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Noise Exposure among Aporn Workers in Khartoum International Airport

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Abstract:

Background: *The aim: To evaluate noise level (dBA) in apron area, to examine worker's perception towards airport noise, to evaluate usage personal protective equipment among apron workers .**Material and Methods: S**tudy conducted on the ramp workers operating in Khartoum International Airport. The apron employees are responsible for coordinating and directing all operations conducted in proximity of the aircraft on the parking area. Simple random sampling was used to select a representative sample of respondents (364 workers were selected), measure the noise, questionnaire was administered to all participating workers to collect data such as personal protect equipment PPE usage.* ***Result:*** *Sound pressure level was 93.3 dBA at under airplane, aircraft marshaling 93.0 dBA, loading and unloading 91.0 dBA, pushback tractor 87.0 dBA, maintenance 86.5 dBA which were more than permissible level, 79.7% of workers did not use hearing protection devices.* ***Conclusion:*** *The presented study demonstrated that apron employees are at high risk of developing hearing loss due to excessive occupational exposure to noise, hearing protective devices must provide to employees, health education on hazards of noise and enforcement of the use of PPEs.*

Key words: Personal protective equipment. Apron. Noise induced hearing loss

Introduction:

Noise is consider as an "unwanted sound" with various harmful effects on health (1). Civilian aviation started in the first decades of the twentieth century (2). Noise pollution in the airport offices next to the apron was inevitable during aircraft landing and taking off (3). Continual exposure to high noise level cause damage and destroys hearing cells within the ear making noise induced hearing loss, hearing loss affect one in ten persons and is considered one of the top ten occupational hazards (4). The most appropriate exposure measurement for occupational noise is the A-weighted decibel, dBA this parameter and the ability of the noise to cause hearing damage (5). There is general agreement that exposure to sound levels less that 70dB does not produce hearing damage, regardless of the duration of exposure and also exposure for more than eight hours to sound levels in excess of 85 dB is potentially hazardous (6).

The Leq is used in the prediction of levels of noise likely to cause hearing damage (7). In order to limit high level occupational noise, maximum permissible occupational noise exposure limit in the range of 85–90 dB(A) Leq for 8 h/d (40 h/wk) has been allowed by the International Standards Organization (ISO), EEC and other developed countries. United Kingdom, Belgium, Italy, Canada, France and Denmark allow 90 dB (A) Leq. Japan, Sweden, Germany, Norway allow 85 dB (A) Leq. These limits are allowed for halving rates of 3 dB(A) and working schedules of 8 h/d. OSHA (USA) allows 90 dB(A) for 8 h/d with halving rate of 5 dB(A) (8).

Noise-induced hearing loss (NIHL) is an irreversible damage its severity depends primarily on duration of noise exposure and sound intensity (1). In a study performed on full-time male workers working at a large metropolitan airport in Korea, it was shown that occupational noise exposure and use

of hearing protective devices were significantly associated with hearing status of these workers (9)

The following categories are widely applied because they correspond to regulatory limits in developed (usually 85 dB (A)) and many developing (usually 90 dB (A)) countries for an 8-hour day:

− Minimum noise exposure: <85 dB (A)
− Moderately high noise exposure: 85−90 dB (A)
− High noise exposure: >90 dB (A) (5).

At first, excessive exposure to harmful noise causes auditory fatigue or a temporary threshold shift (TTS). However, repeated insults of excessive noise can transform this TTS into a permanent threshold shift (10). Permanent threshold shift (PTS) is incomplete recovery of TTS before further noise exposure allows the residual threshold shift to become permanent (11).

In the young, hearing loss affects communication, cognition, behavior, social emotional development, academic outcomes, and later vocational opportunities (12). The degree of annoyance appears to be related to the energy content of the noise (13).The routine use of properly selected and fitted PPEs, such as muffs and plugs, can effectively prevent and reduce such damage (14). The most effective hearing protection devices are those with which the worker is most comfortable will use 100% of the time (15). Tinnitus is the ringing or buzzing sound heard in one or both ears (16). Evidence has shown that unexpected or impulse noise is more annoying than continuous noise of equivalent energy (17).

Material and Methods:

This cross sectional study was conducted on May 2009 in Khartoum International Airport is located just 2.5 km from the center of the city at 15.35 Longitude and latitude 30.23 north east at an altitude of 1260 feet above sea level. Study

population: The apron workers belong to many professional groups with a wide diversity of tasks. The apron workers in airport are responsible for coordinating and directing all operations conducted in proximity of the aircraft on the parking area .This research examines these operations: baggage loading/unloading − cargo loading/unloading, − ramp operation (aircraft fuelling, − air conditioning supply − potable water service − toilet service − catering service − loading bridge) − pushback, maintenance, security. Methods of sampling: simple random sampling was used to select a representative sample of respondents (364 workers were selected).Study population divided in six categories according to work position. Measurements were taken by Noise Dose Meter _ Bruel & Kjaer type 4428, to measure the dose that is exposed to the worker, the calibration and calculation were carried out in order to obtain an accurate weighted noise level (dB A), the measurements were at the level of hearing zone, then readings of % Dose was converted to Leq using Conversion table . The questionnaire is administer to all participating workers and data collected on socio demographic attributes, usage of PPE and information on medical check. Comparison of means was using the t-test. Analysis of contingency tables was using Chi square test. All prevalence estimates and 95% confidence intervals were derived using SPSS statistical package. Workers who were including in this study informed about the purpose and the nature of the study. The risk-benefit is consider and no risk to the participants such as physical or psychological harm or loss of privacy existed.

Results:

Table (1): The age distribution of the Ramp Workers in Khartoum International Airport (n = 364).

Age distribution (years)	No	%
20 – 29	141	38.7
30 – 39	132	36.3
40 – 49	61	16.8

50 – 59	30	8.2
Total	364	100.0

Table (2): The gender distribution of Ramp Workers in Khartoum International Airport (n = 364).

Gender	No	%
Male	351	96.4
Female	13	3.6
Total	364	100.0

Table (3): The way in which the workers perceived the level of noise in their work environment.

Perceived noise level	No	%
High	360	98.9
Low	4	1.1
total	364	100.0

Table (4): Work position, noise level, number of workers in the Ramp in Khartoum International Airport (n = 364).

	Work position	Noise level dBA	Workers		Exposure	
			No	%	No	%
Exposed	Pushback tractor	87	10	2.75	202	55.50
	Aircraft marshaling	93	21	5.77		
	Maintenance	86.5	25	6.87		
	Loading and unloading	91	38	10.44		
	Under airplane	93.9	108	29.67		
Non exposed	Security	79	19	5.22	162	44.50
	Other	75	143	39.28		
	Total	-	364	100.0	364	

Table (5): Usage of PPE among apron airport workers in Khartoum International Airport – 2009

PPE usage	Numbers of workers	%
Yes, with regular	31	8.5
Yes,with unregular	43	11.8
No	290	79.7
Total	364	100.0

Discussion:

The highest recorded sound pressure level reading was 93.3 dBA measured at under airplane flowed by aircraft marshaling record 93.0 dBA, loading and unloading 91.0 dBA, pushback tractor 87.0 dBA, maintenance 86.5 dBA which were more than permissible limit because the standard of National Institute for Occupational Safety and Health (NIOSH) Cincinnati, Ohio USA, recommended exposure limit (REL) of 85dB (18). Evidence has shown that unexpected or impulse noise is more annoying than continuous noise of equivalent energy (17).Noise measurement showed that 55.50% of Khartoum International Airport workers were exposed to noise levels more than 85 dBA. Chronic exposure to sound of air plane engine which is about 150 dB impacts adversely on hearing and is a risk factor in airport workers (1).

The occurrence of hearing loss as a result of prolonged exposure to a noise level greater than 85 dBA without ear protection is well documented in the literature (19)(20)

The study shows 79.7% of workers did not use hearing protection devices; about 11.8% used personal protective measures with irregular. The routine use of properly selected and fitted PPEs, such as muffs and plugs, can effectively prevent and reduce such damage (14). Overall, 62% of interviewed employees reported always using hearing protection when exposed (21). This could be due to ignorance about the hazards caused by continuous exposure to noise and non-usage of PPEs. Understanding factors influencing the use of hearing protection devices will provide direction for programs to decrease risk of noise induced hearing loss (15).

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