Evaluation of National Standards for Exposure to Chemical Materials and Dusts in the State Company for Drugs Industry in Samarra

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المستخلص

الهدف: تقويم ألمعايير الوطنية للتعرض للمواد الكيميائية والغبار في الشركة العامة لصناعة الأدوية في سامراء.
المنهجية: دراسة وصفية استعمل فيها أسلوب التقويم تم استخدامه في الدراسة الحالية للفترة من ٢٥ أيار ٢٠١١ إلى ٣٠ تشرين الثاني ٢٠١١ من اجل تقويم المعايير الوطنية للتعرض للمواد الكيميائية والغبار في الشركة العامة لصناعة الأدوية في سامراء.عينة عمديه قصديه(غير احتمالية) اختيرت في الدراسة وقد تكونت من(١١٠)عامل من العاملين في الشركة العامة لصناعة الأدوية في سامراء. تم جمع بيانات الدراسة عن طريق مقابلة العامل طبقا لطبيعة العمل الذي يؤدّيه. تكونت استمارة التقويم من ثلاثة أجزاء شملت المعلومات الديموغرافية عن العمال والجزئيين الأخريين تعلق بمعايير التعرض للمواد الكيميائية ومعايير التعرض للغبار في موقع العمل. تم إجراء المصداقية والثبات لأداة التقييم من خلال الدراسة الاستطلاعية وعرض الأداة على مجموعة من الخبراء. تم تحليل البيانات من خلال أسلوب الإحصاء الوصفي(التكرار والنسب المئوية) والإحصاء ألاستنتاجي(المتوسط الحسابي).
النتائج: وبشكل عام كشفت النتائج ان معايير التعرض للمواد الكيميائية ومعايير التعرض للغبار المطبقة في موقع العمل يمكن اعتمادها كمعايير وطنية، وليس هناك دلائل على وجود مخاطر مهنية ممكن ان تؤثر على العمال وبيئة العمل نتيجة تطبيق هذه المعايير.
التوصيات: أوصت الدراسة بزيادة الوعي والتدريب، وضرورة توفير برامج للتثقيف الصحي لكل العاملين من اجل مساعدتهم على الالتزام بمعايير التعرض للمواد الكيميائية ومعايير التعرض للغبار من اجل تجنب المخاطر التي تؤثر على صحتهم وعلى بيئة العمل.

Abstract

Objective: Evaluation the national standards for exposure to chemical materials and dusts in The State Company for Drugs Industry in Samarra.

Methodology: A descriptive evaluation design is employed through the present study from 25th May 2011 to 30th November 2011 in order to evaluate the national standards for exposure chemical materials and dusts in The State Company for Drugs Industry in Samarra. A purposive (non-probability) sample is selected for the study which includes (110) workers from the State Company for Drugs Industry in Samarra. Data were gathered through the workers` interviewed according to the nature of work that they perform. The evaluation questionnaire comprised of three parts which include the workers` demographic characteristic and other two part which concern the national standards for exposure to chemical materials and dusts in workplace.
Reliability and validity of this tool is determined through application of a pilot study and panel of experts. Data were analyzed through the application of descriptive statistical (frequencies and percentages) and inferential statistical (mean of score).

Results: The findings of the study present that the national standards for exposure chemical materials and standards for exposure to dusts that are applicable in the workplace, can be adopted as national standards. So, there is no significant impact of occupational hazards that may affect workers and work environment as a result of applicable of this standards.

Recommendations: The study recommends that increase awareness, training and health education programs should be provided for all workers regularly and periodically in order to help them comply with standards for exposure chemical materials and standards for exposure to dusts in order to avoid hazards that affecting their health and work environment.

Key wards: chemical materials, dusts, standards, workers

Introduction:

Chemicals are an essential part of modern manufacture processes. Their use must be managed with great attention in occupational settings to avoid serious detrimental effects to the health of employees [1].

Chronic illness arising from long term chemical exposures at work accounts for the large majority of known work-related mortality. Reducing those known dangerous exposures is therefore the best opportunity to protect the lives and health of American workers. Recognizing the dangers of chemicals at work also would facilitate controlling those chemicals at home and in the community environment [2].

Harmful chemical compounds in the form of solids, liquids, gases, mists, dusts, fumes and vapors exert toxic effects by inhalation, absorption (through direct contact with the skin), or ingestion (eating or drinking). Airborne chemical hazards exist in concentrations of mists, vapors, gases, fumes, or solid. Some are toxic through inhalation and some of them irritate the skin in contact; some can be toxic by absorption through the skin or through ingestion and some are corrosive to living tissue [3].

Depending on their form and structure, chemicals can enter the human body through the lungs, gastrointestinal tract, or skin. Understanding the toxicology of chemical is essential for identifying; the amount of chemicals that produce toxicity; the routes by which chemicals enter the body and the appropriate personal protection for workers [4].

Exposure to harmful chemicals may also occur in restaurants industry. Chemicals commonly used for cleaning may cause chlorine or ammonia gas release when mixed improperly. Depending on the amount of gas inhaled, irritation of the eyes and respiratory tract, dizziness, cough, and chest pain may occur. Sever exposure may led to pulmonary edema, serious lung injury, or pneumonia [5].

Surveillance of occupational exposure to chemical substances is a specific type of hazard surveillance, useful in the prevention of acute chemical effects and essential for the prevention of chemically induced chronic disease [6].

The reactivity of the dust increases together with its parameters of explicability. The finer the dust, the greater the rise in pressure and the lower the ignition energy. On the other hand, for several types of dust this tendency is less pronounced and reaches equilibrium when the dust attains a diameter of a few dozen micrometers. Normally, the energy required to detonate dust is greater than that required for a gas. In sum, the risk of nanoparticles exploding is potentially high [7].

In many workplaces there are likely to be times when workers are exposed to a vapour or a dust or some other contaminant in the air. The exposure standard is a guide to upper levels of exposure to a contaminant for unprotected workers. Relevant workplace measurements of exposure are compared with the exposure standard to determine whether the prevailing exposure is likely to be a risk to health, and whether controls (or additional controls) need to be implemented[8].

The respiratory diseases of construction workers may include pneumoconiosis arising from silica (silicosis) or asbestos exposure, asthma and other allergic reactions (e.g. due to isocyanate paint or resin exposure) and chronic obstructive pulmonary disease. Some hazards encountered in construction can cause lung cancer. Occupational Asthma (OA) is an important occupational health problem with serious implications for both affected individuals and their employers. For the affected individual, continued exposure to the causative agent usually leads to deteriorating asthma and the risk of severe (or, on rare occasions fatal) asthma attacks. Even if exposure ceases, the more severely affected individuals may still be left with persistent asthma and chronic disability [9].

Methodology:

A descriptive evaluation design is employed through the present study from 25th May 2011 to 30th November 2011 in order to evaluate the national standards for exposure to chemical materials and dusts in The State Company for Drugs Industry in Samarra.

A purposive (non probability) sample is selected for the study which includes (110) workers from The State Company for Drugs Industry in Samarra. Data were gathered through the workers` interviewed according to the nature of work that they perform. Each interview takes approximately (20-30) minute for each worker in the workplace.

The evaluation questionnaire comprised of three parts: Part I, this part is concerned with the description of the demographic characteristics of the study subjects that include age, sex, period of services, marital status, educational level, shift of work and nature of the work. Part II, Standards for exposure to chemical materials: It is consisted of (7) items which are measured on 3 levels of scale of Yes, Uncertain and No and rated as Yes=3, Uncertain =2 and No=1. Part III, Standards for exposure to dusts: It is consisted of (8) items which are measured on 3 levels of scale of Yes, Uncertain and No and rated as Yes=3, Uncertain =2 and No=1.

Reliability and validity of this tool is determined through application of a pilot study and panel of experts. Data were analyzed through the application of descriptive statistical (frequencies and percentages) and inferential statistical (mean of score).

Results:

Table 1. Distribution of workers` according to their Demographic Characteristics

Demographic characteristics	Workers` distribution	
	F	%
Age (years)		
20 - 29	**17**	**15.5**
30 – 39	**48**	**43.6**
40 – 49	**25**	**22.7**
more than 50	**20**	**18.2**
Total	**110**	**100%**
Gender		
Male	**91**	**82.7**
Female	**19**	**17.3**
Total	**110**	**100%**
Period of service (years)		
less than 5	**8**	**7.3**
5-9	**27**	**24.5**
10-14	**39**	**35.5**
more than 15	**36**	**32.7**
Total	**110**	**100%**
Marital status		
Single	**11**	**10.0**
Married	**95**	**86.4**
Divorce	**2**	**1.8**
Widowed	**2**	**1.8**
Total	**110**	**100%**
Educational level		
Read and write	**2**	**1.8**
Primary	**27**	**24.5**

Continues table 1.

Intermediate	**15**	**13.6**
Secondary	**26**	**23.6**
Institute	**24**	**21.8**
College	**16**	**14.5**
Total	**110**	**100%**
Shift of work		
Daily	**91**	**82.7**
Evening	**8**	**7.3**
Night	**5**	**4.5**
Rotator	**6**	**5.5**
Total	**110**	**100%**
Nature of work		
Mechanical	**49**	**44.5**
Manual	**55**	**50.0**
Others	**6**	**5.5**
Total	**110**	**100%**

F = frequency, % =percent

Table (1) demonstrates the demographic characteristics of the study sample. The majority workers (43.6%) are (30–39) years old. Most of them are male (82.7%). High proportion is married (86.4%) and have (35.5%) service period with those (10-14) years of services. With regard to the educational level of workers, the highest percentage is (23.6%) who are graduated from secondary schools. Commonest work is manual (50%) presents the main nature of the work, and most of workers (82.7%) work in a day shift.

Table 2. Mean of Scores for Standards of Exposure to Chemical Materials

List	Items	Yes		Uncertain		No		M.S	Sig.
		F	%	F	%	F	%		
a	Exposure is adjusted in a day and week working based on the presence of highly toxic materials which has long term toxic effect (severely toxic)	44	40.0	25	22.7	41	37.3	2.02	S
b	Adjust working hours to be 8 hours a day five days a week with environment temperature 25, in case of the presence of severely toxic materials.	38	34.6	23	20.9	49	44.5	1.90	S
c	There is no need to adjust the exposure in a day and working week in the case of the presence of irritants to the respiratory system.	23	20.9	38	34.6	49	44.5	1.76	S
d	It will be taking in consideration the increase in rate of absorbing pollutants via the respiratory system or the skin when the room temperature increased in the working environment.	54	49.1	13	11.8	43	39.1	2.10	S
e	The occupational hazard is not considered immediate or long term risk to the neighborhoods nor to the general environment.	42	38.1	40	36.4	28	25.5	2.12	S
f	Safety and protection is provided to the individuals living in the neighborhood of the factory.	35	31.8	29	26.4	46	41.8	1.90	S
g	There is a periodic observation of the environment by the ministry if locate the work site as a danger to neighboring residents and the general environment.	37	33.7	35	31.8	38	34.5	1.99	S

F = frequency, % =percent, MS= Mean of scores, Sig. =level of significance, S=Significant

This table indicates that the mean of scores is significant on all items.

Table 3. Mean of Scores for Standards of Exposure to Dusts

List	Items	Yes		Uncertain		No		M.S	Sig.
		F	%	F	%	F	%		
a	Taking into account the effect of irritating dust in the workplace that cause irritation of upper respiratory tract and lungs may cause pneumonia.	72	65.5	2	1.8	36	32.7	2.32	S
b	There are warnings signs that indicates some inhaled organic dusts in the work atmosphere can cause respiratory allergy, leading to asthma and other infections.	61	55.4	9	8.2	40	36.4	2.19	S
c	Necessary precautions are taking to prevent inhalation of smoke and mineral dusts (such as zinc and copper), which leads to fever and body aches for a day or two.	51	46.4	34	30.9	25	22.7	2.23	S
d	Provide the necessary protective equipments to prevent or reduce the inhalation of different types of inorganic dusts (such as asbestos and coal) that could cause lung fibrosis and therefore lung failure.	49	44.5	41	37.3	20	18.2	2.26	S
e	Separating and fencing dusty operations from other industrial processes.	53	48.2	27	24.5	30	27.3	2.20	S
f	There is proper ventilation in the closed work environment that contain, dust resulting from the remnants of the industrial process.	50	45.4	8	7.3	52	47.3	1.98	S
g	Taking in account the importance of personal hygiene by providing suitable places for washing and changing work clothes that contain dust.	81	73.6	8	7.3	21	19.1	2.54	H.S
h	Provide separate areas from the dusty work environment designated for eating, drinking and rest time	77	70.0	7	6.4	26	23.6	2.46	S

F = frequency, % =percent, MS= Mean of scores, Sig. =level of significance, S=Significant

This table indicates that the mean of scores is highly significant on item (g) and significant on the remaining.

Discussion:

Table (1) indicates that the majority of the workers are (43.6%) who is (30-39) years old. This result reveals a fact that the most of the workers in the workplaces are adults' workers, Because of the type of work that they are performing in the workplaces, which reflected the political establishments for the support and interest of this category.

Relative to the worker` gender, most of them are males (82.7%). This finding provides supportive evidence to the fact that males seek more employment opportunity than females and taking most of the family bread winners` role in our country and in the third world nations.

Regarding to the period of services, the majority of workers have (35.5%) service period with those (10-14) years of services.

With respect to their marital status, the married workers are accounted for the majority of the sample (86.4%). This finding presents another fact that most employment regulations support this segment of workers in employment in their institutions. Concerning the workers` educational level, most of them are secondary school graduates (23.6%). This evidence shows

that most factories do not recruit those with Bachelor or high level of education to perform any work in the workplace.

Manual work (50%) presents the main of the nature workers work, and the greater numbers of workers are working in the day shift (82.7%). This finding represents a fact that the focuses factories works take in a day shift of working.

Table 2, shows that the mean of scores is significant on all items. This finding indicates that not only the impact of hazards of exposure to chemicals on the workers near these materials, but can extend its influence to the work-environment and its contents, so there is an obligation and implement of standards for exposure to these materials.

The biostatics and epidemiological assess-ments data on employees work experiences and potential chemical exposures of workers and the public should be gathered and retained, and when appropriate should be used for epidemiological studies to determine whether any exposure had caused illness. Information obtained from these studies can be useful in ensuring that adequate health standards are in place to protect employees and the public [(10)].

Information on specific chemicals must always be available through labels and Material Safety Data Sheets. Affected employees must be aware of ways to detect the presence or release of hazardous chemicals in the work area (e.g., observation or smell). Employees must be aware of the physical and health hazards of these chemicals, protective procedures and work practices, emergency procedures, and personal protective equipment to be used [(11)].

Table 3, shows that the mean of scores is highly significant on item (g) (Interest with the personal hygiene through the provision of suitable places for washing and changing work clothes containing dust). Other items in this table indicate that mean of scores is significant.

This finding demonstrates that the obligation of these standards as a result of appropriate knowledge of hazards of organic and inorganic dusts that may affect workers` health and work-environment.

The observation of the importance of hazards arising from exposure to dust is also noted by Hentschel and others (2002) who, in a review of the artisanal and small-scale mining activities in several countries, gave a progress report on the health and safety issues in these exploitation sites. Moreover, they put emphasis on the problems occurring due to the absence of ventilation [(12)].

Plitzko (2009) reported that the dust collected from surfaces was also investigated by electron microscopy to give information about possibly sedimented nanostructured materials emanating from the work processes [(13)].

Finally the study finding found that the national standards for exposure to chemical materials and standards for exposure to dusts that are applicable in the workplace can be adopted as national standards. So, there is no significant impact of occupational hazards that may affect workers and work environment as a result of applicable of this standards.

Recommendations:

The study recommends that increase awareness, training and health education programs should be provided for all workers regularly and periodically in order to help them comply with standards for exposure to chemical materials and dusts in order to avoid hazards that affecting health of them and work environment.

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