

Effects of lightning and possible health hazards due to erection of telecommunication towers

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The health hazards due to lightning and electromagnetic radiations in the neighbourhood of telecommunication towers were studied. Six tower sites were selected for the investigations from the areas covering the Sri Lankan lightning belt in Gampaha (Delgoda, Gonawala, Madarawa and Udupila) and Kaluthara (two in Poruwadanda) districts. Initially, a survey was conducted with a questionnaire based interviews. The earth resistance was measured using a digital earth tester according to the fall of potential method inside a region of 15 m from the tower for studying the contribution to the lightning effects. The electromagnetic radiation power density was measured using a broadband field meter. Readings were obtained at 10 m intervals along the direct line-of-sight of the antennas from the tower to about 80 m distance. According to the literature and from the observations it was revealed that the most important factors related to the induced lightning current effect are the earthing systems utilised at the tower site, locations of the power feeding transformer and the houses in the neighbourhood. It was also observed that the earth resistance was near to threshold value in the Kaluthara district, and severe lightning hazards were prevented by installing Surge Protection Devices (SPD) by the service providers. However, installing SPDs into houses was a temporary solution for the induced lightning current effects. The results of power densities showed that they were significantly below the recommended threshold values according to the guidelines of Telecommunication Regulatory Commission of Sri Lanka; such that the maximum and minimum were 0.001 % and 0.0001 % respectively. The measurements also revealed that distance from the tower is not the sole criteria determining radiation hazards. In some regions the power density was independent from the distance from the tower because it was not proportional to the distance. In rural areas, the radiation power density emitted by the telecommunication towers is considerably low compared to that emitted by in-use mobile phones. Also, the radiation pattern critically depends on inclination and tilting direction of antennas. Thus, this study revealed that the effects of radiation emitted from telecommunication towers are negligible in the immediate neighbourhood.

Keywords: Lightning, Radiation, Surge Protection Devices