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Assessment of noise pollution in Haridwar city of Uttarakhand State, India during Kumbh Mela 2010 and its impact on human health

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Abstract: The present study was carried to investigate the noise level at four different locations of Haridwar viz. Singh Dwar, Rishikul, Chandi ghat and Har Ki Pauri during **Kumbh** Mela 2010. During normal days maximum noise levels were recorded at Chandi ghat *i.e.* 87.11±0.45 dB (A) in the evening hours and minimum noise levels were recorded at Har Ki Pauri *i.e.* 60.8±0.89 dB (A) in the morning hours. While during festival days maximum noise levels were at Har Ki Pauri *i.e.* 88.4 ± 1.65 dB (A) in the evening respectively and Rishikul the least being 54.93±0.53 dB (A) in the morning hours. Noise levels in all the areas were found to be above the ambient noise standard. These high noise levels may have induced headache, annoyance, lack of concentration and other varied effects on human health.

Keywords: Kumbh Mela, Noise levels, Ambient noise, Haridwar

INTRODUCTION

Noise is a potential hazard to health, communication and enjoyment of social life slowly, but surely noise is becoming an unjustifiable interference and imposition upon human comfort, health and quality of life. High level noise is a disturbance to the human environment. Thus, Noise Pollution is slow and subtle killer (Singh and Davar, 2004).

A paradise for nature lovers, Haridwar presents kaleidoscope of Indian culture and civilization. Haridwar termed as "Gateway to Gods" being a holy city experience influx of tourist from all over the country and abroad throughout the year. Haridwar receives on an average around 50,000 visitors each day which may swell to manifold on more sacred occasions. (www.kumbh2010haridwar.gov.in).

Kumbh Mela is religiously most important for the Hindus. Saints, Priests and Yogis from all the corners of India and giant congregation of pilgrims occur in Haridwar to perform various religious rituals, as a result the noise level rises. Besides this the vehicles and musical instruments used by pilgrims on this occasion add to the Noise level and cause traffic jams. Hundreds of devotees are seen on foot moving towards Har Ki Pauri to take holy bath in river Ganga on the sacred occasion.

In the present study, an attempt has been made to evaluate noise level at different locations of Haridwar during normal and festival days of Kumbh Mela 2010 along with its impact on human health.

MATERIALS AND METHODS

Study Sites: The present study was conducted from January-2010 to March-2010 during the religious Khumb Mela with the help of portable precision sound level meter type SL – 4010.To evaluate the ambient noise levels of Haridwar city following four sites were selected *i.e.*

Singh Dwar- The intersection located mainly on the National Highway-58 considered as the entry point of Haridwar connecting three towns of Kankhal , Jwalapur and Haridwar. This point was heavily crowded with heavy vehicular Traffic and high noise levels.

Rishikul- It is the point where Bus Stand wasset up temporarily for Khumb Mela. A place where hooting and shrieking of horns throughout the day and all round traffic of the city passes by.

Chandi Ghat- The junction is very close to the main Har ki Pauri areas where all round the year tourist and pilgrimage activity is clearly visible. An area was too crowded with four and three wheelers and people on foot towards Har Ki Pauri.

Har Ki Pauri- It is the main centre of attraction for the tourists in Haridwar where loud religious music blows almost throughout the day and night. It was highly crowded congested zone of the city during the festive seasons situated on the right bank of Upper Ganga Canal and is famous for its religious sanctity and as bathing ghat cum tourist place.

Monitoring method: The ambient noise monitoring was conducted at four different locations of the city on the

Table 1. Noise levels during normal days in dB (Values are mean ± S.E of 9 observations each).

Time (in hours)	Study Locations			
	Singh dwar	Rishikul	Chandi ghat	*Har ki pauri
0800-1000 AM	69.85±1.16	69.14±0.77	77.88±0.59	60.8±0.89
1300-1500 PM	75.29±0.62	76.55±1.03	83.05±0.77	73.02±0.60
1700-1900 PM	81.6±0.73	85.04±1.14	87.11±0.45	80.28±0.97

occasion of Kumbh Mela. The measurement of sound pressure levels was carried out at three different times during the day between 0800 to 1700 hours. During each monitoring of Noise readings of SPL were recorded nine times at an interval of 10 – 15 minutes in a period of constant two hours survey by holding a Sound level meter at arm's length at the chest level in order to reduce errors due to reflection of sound from the body. The maximum and minimum sound pressure levels were also recorded. A survey on public was also conducted to assess the impact of noise on human health. The sound levels were measured in decibel denoted as dB (A).

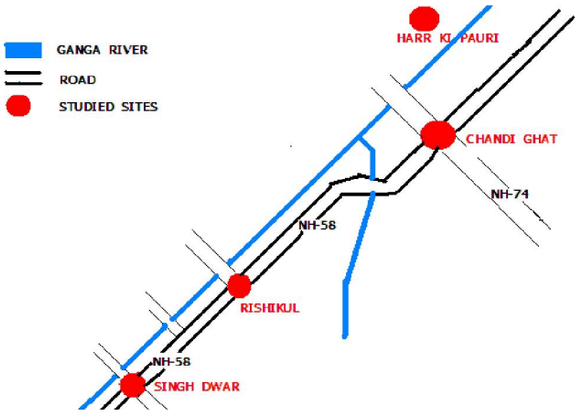

Fig. 1. *Map showing the study sites.*

RESULTS AND DISCUSSION

Various researchers have worked on noise pollution by traffic, generators, musical instruments , machines etc in different cities of India as well as abroad. Deka (2000) monitored the noise quality of Guwahati city and reported that average noise levels was 68 db at residential area 83 db at commercial area which was 23.6% and 27.7% higher as compared to the standard limits of noise in residential and commercial zones respectively. Bodhe *et al.* (2006) monitored the impact of noise from rail car depot on residential area. Hasan (2006) described the impact of noise pollution on health of living being and also suggested the management to control noise pollution. Sharma *et al.* (2010) studied noise levels in different zones of Haridwar city on working and nonworking day in August 2009. It was monitored that noise level during working days was 18.9%, 8.3% and 28.8% higher as compared to non working days respectively for industrial, commercial and silence zones. The noise during night was 8.2%, 5.9% and 3.2% higher on working days as compared to non working. While in residential zone the average noise was 2.09% and 2.6% higher on working days as compared to non working during day and night. In the present study the noise levels during normal and festival days are given in Table 1 and 2. From Table 1 it is evident that during normal days maximum noise levels was recorded at Chandi ghat *i.e.* 87.11±0.45 dB (A) in the evening (1700-1900 hours) respectively.

Har Ki Pauri recorded lowest noise levels *i.e.* 60.8±0.89 dB (A) in the morning hours (08:00-10:00 hours), during normal days of Khumb Mela.

From Table 2 it is evident that during festival days maximum noise level was recorded at Har Ki Pauri *i.e.* 88.4 ± 1.65 ± dB (A) in the evening hours (1700-1900 hours) respectively as compared to other sites and minimum at Rishikul *i.e.* 54.93±0.53 dB (A) in the morning hours (0800-1000 hours). Noise levels were seen lowest during the morning hours and highest during the evening at all the four locations of the city.

Noise levels were above the prescribed standards at all the four locations of the city. At Chandi ghat Traffic congestion after every 10-15 minutes is very common view at this junction even in normal days which increased manifold during festive occasions.

Singh Dwar and Rishikul show a similar noise levels during morning and afternoon hours. Variations occur at these two sites during evening *i.e.* 4-5 dB. At Singh Dwar evening noise was recorded as 81.6 ± 0.73 dB (A) and at

Table 2. Noise levels during festival days in dB (Values are mean ± S.E of 9 observations each).

Time (in hours)	Study locations			
	Singh dwar	Rishikul	Chandi ghat	*Har ki pauri
0800-1000 AM	69.98±0.93	54.93±0.53	61.4±1.36	70.5±2.34
1300-1500 PM	110.94±2.29	60.7±0.33	62.6±0.74	80.6±1.97
1700-1900 PM	74.2±1.06	55.32±0.74	65.3±1.16	88.4±1.65

Table 3. Impact of noise level on human health of all age groups at four studied sites.

Impact of noise	Yes	No
1. Induce Headache	80%	20%
2. Reduce Working efficiency	44%	56%
3. Increase Proneness to accidents	30%	70%
4. Difficult to concentrate	76%	24%
5. Communication Interference (Face to Face and Telephonic)	54%	46%
6. Affect sleep at night	78%	22%
7. Makes you fatigue, tired	84%	16%
8. Makes you feel anxious and nervous	16%	84%
9. You feel annoyed	34%	66%
10. You have fear feeling	10%	90%
11. Rapid blinking of eyes	22%	78%
12. More frequent dilation of pupil	26%	74%
13. Induce Blood Pressure	58%	42%
14. Induce Hearing Problems	68%	32%

Rishikul 85.04 ± 1.14 dB (A) in the evening. Har Ki Pauri was declared as zero zone. Least noise level were recorded at this area *i.e.* 60.8±0.89 dB (A) in the morning hours at it was above the prescribed standard.

Noise levels during the festival days were low as compared to normal days at Singh Dwar, Rishikul and Chandi ghat area due to declaration of zero zone in Haridwar. At all the three sites noise levels was 14.21 dB to 20.83 dB less than normal days.

The present study revealed highest noise level *i.e.* 110.94±2.29 dB (A) at Singh Dwar on the festive day of Magh Purnima Snan in the afternoon hours because of the religious Peshvai of Sadhus along with loud musical instruments. On the other hand, the lowest mean was recorded at Rishikul during morning hours on Mahashivratri because Haridwar was declared as zero zone on this day.Har Ki Pauri recorded maximum noise level 88.4±1.65 dB (A) in the evening hours. This area is famous for Aarti and Puja with the help of loudspeakers which add to the high noise level in the area.

From Table-3 it is evident that high noise levels had a considerable psychological effect on human health. 80% of the public got affected with headache and 44% has reduced work efficiency . 76% of the people find difficult to concentrate and 55% people were affected by communication interferences both face to face and telephonic while 30% says that high noise levels increase proneness to accidents due to lack of concentration on driving. 78% of the people sleep was affected at night and 84% get tired of being exposed to high noise. Intense blowing of horns cause rapid blinking of eyes in 22% and 26% showed frequent dilation of pupil.

Thus, Noise levels in all the studied areas were found to be above the ambient noise standard which had a critical impact on human health during the period of Kumbh Mela, 2010.

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