Evaluation of correlation in two job analysis techniques of QEC and Ergo-easer

Abstract:

The purpose of research was evaluation of work place situation and health condition by using of two techniques: Quick Exposure Checklist (QEC) and Ergo-easer. Also in this study assessing of physical load on the musculoskeletal system were used among workers at work sites in the battery manufacturing company in Iran. According to this fact work-related musculoskeletal disease (WMSD) is estimated as the most common occupational disorder in Iran. It is necessity to find out a quick and easy-to-use of valid technique for assessing WMSD and exposure to health risks. In this study (QEC) method was used currently for 26 assembling workstations in the battery manufacturing company.

The aim of this study was to compare two methods (QEC) and Ergo-easer, and to find out which of those mention methods is practical and easy for assessing of WMSD related to work condition.

The data collection was carried by observation techniques and interviews. The results were analyzed by SPSS-10. In this study considered correlation, Pearson's correlation coefficient and data was calculated in 86% (P-value: 0.001). Results of evaluation of health condition in different part of work sites shows the score related to the back are critical joint compare to other part of body. The Chi-square test procedure (Mc.nemar) was used for data analyzing. No significant difference was observed. On the basis of above-mentioned result there is a significant correlation between two techniques (r= 86%, P-value 0.001) in diagnosis the critical work site and no significant difference in distinguishing the critical target organ. This study indicates that: a) These two methods have a strong correlation in identifying critical work site; b) No significant difference was seen in determining critical joint between two methods. Results achieved in QEC are more harmoniously than Ergo-easer.

According to the results of analyses, the QEC method was the fast, simple and practical method compare to Ergo-easer and other techniques. Also this method strongly recommend for utilizing in industries for evolution of WMSD related to health risks in work sites.

Introduction:

Musculoskeletal disorders are one of the common disorders because of health risks in the industrial work condition. The prevalence of musculoskeletal problems in industries is noticeable in Iran. According to statistical information provided by Iranian Statistical Center and Health ministry (2000) more than 1/13 of government general budget expended for MSD related to work condition and the situation is the same less or more in other countries. OSHA reported direct cost of WMSD's in USA, were more than seventy billion dollars in 1997.

According to globally increasing of the MSD's, World Organization health (WHO), allocated the decade of 2000 to 2001 to provide for preventive programs and control of is called (Silent Epidemic). Different methods were used for evaluation of exposure to health risks that affected on the musculoskeletal. Otherwise researchers are attempting to find out the best method for assessing of health risks. It is very important to provide the valid and

trusting method for evaluation of health problems in the industry, with considering a quick and easy method to use.

The aim of present this study is considering and comparing the results of evaluation works station layout in a battery manufacturing companies in Iran by using of Quick Exposure Checklist (QEC) and Ergo-Easer for finding out the relation between health risks and health problem.

Ergo-Easer is a posture based evaluating software of work condition which is designed by the Occupational health office of the US ministry of Energy under consideration of Occupational Safety and Health Administration (OSHA). Such as this method could be provided different considerable points for evaluating the problem in diverse workstations.

Quick Exposure Checklist (QEC) was introduced by some of the Surrey university researchers in UK. For learning this method 30 minutes is enough. The required information in the checklist can be completed by 10 minutes for each selected work site.

***Method**:*

This research is carried out for reviewing two methods (QEC and Ergo-Easer) with considering the results of comparison two methods. The results of this study are evaluated in two parts.

-The first part of this assessment workload by giving Total Score to each work site.

-Second part of this study is comparison different parts of body (Lower back, upper back, neck, shoulders, waist, hands), which are exposed to high level of health risks.

The results of this study statistically analyses by using of SSPS 9 software. Two considering method separately were used for evaluating all the selected (28) selected work sites. Additionally majority of activity which performed in the selected industries required manual material handling and frequently repetitive motion with potential of Cumulative Traumatic Disorders (CTD).

-Observation

Direct observation was performed with using checklist. Such as the collected information interpreted the computer software's.

Ergo-Easer method is using of 5 main parameters for evaluation, which are including: Human, Job, Object, Origin, Destination.

-The factors are considering for evaluation Human include: lifting, carry load, (by one or two workers) and twisting and bending trunk and knees.

- Working hours, resting time are most important factors which reviewed about job such as in this study others factors were considered (carrying and pulling pushing and holding load by hand, walking with load, using small work space , using wheelchair)
- Identified work load (Object)

Most important factor about load include: Max, average of load's weight and dimension and the Subject's posture for holding load. In this study for identify of origin and destination of load some information were necessary to find out. Load's height from ground and the loads' distance from subject also twisting in lower back were investigated.

The required information by Ergo-Easer includes:

-Lifting Index

- The frequently of work and load's weight and employee's situation recorded based on the results which are obtained from the results of evaluation in two area (Safety, high risks)
- Showing a graph of workers situation with considering origin and destination. (Marking the joints which exposure to health risks
- Recommendations for preventing and reduction of WMSA

Procedure of methods

Exposure Score in two parts designed:

The fist part related to Human body

- Bending (Lower back Spinal column) and frequently of carrying load.
- Considering frequently of abdication and adduction of shoulders and arms.
- Considering of twisting and bending of wrists and hands.
- Considering duration neck bending

In part two of this procedure the questionnaires were used for finding out the activity duration and load weight and frequently of carrying load, force exertion, vibration. Also by this questionnaire, satisfaction and work stress were investigated. Additionally, two of the twenty-eight work sites were eliminated because lack of reinvestigation.

Results

In this study mean value of the QEC & Ergo has been calculated 116.5, 1.7 with SD equal to 28.5, 1.2 (table1) by order the results of global value of work stations have acceptable correlation (r=0.86, P value<0.001) between these two systems (table2).

		QEC Total Score	Ergoeaser Total Score
N	Valid	26	26
	Missing	0	0
Mean		116.46	1.688
Std. Error of Mean		5.59	.235
Median		112.50	1.400
Mode		103	.1
Std. Deviation		28.52	1.198
Variance		813.46	1.435
Range		100	3.9
Minimum		67	.1
Maximum		167	4.0
Percentiles	25	92.50	.750
	50	112.50	1.400
	75	147.00	2.750

Table 1- Results of measures of central values and dispersion of two methods of QEC and Ergo-Easer.

Methods		QEC Total Score	Ergoeaser Total Score
QEC Total Score	Pearson Correlation	1.000	.815
	Sig. (2-tailed)	.	.000
	N	26	26
Ergoeaser Total Score	Pearson Correlation	.815	1.000
	Sig. (2-tailed)	.000	.
	N	26	26

Table 2- Results of analysis for correlation between two methods in detection of Critical worksite

Since the body part which is at most risk by these two methods is lumbar region, it considered as the critical part. The results of chi-square with Mc.nemar method showed lack of difference among findings of two methods in detection of critical part of the body. The results of the study showed significant correlation between two methods in detection of critical body part, and reporting the most critical workstation.

Discussion:

The result of this study showed that there is correlation between the results of two methods of linear correlation evaluation(r=0.86. P value<0.001) (chart 1). As one of the

reasons of these findings can be referred to this fact that the basis of the judgment in these two methods is the evaluation of the equilibrium of recommended weight lift (RWL) from NIOSH which is acceptable for scientific societies by QEC method of evaluation objectives parameters such as existence of the stress? difficulty of the occupation have been evaluated, which have not been considered in Ergo-easer method so, such agents can make difference in the results of the two methods.In addition the presence of sperance to false benefits or the fear of worker from the complications of the state of own idea can lead the responses to bias however in the Ergo-Easer evaluation method there are not Such problems.

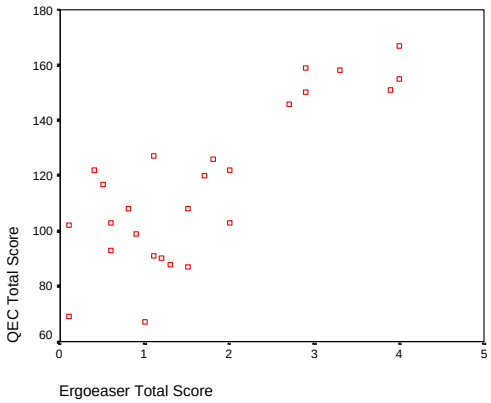

Diagram1- Scatter diagram of results of analysis for correlation between two methods in detection of Critical worksite

Beside to above by comparing the coefficient of changes in two above mentioned methods, it will be shown that distribution of the results of the QEC is more homogenous and as a result are more practical. There is not any significant difference between two methods to find critical part of the body based on Mc.nemar applied note of detection of critical part of the body is in better designing and activities of occupational medicine.

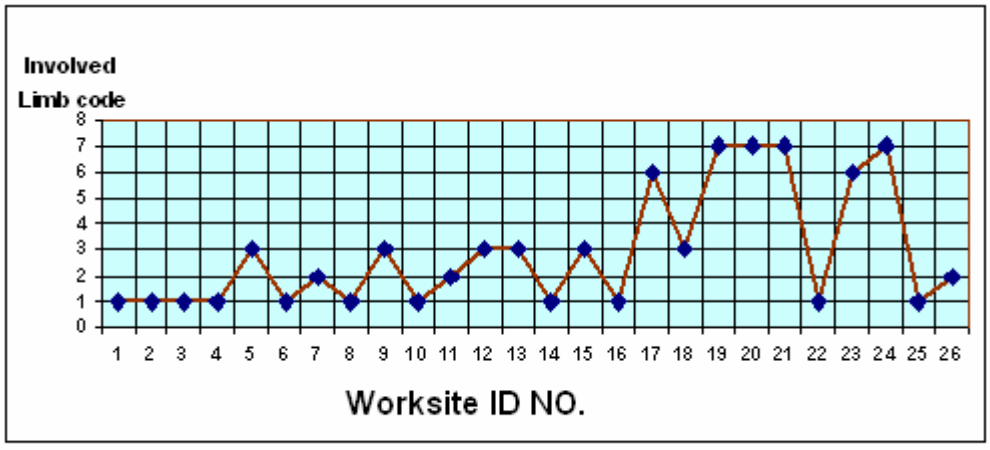

Diagram2- Results of Critical limbs detected by QEC

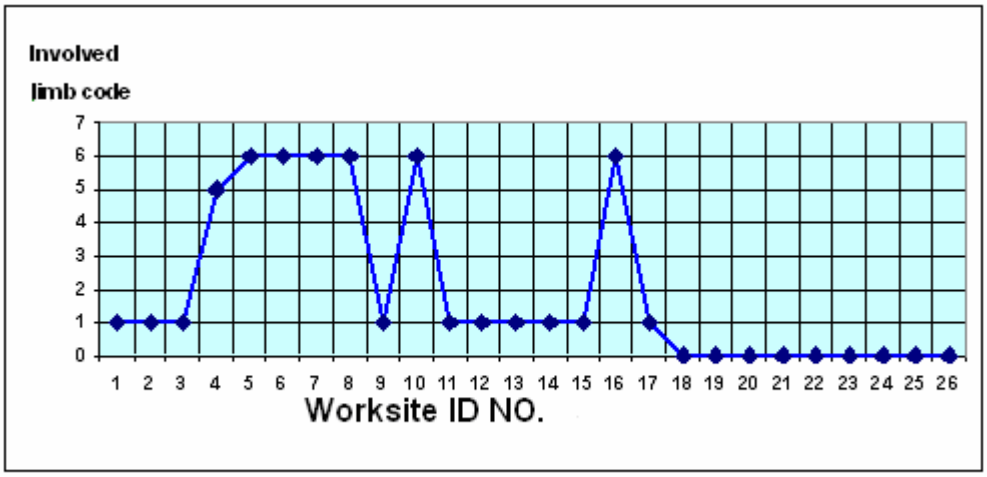

Diagram3- Results of Critical limbs detected by Ergo-Easer

Limb	**Back**	**Shoulder**	**Wrist**	**1 & 2**	**1& 2 & 3**	**1& 2 & 4**	**1&2&3&4**
Code	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Table3- Coding of limbs (target effect organs) in comparing two methods for detecting critical limb

Conclusion:

Overall, according to lack of significant difference in detection of critical part of the body, it seems that we can use each evaluation method in place of the other one but the facilities and easy- to –learn features of the application of QEC instead of Ergo-Easer and less change coefficients make the QEC method more valuable than Ergo-easer for detection and doing of the industrial interventions.

Authors:

1) **Ghafarian, Vahid** MD,MPH,PT **–**Director of the Committee of Ergonomics in Safety & Health Center

2) **Sayadli,Shahram** OT**-** Member of the Committee of Ergonomics in Safety & Health Center

3) **Kavian Lanjani,Jafar** dept. for Studies of Work, Economics and Health, University of Trollhjttan/Uddevalla

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