

# Acoustic shock syndrome in a large call center

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## ABSTRACT

Call centers represent one of the fastest growing industries in East Africa. However, there are health and safety hazards unique to this new industry. This field is underexplored for workers of call centers in East Africa and this study sought to establish the symptoms of acoustic shock syndrome. In a descriptive cross-sectional study, a total of 1351 employees, male 579 and female 772 subjects were recruited. They were screened for Acoustic shock syndrome. Eighty percent of those who had symptoms were said to have acoustic shock syndrome. The age group of the subjects for this study ranged from 19-55 years. Those subjects with other medical conditions ENT conditions were excluded. Blockage or fullness of the ears was the most common complaint with 27.7%, followed by Headache (25.8%), then with 24.9% having otalgia. Prevalence of tinnitus (21.3%) and hoarseness of voice (21.8%) was almost the same in this sample population. Hyperacusis was seen for 19.5% of the workers. Other symptoms noted but which were less frequent include: recurrent loss of voice, muffled hearing, distorted hearing, phonophobia, nausea, dizziness, anxiety and depression. However despite the myriad of symptoms, only 21 workers had a form of hearing loss. 12 females had mild hearing loss while for the males, 8 had mild hearing loss and 1 had severe hearing loss. The most common symptoms noted were blockage or fullness of the ears, headache, otalgia, tinnitus, hoarseness of voice, hyperacusis. Acoustic shock syndrome mainly sets in the third decade with the most affected age group being 30-34 years, followed by 25-29 years and the third most affected was 35-39 years. Despite a good number of workers having Acoustic shock syndrome only 21 out of the 1351 (1.55%) actually developed some form of hearing loss.

**Keywords:** Safety hazards, acoustic shock, Hyperacusis

## INTRODUCTION

Acoustic shock is an involuntary response to a sound perceived as traumatic (acoustic incident), which causes a specific and consistent pattern of neurophysiological and psychological symptoms. These include aural pain, tinnitus, hyperacusis/phonophobia, vertigo and other unusual symptoms such as numbness or burning sensations around the ear. A range of emotional reactions including trauma, anxiety and depression can develop. (Wescot 2006).

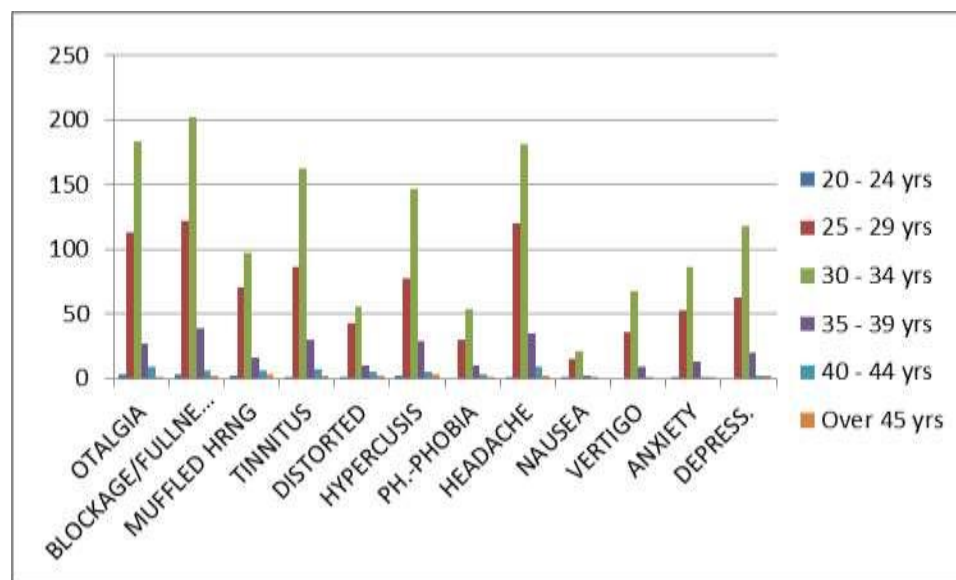
The symptoms of Acoustic shock are usually temporary, but some may persist with ensuing permanent disability. The term acoustic shock disorder (ASD) is used to identify this persistent symptom cluster.

An acoustic incident is any sound that is perceived as threatening, usually a sudden/unexpected/loud sound heard near the ear. The sound is rarely loud enough or present for long enough to cause a noise induced hearing loss.

A call center is defined as a workstation where the basic tasks of a worker are carried out with the use of a phone and a computer. According to statistics, about 1.3-4% of workers are employed in call centers in the European countries. The number employed in Subsaharan Africa is rising yet occupational health measures to protect workers from harmful noise remains wanting. (Smagowska 2010) Call Centre staff using a

**Table1.**

SYMPTOMS	MALE	% Male	FEMALE	% FEMALE	TOTAL	
Otalgia	140	10.4	196	14.5	336	24.9
Blockage/fullness	148	11.0	226	16.7	374	27.7
Muffled Hearing	77	5.7	118	8.7	195	14.4
Tinnitus	113	8.4	175	13.0	288	21.3
Distorted Hearing	44	3.3	73	5.4	117	8.7
Hyperacusis	102	7.5	161	11.9	263	19.5
Phono-phobia	42	3.1	56	4.1	98	7.3
Headache	124	9.2	224	16.6	348	25.8
Nausea	14	1.0	26	1.9	40	3.0
Dizziness/Vertigo	44	3.3	70	5.2	114	8.4
Anxiety	62	4.6	93	6.9	155	11.5
Depression	81	6.0	124	9.2	205	15.2

**Figure1.** Symptoms of Acoustic Shock Syndrome

telephone headset are vulnerable to ASD because of the increased likelihood of exposure, close to their ear(s), to an acoustic incident randomly transmitted via the telephone line. The objective of this paper is to study the magnitude of the Acoustic shock syndrome in a big call center in East Africa.

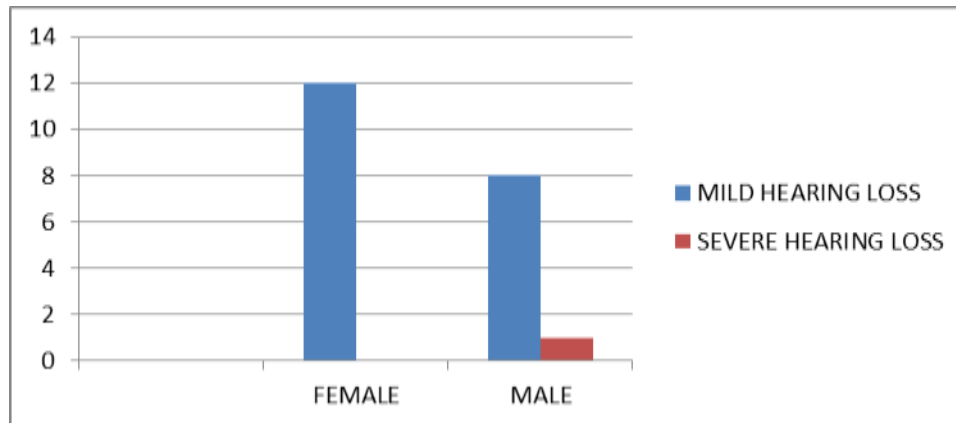
## MATERIALS AND METHODS

In a descriptive cross-sectional study, a total of 1351 employees, male 579 and female 772 subjects were recruited. The age group of the subjects for this study ranged from 19-55 years. Eighty percent of those who had symptoms were said to have acoustic shock syndrome. They were asked in a questionnaire about any ENT symptoms they may have presently. The questionnaire asked about their symptoms after using earphones: duration of work, their previous occupation,

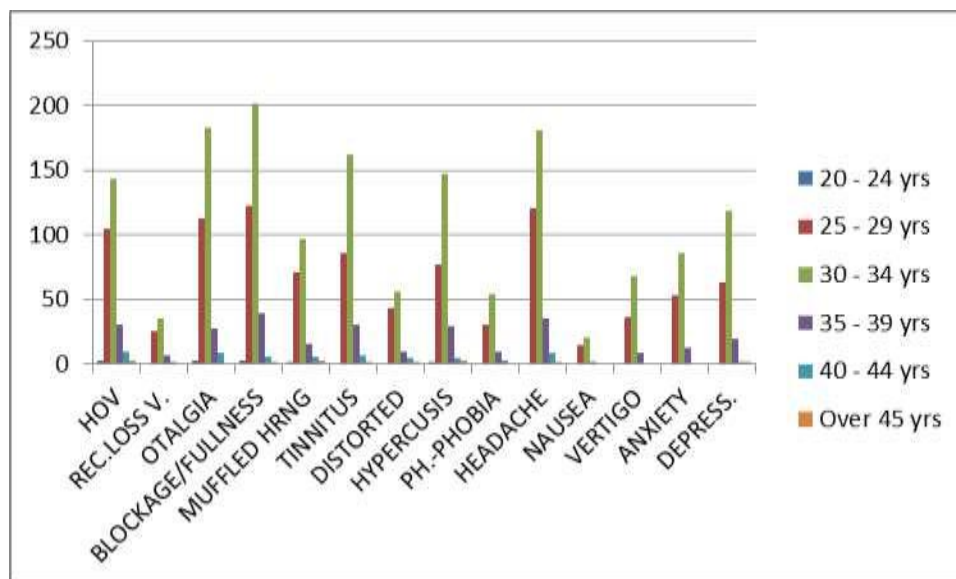
potential hazards exposure at work place or outside, breaks in between working hours, and if they had the following symptoms: recurrent or persistent cough, painful ears, blockage of ears, fullness or pressure in the ears, fluttering sensation in the ear, muffled hearing, distorted hearing, ringing sensation in the ear, perception of sound as unusually loud (hyperacusis), phono-phobia (abnormal fear of sound), headache, nausea dizziness/vertigo, anxiety when anticipating phone calls, depressed feeling.

## RESULTS

The total number of people recruited for this study was 1351 employees, male 579 and female 772 subjects. Table1 and Figure1 show the different symptoms and the frequency in which they were reported. Most workers had



**Figure2.** Prevalence of hearing loss amongst the workers at the call center



**Figure3.** Distribution of symptoms according to age groups

more than one symptom. Blockage or fullness of the ears was the most common complaint with 27.7%, followed by Headache (25.8%), then with 24.9% having otalgia. Prevalence of tinnitus (21.3%) and hyperacusis (19.5%) was noted. Other symptoms noted but which were less frequent include: muffled hearing, distorted hearing, phonophobia, nausea, dizziness, anxiety and depression.

However despite the myriad of symptoms, only 21 workers had a form of hearing loss. 12 females had mild hearing loss while for the males, 8 had mild hearing loss and 1 had severe hearing loss. (Figure 2).

Furthermore it was noted that the age group affected most was 30-34 years (Figure 3), followed by 25-29 years and the third most affected was 35-39 years.

## DISCUSSION

The most common symptoms noted were blockage or fullness of the ears, headache, otalgia, tinnitus, hyperacusis. Other symptoms noted but which were less frequent include: muffled hearing, distorted hearing, phonophobia, nausea, dizziness, anxiety and depression but unique to this study is that it categorizes the symptoms according to frequency. Symptoms of Acoustic Shock in other studies (Peretti *et al.*, 2003; Chiusano *et al.*, 1995; Groothoff, 2005) include a startle reflex, tingling, dizziness and nausea, headaches, fullness of hearing or tinnitus. Hearing loss has also been reported in previous studies (Peretti *et al.*, 2003, Chiusano *et al.*,

1995; Groothoff, 2005). Despite a good number of workers having Acoustic shock syndrome only 21 out of the 1351 i.e.1.55% actually developed some form of hearing loss. A-weighted sound pressure levels fluctuate between 50 and 87 dB (Peretti *et al.*, 2003), from 65 to 88 dB (Patel and Broughton 2002), from 80 to 104 dB (Chiusano *et al.*, 1995). Therefore a possibility of hearing loss connected with exposure to headset noise has been stated. The phenomenon occurs if an employee is under short-term exposure to high-intensity noise, which can even reach 118 dB under equipment. The sounds originate either from line faults, misdirected faxes, power supply failures, or manmade sources, e.g. frustrated customers. (Groothoff, 2005)

This study noted that acoustic shock syndrome mainly sets in the third decade with the most affected age group being 30-34 years (Figure 3), followed by 25-29 years and the third most affected was 35-39 years.

The initial physiological symptoms of acoustic shock are considered to be a direct consequence of excessive, involuntary middle ear muscle contractions. While the stapedial reflex is an acoustic reflex triggered by high volume levels, the tensor tympani reflex is a startle reflex (Milhinch, 2001; Patuzzi, 2002) which is exaggerated by high stress levels. The tensor tympani muscle contracts immediately preceding the sounds produced during self-vocalisation, suggesting it has an established protective function to loud sounds (Wescot, 2006), assists in the discrimination of low frequency sounds, and is involved in velopharyngeal movements (Ramirez *et al.*, 2007).

## CONCLUSION

The most common symptoms noted were blockage or fullness of the ears, headache, otalgia, tinnitus, hoarseness of voice, hyperacusis. Acoustic shock

syndrome mainly sets in the third decade with the most affected age group being 30-34 years, followed by 25-29 years and the third most affected was 35-39 years. Despite a good number of workers having Acoustic shock syndrome only 21 out of the 1351 (1.55%) actually developed some form of hearing loss.

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