.9	96	0.44	1.37	0.24
Unstable	132	61.1	120	0.56		
No.of hs. of mobile phone use/day:						
Median = 2 hs - Range(1-4)						
≤ 2	176	81.5	215	99.53	40.99	0.000
>2	40	18.5	1	0.004		
Relationship with manager:						
Bad	9	4.2	5	0.23	1.20	0.549
Satisfactory	142	65.7	146	0.67		
Good	65	30.1	65	0.30		
Relationship with colleagues:						
Bad	5	2.3	3	0.013	28.7	0.000
Satisfactory	86	39.8	37	0.171		
Good	125	57.9	176	81.0		
Bag load**:						
Median = 24 (Kg/h) -Range(1-81)						
≤24	112	52.0	216	100.0	136.9	0.000
>24	104	48.0	0	0.0		
No. of driving hours/day:	N=151		N=39			
Median = 3 hs.- Range(1-6)						
≤3	82	54.3	38	97.4	24.78	0.000
>3	69	45.7	1	2.6		
+ve history of car accident:	91	60.3	11	28.0	12.8	0.000
Accident cause:	N=91		N=11			
Others fault	34	37.4	5	12.8	fisher	0.416
high speed	15	16.5	3	7.6	fisher	0.30
tiredness and stress	36	39.6	2	5.1	fisher	0.145
mobile phone use	6	6.5	1	2.5	fisher	0.56
Sever stress	164	76	32	14.8	164.34	0.000

**Cumulative working period = working hours × working days × working weeks × working years **Bag load=bag weight × no. of hours of carrying the bag/day (Kg/hour).*

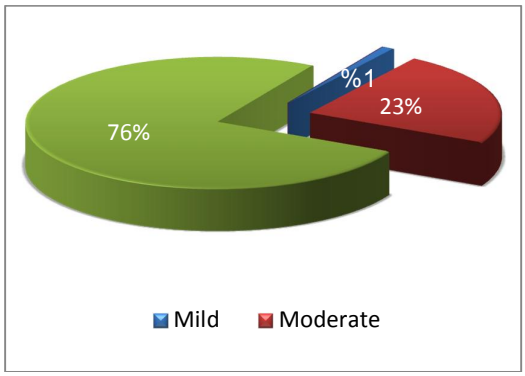

Fig. 1: Pie chart showing stress level among studied pharmaceutical sales representatives

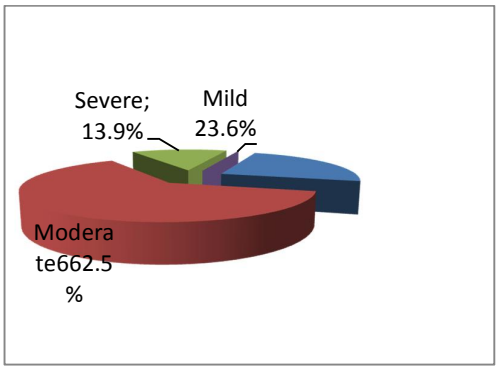

Fig. 2: Pie chart showing stress level among the comparative group

Table 2: The relation between some occupational characteristics and stress level among the studied pharmaceutical sales representatives.

Work conditions	Stress level				OR (95%CI)	P
	Mild to moderate		Severe			
	No.	%	No.	%		
Cumulative work period: hours						
≤7056 (n=108)	31	28.7	77	71.3	1.66	0.11
>7056 (n=108)	21	19.4	87	80.6	(0.88-3.14)	
Job stability:						
stable (n=84)	31	36.9	53	63.1	3.09	0.000
unstable (n=132)	21	15.9	111	84.1	(1.55-6.19)	
No. of hours of mobile phone using:						
≤ 2 (n=176)	43	24.4	133	75.6	1.11	0.79
>2 (n=40)	9	22.5	31	77.5	(0.49-2.52)	
Relationship with manager:						
bad to satisfactory (n=151)	23	15.2	128	84.8	4.48	0.000
good (n=65)	29	44.6	36	55.4	(2.20-9.17)	
Relationship with colleagues:						
bad to satisfactory (n=91)	19	20.9	72	79.1	1.36	0.34
good (n=125)	33	26.4	92	73.6	(0.68-2.27)	
Relationship with clients:						
bad to satisfactory (n=118)	21	17.8	97	82.2	2.14	0.01
good (n=98)	31	31.6	67	68.4	(1.08-4.24)	
Driving:						
not drive (n=65)	19	29.2	46	78.1	1.47	0.24
drive (n=151)	33	21.9	118	70.8	(0.76-2.85)	

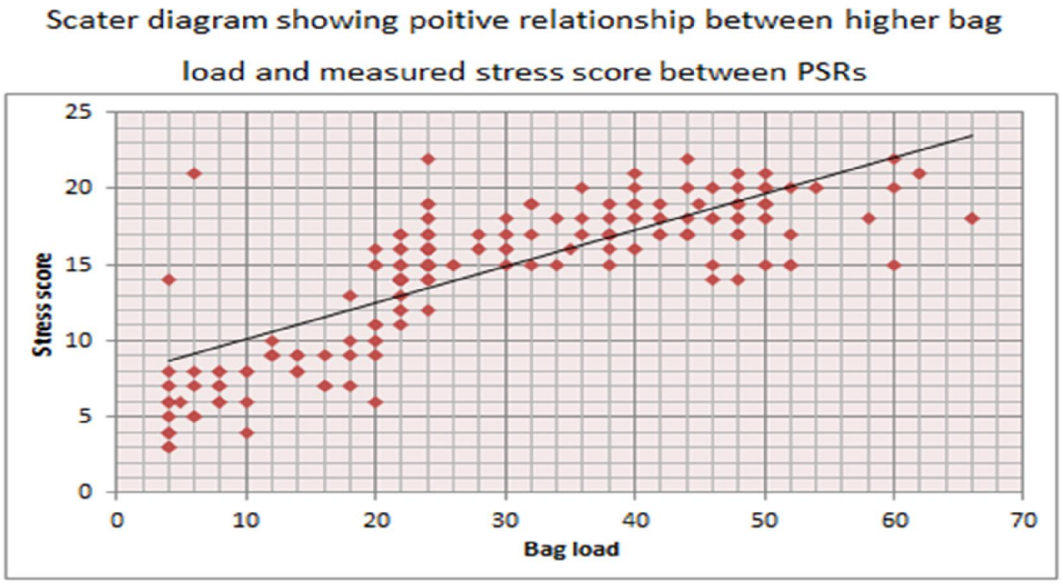

Table 3: General musculoskeletal complaint and specific regional affection among studied pharmaceutical sales representatives in comparison to control group.

Musculoskeletal complaints	Pharmaceutical sales representatives			Control group		
	No.	%	N	%	X^2	P
In any body part :	194	89.8	56	25.9	180.8	0.000
In neck region affecting normal activity	61	43.6	8	73	3.49	0.06
In Shoulder region affecting normal activity	32	39.0	9	81	7.2	0. 00
Elbow region affecting normal activity	11	39.3	1	20	Fisher	0.38
Wrist region affecting normal activity	29	44.6	1	0.16	Fisher	0.18
Upper back region affecting normal activity	57	52.8	7	0.64	0.47	0.49
lower back region affecting normal activity	97	44.9	11	5.09	91.31	0.000
One or both knees affecting normal activity	60	49.1	17	85	8.8	0.000
One or both ankles and feet affecting normal activity	73	54.9	21	0.66	1.2	0.27

Table 4: The relation between some occupational characteristics and stress level and musculoskeletal dysfunctions among studied pharmaceutical sales representatives:

Occupational characteristics	MSDs				OR (95%CI)	P
	No		Yes			
	No.	%	No.	%		
Cumulative working period: hours						
≤7056 (n=108)	14	13.0	94	87.0	1.86	0.17
>7056 (n=108)	8	7.4	100	92.6	(0.74-4.64)	
Job stability:						
stable (n=84)	16	19.0	68	81.0	3.91	0.000
unstable (n=132)	6	4.5	126	95.5	(1.36-11.7)	
No. of hours of mobile phone using:						
≤ 2 (n=176)	19	10.8	157	89.2	1.49	
>2 (n=40)	3	7.5	37	92.5	(0.41-5.31)	0.53
Driving:						
Not drive (n=65)	10	15.4	55	84.6	2.10	0.09
Drive (n=151)	12	7.9	139	92.1	(0.86-5.15)	
Stress level:						
Mild to moderate (n=52)	14	26.9	38	73.1	7.18	0.000
Severe (n=164)	8	4.9	156	95.1	(2.81-18.35)	

Table 5: The relation between some occupational characteristics and stress level and car accidents occurrence among the studied group:

Occupational characteristics	Car accidents				OR (95%CI)	P
	No		Yes			
	No.	%	No.	%		
Cumulative work period: hours						
≤7056 (n=46)	25	54.3	21	45.7	2.38	0.01
>7056 (n=105)	35	33.3	70	66.7	(1.17-4.83)	
Job stability:						
stable (n=54)	22	40.7	32	59.3	1.07	0.85
unstable (n=97)	38	39.2	59	60.8	(0.51-2.22)	
No. of hours of mobile phone using:						
≤ 2 (n=126)	51	40.5	75	59.5	1.20	0.67
>2 (n=25)	9	36.0	16	64.0	(0.49-2.94)	
No. of driving hours/day:						
≤3 (n=82)	37	45.1	45	54.9	1.64	0.14
>3 (n=69)	23	33.3	46	66.7	(0.84-3.19)	
Stress level:						
Mild to moderate (n=33)	18	54.5	15	45.5	2.17	0.04
Severe (n=118)	42	35.6	76	64.4	(1.00-4.47)	

Table 6: Quality of life among studied pharmaceutical sales representatives and control group.

Variables	PSRs		Control		X^2	P
	No.=216	%	N	%		
General health:						
Bad	111	51.4	14	6.4		
Moderate	83	38.4	176	81.4	109.0	0.000
Good	22	10.2	26	12.2		
Physical function:						
Bad	5	2.3	2	0.9	97.3	0.000
Moderate	46	21.3	148	68.5		
Good	165	76.4	66	30.6		
Social function:						
Bad	98	45.4	88	40	14.6	0.001
Moderate	79	36.6	111	51.3		
Good	39	18.0	17	8.7		
Role limitation by physical problems:						
Bad	53	24.5	14	6.5		
Moderate	106	49.1	26	12	132.0	0.000
Good	57	26.4	176	815		
Role limitation by emotional problems:						
Bad	45	20.8	4	1.9		
Moderate	113	52.3	9	4.1	204.0	0.000
Good	58	26.9	203	94		
Bodily pain:						
Bad	105	48.6	7	3.2	146.0	0.000
Moderate	62	28.7	49	22.7		
Good	49	22.7	160	74.1		
Mental health:						
Bad	82	38.0	18	8.3		
Moderate	108	50.0	33	15.3	182.0	0.000

Good	26	12.0	165	76.4		
Vitality:						
Bad	54	25.0	2	0.9		
Moderate	128	59.3	11	5	267.0	0.000
Good	34	15.7	203	93.9		
Total quality of life:						
Bad	31	14.4	18	8.5		
Moderate	141	65.3	70	32.2	68.4	0.000
Good	44	20.3	128	59.3		

Table 7: Relation between some occupational characteristics, musculoskeletal dysfunctions (MSDs) and stress level and quality of life of studied pharmaceutical sales representatives

Characteristics	Quality of life				OR (95%CI)	P value
	Bad to moderate		Good			
	No.	%	No.	%		
Cumulative work period: hours						
≤7056 (n=108)	83	76.9	25	23.117.6	1.41	0.31
>7056 (n=108)	89	82.4	19		(0.69-2.90)	
Job stability:						
Stable (n=84)	56	66.7	28	33.3	3.63	0.000
Unstable (n=132)	116	87.9	16	12.1	(1.81-7.24)	
No. of hours of mobile phone using:						
≤ 2 (n=176)						
>2 (n=40)	139	79.0	37	21.0	1.25	0.62
	33	82.5	7	17.5	(0.48-3.39)	
Bag load: Kg/hour						
≤24 (n=112)	89	79.5	23	20.5	1.02	0.59
>24 (n=104)	83	79.8	21	20.2	(0.50-2.09)	
Driving:						
Not drive (n=65)	52	80.0	13	20.0	1.03	0.92
Drive (n=151)	120	79.5	31	20.5	(0.50-2.13)	
MSCs:						
Yes (n=194)	163	84.0	31	16.0	7.59	0.000
No (n=22)	9	41.0	13	59.0	(2.74-21.38)	
Stress level:						
Mild to moderate (n=52)	24	46.2	28	53.8	10.79	0.000
Severe (n=164)	148	90.2	16	9.8	(4.79-24.60)	

Table 8: Logistic regression analysis for significant predictors of occupational health problems among the studied pharmaceutical sales representatives:

Independent factors	B	S.E	Wald	O.R (95%C.I)	P
For car accidents:					
High Cumulative working period:	0.84	0.36	5.30	2.32(1.13-4.75)	0.02
Severe stress:	0.74	0.40	3.30	2.09(1.01-4.65)	0.05
For MSCs:					
Job instability:	1.16	0.52	4.82	3.19(1.13-8.98)	0.02
Sever stress:	1.64	0.49	10.99	5.19(1.96-13.75)	0.001
For severe stress:					
Job instability:	0.71	0.36	3.70	2.03(0.98-4.19)	0.05
Bad relationship with manager:	1.12	0.36	9.42	3.08(1.50-6.32)	0.002
For bad to moderate quality of life:					
Female:	1.93	0.82	5.54	6.92(1.38-34.63)	0.019
Job instability:	0.82	0.41	3.97	2.28(1.01-5.12)	0.046
Have MSCs:	1.24	0.58	4.62	3.45(1.12-10.67)	0.032
Severe stress:	1.99	0.41	23.39	7.35(3.28-16.50)	0.000

Discussion

Pharmaceutical sales representatives constitute a growing sector of working force in Egypt that is subjected to multiple health hazards because of the specific nature of multi-customers, long distances, time challenge and competition between companies or even the Pharmaceutical sales representatives themselves. Half of our target group were veterineans while the other two quarters were from pharmacy and science collages. Regarding occupational profile of our group of pharmaceutical sales representatives: more than half of them work for more than 8 hours per day for 6 days per week resulting in high cumulative working period and 45.7% of them drive more than 3 hours per day .High bag load had resulted from long hours caring bags weighted more

than 5 Kg in average. Regarding mobile phone use, most of pharmaceutical sales representatives in the study (18.5%) used mobile phone at least 2 hours per day The present study also showed that, about two thirds of pharmaceutical sales representatives included in the study (57.9%) had unstable job condition. 30.1% and 47.7% of them had good relationships with their managers and their clients respectively. The conditions was different among the controls who show more variable educational levels and satisfactory in-between-colleagues relationships, less driving hours , use of mobile phone and stress levels. (Table 1) showed also that more than two thirds of pharmaceutical sales representatives included in the study (69.9%) used their own cars, of those using their own cars 60.3% had previous car accidents. These conditions was different among controls with significant difference regarding relations with colleagues, number of driving hours, accidents incidence, bag load and sever stress level ($p<0.000$ for each item).

In more details about stress levels among the two groups, (Figure1) shows that most of the studied pharmaceutical sales representatives (76%) had severe stress and about 23% had moderate stress while those had mild stress represent only 1% of them while, control group was represented by13.9%, 62.5 % and 23.6% respectively (fig.2).

These results were inconsistent with Harries *et al.*, 2003 who clarified that, sales representative work is demanding in terms of both time and energy. Their working environment can be uncomfortable at many times with periods spent working alone, sometimes with difficult customers. Also, Sandip and Jeewan, 2013 found that 66% of medical representatives were under pressure and have a form of stress.They discussed the condition and mentioned its main reasons to be: dissatisfaction with job profile (60%) & working hours (63%), continuous pressure for improved performance (73%) and Conflicting demands of work & home (78%).

The present study confirmed job-related items among studied pharmaceutical sales representatives like: higher bag load (scatter diagram) and job stability and those had unstable job were at more risk for severe stress (OR=3.09) (Table2). This was confirmed by Logistic regression analysis ($p<0.05$) (Table 8). Brog and Kristensen (1999) also found that the salespeople are not continuously supervised which influence the daily planning of the work and the way in which the work is performed. But the manager is still able to monitor and control their sales results and poor individual sales performance may lead not only to lower income but also to dismissal which lead to the feeling of job instability and but the sales rep under more stress.

Harries *et al.* (2003) also demonstrated that pharmaceutical sales representatives' communication with their line manager may be difficult to maintain due to long periods of absence from their firm which limit the social contact between the

Pharmaceutical sales representatives and their manager and lead to bad relation between them which adversely affect the mental health of pharmaceutical sales representatives. Our study agreed with the previous study that, bad relationship with the manager increased the risk of severe stress among the studied pharmaceutical sales representatives by about 4 times (Table2). The logistic regression analysis also confirmed that $p<0.05$(Table 8).

In the present study the number of the driving hours and the number of the working hours has no effect on the stress level (Table 2). This disagreed with previous studies, Leclerc *et al.* (1992) who also connected between number of driving hours and stress level among sales people and Brog & Kristensen (1999) who found that the long working hours were also associated with high stress level among pharmaceutical sales representatives.

Regarding increased accidents among PSRs during their work time compared to control($p=0.00$), another study by Strading et al,(2001) identified the sales force as a 'high-risk' group for road accidents .Also Lancaster & Ward (2001) confirmed by a strong evidence that company car drivers like pharmaceutical sales representatives are at increased risk of accidents compared to the general population.

Adams & Guppy (1995) indicated that the reason for the high accident rate in company drivers like pharmaceutical sales representatives is due to high demands on time, which ultimately affected decision-making regarding speeding and overtaking. In agreement with the previous study, the result of the present study showed that 16.5% of the accidents were due to high speed. The application of logistic regression analysis for significant predictors of car accidents among studied pharmaceutical sales representatives confirmed that long working hours was one of the most significant predictors (OR=2.32) (Table 2). Analysis of the scientific studies on the hazard potential of mobile phones when used in vehicles unequivocally shows a marked impairment of driver performance (Grass & Staak, 1998) and (Horswill & McKenna, 1999). The evidence reveals that the use of mobile phones while driving has a detrimental effect on the driver's reaction time (Lamble *et al.*, 1999). In The present study 6.5% of the accidents were due to mobile phone use when driving (Table 1). Stress is a major factor in occurrence of accidents (Table 5) in accordance with (Birch, 2000) who stated that stress and major life events are associated with increased accident frequency.

Regarding significant rise in musculoskeletal problems in pharmaceutical sales representatives (89.8 % - $p<0.000$), most complaints affected their normal daily activity was ankle and foot (54.9%) followed by upper back (52.8%) then both knees (49.1)% with significant difference compared to control group in affection of lower back, knee and shoulder regions (Table 3). These results was expected and consistent with the previous

studies which suggested that pharmaceutical sales representatives similarly experience musculoskeletal symptoms (Sang *et al.* 2009).

The results of the present study showed that the risk of musculoskeletal dysfunctions among PSRs included in the study were more in those who had unstable job and severe stress (OR= 3.91 and 7, 18 respectively) (Table 4). The previous results were consistent with Lanfranchi & Duveau (2008) who showed that psychological factor such as high job demands; low income, job insecurity and stress at work were associated with musculoskeletal pain.

Harris et al, (2003) clarified that, the sales force spends long periods driving and repeatedly lifts and loads bulky promotional goods which may be delivered in bulk to the employee's home, posing additional manual handling hazards, especially where employees live in apartments. Time pressures may limit communication with colleagues and line manager, compromising the ability to explore solutions to these problems so, detected high prevalence of musculoskeletal complaints in the study may resulted from the psychological factors of work i.e. job instability and high stress level. These results were consistent also with those of a study by Skov *et al.* (1996) who added that the leading factors of having neck, shoulder and lower back pain in pharmaceutical sales representatives were due to both psychological factor such as low job control and high job competition beside the known physical factors such as driving long distance, repeated movements, lifting heavy equipment and being too tired. Also, with another study by Van-Tulder *et al.* (2002) who stated that manual handling which has been identified as a component of a pharmaceutical sales representatives work is a known risk factor for musculoskeletal symptoms.

Quality of life among pharmaceutical sales representatives:

The present study showed that more than two thirds of the studied pharmaceutical sales representatives reported moderate quality of life (65.3%) and only small proportion of them reported good quality of life (20.3%). Lastly the bad quality of life (14.4%) of them and all parameters of quality of life was significantly less than that of the control group ($p<0.00$) (Table 6).

Bad quality of life is due to high prevalence of musculoskeletal dysfunctions and severe stress among them (Table 7). This condition was confirmed by logistic regression which proved that most important predictors for bad quality of life were musculoskeletal dysfunctions (OR=3.45), job instability (OR=2.28) (predictors for stress) and severe stress (OR=7.35) (Table 8).

These results were consistent with previous studies as Tandera *et al.* (2007) which found that musculoskeletal problems and stress level affected all aspects of quality of life among pharmaceutical sales representatives .Also (Brog and Kristensen, 1999) found that their psychological work environment lead to high stress level among them which adversely affected their quality of life especially their mental health

The cause of high prevalence of moderate quality of life among PSRs inspite of the high level of MSDs and severe stress was that more than half of them was less than 26 years old (52.3%) which enable them to cope with these problems .

Conclusion and recommendations:

Egyptian PSRs suffer from severe stress which was mostly due to job unstability and bad relationship with the manager. This stress also lead to bad quality of life. They are in great danger for having car accidents especially those who work for long periods or have severe stress. Also PSRs are at great risk for musculoskeletal disfunctions which increase with driving, heavy bag load and severe stress. These MSDs affect their quality of life badly. So, pharmaceutical sales representatives need syndicate under supervision of the ministry of health, enforced medical measures as pre-placement medical examination, periodic medical examination, health education and supportive medical services. Also they need periodic training for prevention of car accidents, musculoskeletal dysfunctions and stress. Other measures as intervening in the psychosocial working environment and problems solving group may assist.

Limitations of the study

1. Some participants refused to complete participation in the study due to their limited time or fear from responsibility.
2. It needed much time and effort to collect control group data due to different sites (no meeting places)
3. At presentation time, it was difficult to meet the same pharmaceutical sales representatives who completed the questionnaire at the first time so, a clear educative message was presented and explained once at each place and additional soft copies were left for other pharmaceutical sales representatives (all of them are highly educated, working in the medical field and easy to understand the message.

Contributors:

Samah S Shetta designed the study, determined the objectives wrote the manuscript, submitted the paper and conducted the practical phase, EL Naggar SA collected and analyzed the data statistically. The authors revised the manuscript and have seen and approved the final version.

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