Non-auditory Effects of Noise among Staff Working in a Tertiary Care Hospital in New Delhi, India

P1-H4

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- At least three out of four study participants reported experiencing at least one non-auditory effect due to hospital noise, of which sleep disturbance, impaired concentration and headache were the most common.
- Headache, impaired concentration, and fatigue were significantly linked to hospital noise at levels higher than those recommended by National and International Agencies.

BACKGROUND

- Noise, defined as unwanted sound, has been recognized as a health hazard for a long time.
- Hospital noise has been associated with a myriad of non-auditory symptoms such as stress, changes in blood pressure and heart rate, sleep disturbance, headache etc. among the working staff.[1]

OBJECTIVES

- To find the prevalence of non-auditory effects of noise among staff and its association with hospital noise levels.

MATERIALS AND METHODS

- Cross-sectional study conducted in a 1600-bedded tertiary care hospital in New Delhi, India from March 2021 to September 2021 among Staff employed in the hospital at 30 sites (indoor and outdoor).
- The sample size was calculated to be **450**, based on 29.3% prevalence of loss of sleep observed among health care staff by Khaiwal et al[2], accounting for a 15% relative error, 95% confidence and 10% non-response rate.
- Staff list for each site was obtained and 15 participants were recruited per site using stratified random sampling and staff members who did not have any night duties during duration of this study were excluded.
- A pre-designed, pre-tested, semi-structured questionnaire[3] consisting of socio-economic information and questions related to symptoms due to noise and and DASS-42[4,5] which was self-administered were used.
- Noise data in the form of LAeq 24 hours was collected on weekdays and weekends using Digital Integrating Sound Level Meter, Lutron SL-4035SD (ISO 9001,CE,IEC 1010) meeting the IEC 61672 class 2 standards. LAeq: It is the A-weighted equivalent continuous sound level in decibels.[6]
- Ethical approval was obtained from the Institute Ethics Committee. Prior written informed consent was obtained from each participant.

RESULTS

Figure 1: (a) Noise levels at different sites (N=30) and (b) Participants' profession (N=450)

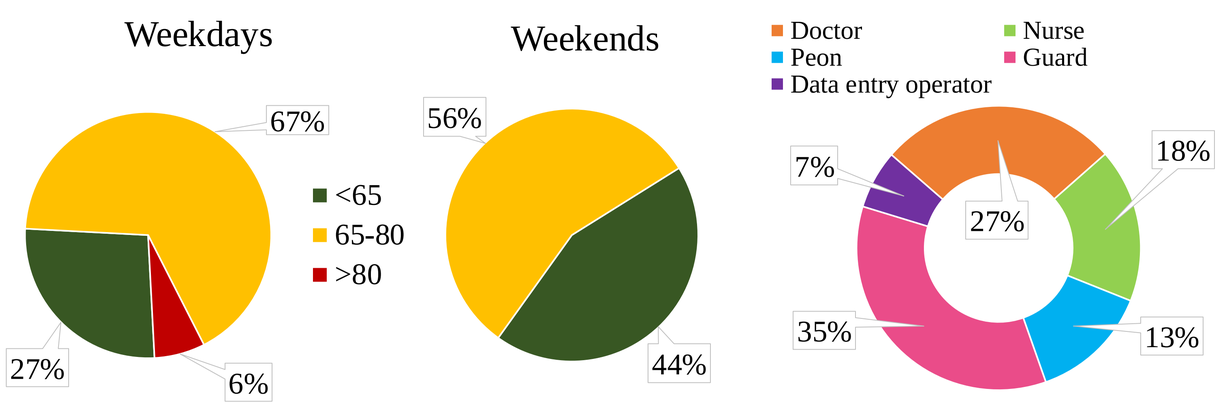
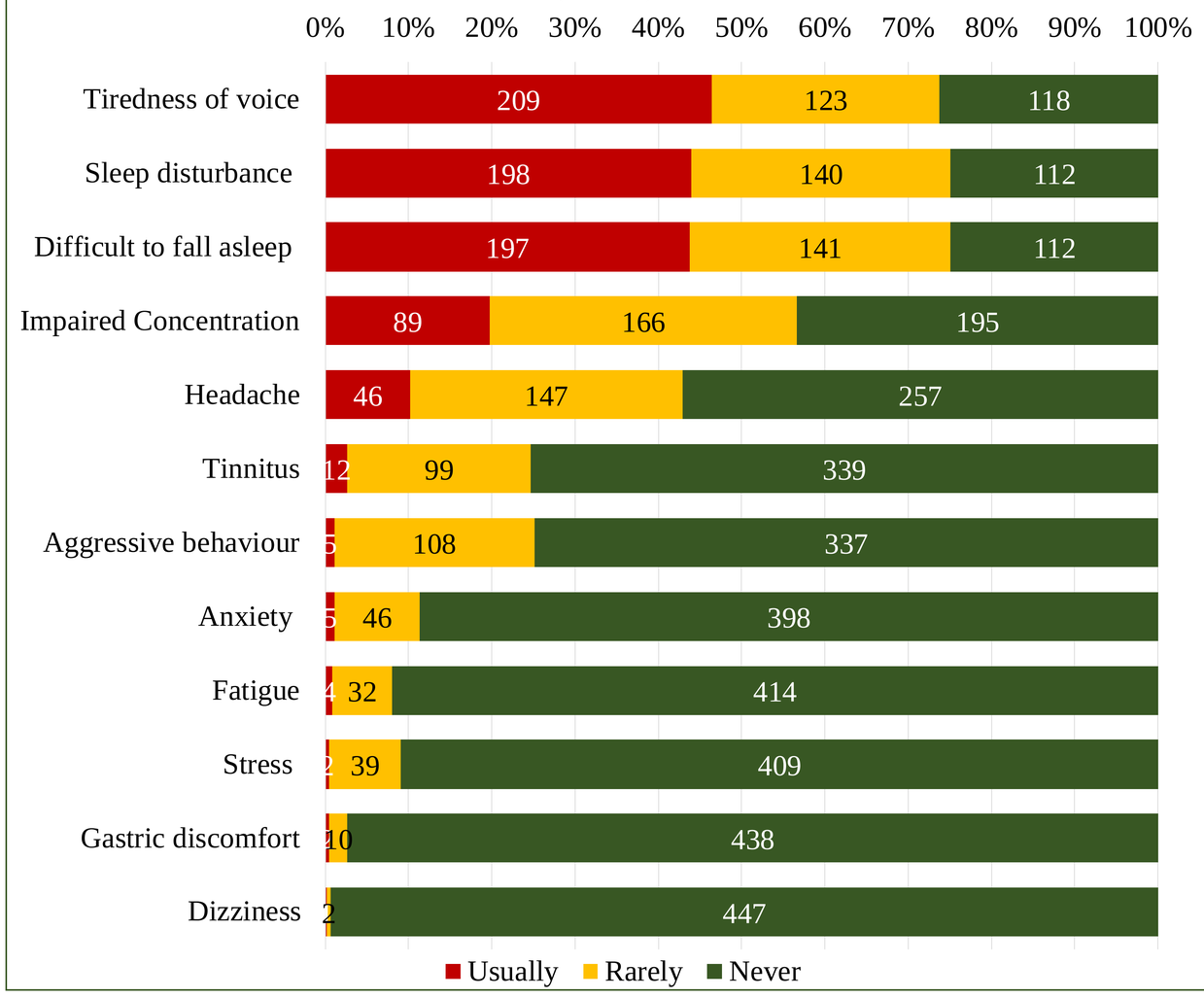


Figure 2: Frequency of reporting non-auditory effects as perceived to be due to hospital noise (N=450)



- Dizziness, gastric discomfort and perceived stress were not found to be associated on chi-square analysis.
- On multivariable logistic regression, only headache, impaired concentration, fatigue and tinnitus were found to be significantly associated with noise on adjustment.
- Tiredness of voice, aggressive behavior, perceived anxiety, sleep disturbances, depression, anxiety, and stress were not found to be associated with noise after adjustment.

Table 1: Association of perceiving non-auditory symptoms to be due to noise among study participants with noise levels (N=450)

	LAeq 24h Weekday (in dBA)			p-value*	LAeq 24h Weekend (in dBA)		p-value*
	<65	65-80	>80		<65	65-80	
Headache	38(31.7)	138(46)	17(56.7)	**0.007**	62(31.5)	131(51.8)	**<0.001**
Impaired concentration	54(45)	187(62.3)	14(46.7)	**0.003**	99(50.3)	156(61.7)	**0.017**
Fatigue	8(6.7)	27(9)	1(3.3)	0.460	8(4.1)	28(11.1)	**0.008**
Tinnitus	16(13.3)	84(28)	11(36.7)	**0.001**	39(19.8)	72(28.5)	**0.037**
Tiredness of voice	62(51.7)	247(82.3)	23(76.7)	**<0.001**	135(68.5)	197(77.9)	**0.031**
Aggressive Behaviour	18(15)	82(27.3)	13(43.3)	**0.002**	64(32.5)	49(19.4)	**0.002**
Perceived anxiety	14(11.7)	29(9.7)	9(30)	**0.009**	23(11.7)	29(11.5)	1.000
Sleep disturbance	91(75.8)	231(77)	16(53.3)	**0.022**	146(74.1)	192(75.9)	0.742
Depression	4(3.3)	3(1)	3(10)	**0.007**	0	10(4)	**0.003**
Anxiety	7(5.8)	4(1.3)	0	**0.022**	3(1.5)	8(3.2)	0.361
Stress	10(8.3)	13(4.3)	7(23.3)	**0.001**	11(5.6)	19(7.5)	0.452

Table 2: Multivariable logistic regression analysis of association of non-auditory effects perceived to be due to noise with noise levels in hospital (N=450)

	LAeq 24h Weekday (aOR with 95% C.I.)*			LAeq 24h Weekend (aOR with 95% C.I.)*	
	<65	65-80	>80	<65	65-80
Headache	Ref	1.35(0.58-3.11)	2.68(0.94-7.64)	Ref	**2.49(1.44-4.33)**
Impaired concentration	Ref	1.77(0.85-3.69)	1.92(0.89-3.40)	Ref	**2.36(1.35-4.13)**
Fatigue	Ref	1.12(0.8-3.21)	1.78(0.48-6.9)	Ref	**3.14(1.12-8.77)**
Tinnitus	Ref	**6.51(1.98-21.48)**	**4.08(1.71-9.23)**	Ref	**4.55(2.36-8.77)**

*Adjustment was done for marital status, education of participant, socioeconomic status and type of work.

CONCLUSIONS

- At least three out of four study participants reported non-auditory effects, commonly, sleep disturbance, impaired concentration, and headaches.
- Significant associations with higher levels of noise was found for several non-auditory effects, and these associations have been reported from elsewhere around the world, irrespective of sociodemographic diversity, development status, patient loads or service delivery models.
- This indicates the need to earmark hospital noise as an occupational health priority globally, and especially in India as current policies inadequately address this concern, and measures to comply with regulations are limited and ineffective.
- Further research is needed at various levels of health care to influence policy changes and raising staff awareness could drive action from hospital planning and administration.

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