

## Original Research Article

# Phantom ringing syndrome: an Indian perspective

Ajeet Kumar Khilnani<sup>1\*</sup>, Rekha Thaddanee<sup>2</sup>, Gurudas Khilnani<sup>3</sup>

<sup>1</sup>Department of Otorhinolaryngology, <sup>2</sup>Department of Paediatrics, <sup>3</sup>Department of Pharmacology, Gujarat Adani Institute of Medical Sciences, Bhuj, Kutch, Gujarat, India

**Received:** 24 November 2017

**Accepted:** 28 December 2017

### \*Correspondence:

Dr. Ajeet Kumar Khilnani,

E-mail: [ajeetkhilnani@gmail.com](mailto:ajeetkhilnani@gmail.com)

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

### ABSTRACT

**Background:** Use of smart phone, which has become an integral activity of daily life now, has begun to show subtle untoward effects on health. Various health related problems associated with electronic devices, especially smart phones, use are being studied. Phantom ringing syndrome (PRS) is one such adverse effect, which is an auditory hallucination seen in mobile phone users when they feel that their phone is ringing when it is actually not. To the best of our knowledge and literature search, we could not find any Indian study on PRS. This study was conducted to determine the prevalence of PRS and to find the factors associated with it.

**Methods:** This was a prospective, cross-sectional online questionnaire based study, conducted in western Gujarat from July 2017 to October 2017. A 7-item validated questionnaire was sent to 800 participants, through e-mail or WhatsApp, and the responses received were analyzed using MS excel.

**Results:** Out of 319 respondents, 181 (67%) were males and 89 (33%) females. The mean age of males was 31.65 (9.65) years and females was 29.96 (11.19) years. PRS was present in 54.4% of respondents. There was no significant association between presence of PRS and age of participants ( $p=0.855$ ), sex of participants ( $p=0.5232$ ), profession (medical vs. non-medical) ( $p=0.498$ ), physical location of mobile phone ( $p=0.829$ ), mode of using mobile phone ( $p=0.718$ ) and duration of mobile phone use ( $p=0.748$ ).

**Conclusions:** The prevalence rate of PRS in our study was 54.4%. PRS occurs irrespective of gender, age, profession, and physical location, duration and mode of phone use. It would be interesting to find exact site of involvement, in auditory circuit, by BERA studies.

**Keywords:** Auditory hallucinations, India, Mobile phone, Phantom ringing syndrome, Smart phone

### INTRODUCTION

With more and more use of technology and gadgets in our daily lives, various terminologies, describing their effects on our health, have come up in recent years. Untoward health effects related to use of smart phones, hitherto unknown, have been identified and defined. Apart from a sensation of heat at pinna, other effects, probably due to continued sound stimulation of auditory circuit, are being reported. Phantom vibration syndrome (PVS) (a sense of vibration, actually a tactile hallucination, experienced by people when the device is actually not vibrating) was first reported by Rothberg et

al among medical staff.<sup>1</sup> Similarly, Phantom ringing syndrome (PRS) is an auditory hallucination that an electronic device is ringing when actually it is not. The term PRS was first used by Lin et al in 2013.<sup>2</sup> Recently, in 2014, Fernandez-Guerrero coined the term "WhatAppitis", to denote the Tenosynovitis caused by texting with mobile phones.<sup>3</sup> Such has been the extent of use of mobile phones, especially smart phones, nowadays, that Smart phone addiction is being considered as an emerging health problem. Lin YH et al, in 2014, developed and validated a 26-item smartphone addiction inventory (SPAI).<sup>4</sup>

PRS has become an emerging phenomenon of everyone's concern recently. There are no studies available till date to address the prevalence of PRS in general population. Lin et al found the prevalence of PRS in medical interns in Taiwan and concluded that the baseline phantom ringing prevalence was 27.4%, which significantly increased to 84.9%, 87.7%, and 86.3% at the third, sixth, and twelfth internship months, respectively.<sup>2</sup> The phantom ringing prevalence decreased to 54.2% two weeks after the internship ended, and remained significantly higher than at baseline. Another study on Iranian medical students found the prevalence of PRS due to mobile phones to be 49.3%.<sup>5</sup>

PRS is a disturbing condition which may affect the daily routine of individuals. It is important to study PRS and to assess its psychological impact. So far as India is concerned, we could not find any study on PRS using the search terms 'phantom ringing syndrome' and 'India' in PubMed and Medline. Hence, this entity is yet to be explored in India. This study was undertaken with two objectives. First, to assess the prevalence of PRS in general population, and, Second, to identify the factors associated with development of PRS.

**METHODS**

This was a prospective, cross-sectional, observational, questionnaire based study, carried out at a tertiary care teaching hospital in Western Gujarat from July 2017 to October 2017. Institutional Ethics Committee approval was taken before starting the study. A 7-item validated

questionnaire in English, enquiring about the demographics, characteristics of mobile phone use and phantom ringing experienced, was sent (through e-mail or on WhatsApp) to 800 individuals through Google forms. The participation of subjects in this study was totally voluntary. Out of 800, 319 responded, while 51 forms were incomplete, hence excluded from the study. Hence, the sample size for this study was 270. All the data received was tabulated in MS Excel sheets and descriptive (Mean and SD) and analytical statistics tests (Chi square and one way ANOVA) were used to analyze the data. The difference was considered significant at 95% confidence interval (p<0.05).

**RESULTS**

Of 319 respondents, 181 (67%) were males and 89 (33%) females. The mean age of males was 31.65 (9.65) years and females was 29.96 (11.19) years.

Out of 270 respondents, 147 (54.4%) felt at least one episode of phantom ringing of their mobile phones in the last three months. Phantom ringing was present in 101 (55.8%) males and 46 (51.6%) females. However, the difference was not significant (p=0.5232). In PRS group, 79 out of 101 males (p=0.77) and 42 out of 46 females (p=0.447) belonged to medical related professions. Conversely, in non-PRS group, 64 out of 80 males and 41 out of 43 females belonged to medical related professions. Hence, there was no significant difference between medical and non-medical profession subjects, in both sexes (Table 1).

**Table 1: Relation of PRS with sex and occupation of subjects.**

Phantom ringing present (n=147)				Phantom ringing absent (n=123)			
Males		Females		Males		Females	
<b>101</b>		46		80		43	
Medical profession	Non-medical profession	Medical profession	Non-medical profession	Medical profession	Non-medical profession	Medical profession	Non-medical profession
<b>79</b>	22	42	4	64	16	41	2

**Table 2: Relationship of various factors with PRS.**

Factor	Category	PRS present (n=147)	PRS absent (n=123)	P value
Age of participants (years)	≤20	16	14	P=0.855
	21-40	111	87	
	41-60	19	21	
	>60	1	1	
Physical location of mobile phone	Breast pocket	13	08	P =0.829
	Trouser pocket	101	84	
	Separate pouch	33	31	
Mode of using mobile phone	Ring + vibration	65	48	P=0.718
	Ring alone	45	48	
	Vibration alone	30	18	
	Silent	07	09	
Duration of mobile phone use (years)	<1	1	1	P=0.748
	1-5	48	47	
	5-10	39	19	
	>10	59	56	

Maximum subjects (n=198, 73.3%) were between 21-40 years of age, of which 111 had PRS, with a prevalence of 56%. However, there was no significant difference in presence of PRS between different age groups (p=0.855) (Table 2).

Subjects were asked where they kept their phones most of the times and at what mode. Maximum patients (185) kept their phones in trouser pocket, 64 kept it in separate pouch, while 21 kept it in breast pocket. However, there was no significant difference in the presence of PRS with relation to the place of keeping the phone (p=0.829). Similarly, there was no significant difference found in presence of PRS in relation to the use of phone on different modes, i.e. silent, ringing, vibration or ringing + vibration (p=0.718) (Table 2).

Subjects were asked about the duration since they are using mobile phone. 115 participants had been using phone since >10 years, of which 59 had PRS (prevalence of 51.3%). However, there was no significant difference between duration of mobile phone use and presence of PRS (p=0.748) (Table 2).

## DISCUSSION

PRS, an auditory hallucination, has been evaluated for the first time in India, in this study, and also for the first time in general population, as previous studies have reported PRS in medical students and interns.<sup>2,5</sup> In the present study, 54.4% of participants complained of phantom ringing at least once in the last three months, which is a sizeable number.

The psychological impact of PRS is not yet fully known. The results of present survey reveal that PRS occurs frequently with use of mobile phones in any mode, and occurs uniformly irrespective of age and sex. In the study by Mohammadbeigi et al, PRS was seen significantly higher in females and in those people living in dormitory.<sup>5</sup> In another study by Lin et al, they studied the role of anxiety, depression and device characteristics on PRS, but could not find any significant correlation.<sup>2</sup> Occupational burnout was studied as a factor associated with PRS by Chen et al in 2014, and they found that a higher score for service target fatigue had an independent impact on the presence of PRS.<sup>6</sup>

The PRS appears to be an auditory adaptive phenomenon arising out of changes in function of neurons of auditory brain. A considerable prevalence (54.4%) of PRS in phone users in this study indicates that normal brain mechanisms are disturbed. Presence of PRS provides an evidence pointing toward a contribution of non-genetic factors in the etiology of psychotic symptoms and might represent a state of general vulnerability in the general population.<sup>7-9</sup> A measurement of autonomic modulation, such as Heart rate variability, may also clarify the role of the hypothalamic-pituitary-adrenal (HPA) axis in the development of PRS.<sup>10</sup> Conversely, it could simulate

development of functional ectopic focus in auditory pathway or cortex akin to continuous stimulation of neuronal circuit, as in kindling phenomenon. Since cognitive style may play an important role in the development of PRS, a more cognitive approach should be explored in the next study.

## CONCLUSION

PRS still remains an under explored entity with unknown affecting factors. This study will act as a platform to evaluate PRS further in Indian perspective and also to find its associated factors. It would be interesting to study changes in Brainstem Response Evoked Audiometry (BERA) pattern in subjects with PRS to identify locus and site of auditory pathway involved, if any.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

## REFERENCES

1. Rothberg MB, Arora A, Hermann J, Kleppel R, St Marie P, Visintainer P. Phantom vibration syndrome among medical staff: a cross sectional survey. *BMJ.* 2010;341:c6914.
2. Lin YH, Chen CY, Li P, Lin SH. A dimensional approach to the phantom vibration and ringing syndrome during medical internship. *J Psychiatr Res.* 2013;47(9):1254-8.
3. Fernandez-Guerrero IM. WhatsApp it is. *Lancet.* 2014;383(9922):1040.
4. Lin YH, Chang LR, Lee YH, Tseng HW, Kuo TB, Chen SH. Development and validation of the Smartphone Addiction Inventory (SPAI). *PLoS One.* 2014;9(6):e98312.
5. Mohammadbeigi A, Mohammadsalehi N, Moshiri E, Anbari Z, Ahmadi A, Ansari H. The prevalence of phantom vibration/ringing syndromes and their related factors in Iranian' students of medical sciences. *Asian J Psychiatr.* 2017;27:76-80.
6. Chen CP, Wu CC, Chang LR, Lin YH. Possible association between phantom vibration syndrome and occupational burnout. *Neuropsychiatr Dis Treat.* 2014;10:2307-14.
7. van Os J, Krabbendam L, Myin-Germeys I, Delespaul P. The schizophrenia envirome. *Curr Opin Psychiatry.* 2005;18(2):141-5.
8. Welham J, Isohanni M, Jones P, McGrath J. The antecedents of schizophrenia: a review of birth cohort studies. *Schizophr Bull.* 2009;35(3):603-23.
9. Langer AI, Cangas AJ, Serper M. Analysis of the multidimensionality of hallucination like experiences in clinical and nonclinical Spanish samples and their relation to clinical symptoms: implications for the model of continuity. *Int J Psychol.* 2011;46(1):46-54.

10. Heart rate variability. Standards of measurement, physiological interpretation, and clinical use. Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology. *Eur Heart J.* 1996;17(3):354-81.

**Cite this article as:** Khilnani AK, Thaddanee R, Khilnani G. Phantom ringing syndrome: an Indian perspective. *Int J Otorhinolaryngol Head Neck Surg* 2018;4:477-80.