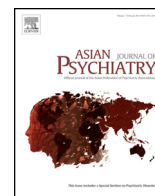




Contents lists available at ScienceDirect

## Asian Journal of Psychiatry

journal homepage: [www.elsevier.com/locate/ajp](http://www.elsevier.com/locate/ajp)

# The prevalence of phantom vibration/ringing syndromes and their related factors in Iranian' students of medical sciences



Abolfazl Mohammadbeigi<sup>a,\*</sup>, Narges Mohammadsalehi<sup>b</sup>, Esmail Moshiri<sup>c</sup>,  
Zohreh Anbari<sup>d</sup>, Ali Ahmadi<sup>e</sup>, Hossein Ansari<sup>f</sup>

<sup>a</sup> Department of Epidemiology and Biostatistics, Neurology and Neurosciences Research Center, Qom University of Medical Sciences, Qom, Iran

<sup>b</sup> Health Policy and Promotion Research Center, Qom University of Medical Sciences, Qom, Iran

<sup>c</sup> Department of Anesthesiology, Arak University of Medical Sciences, Arak, Iran

<sup>d</sup> EDC, Arak University of Medical Sciences, Arak, Iran

<sup>e</sup> Modeling in Health Research Center, Department of Epidemiology and Biostatistics, School of Public Health, Shahrekord University of Medical Sciences, Shahrekord, Iran

<sup>f</sup> Health Promotion Research Center, Department of Epidemiology and Biostatistics, Zahedan University of Medical Sciences, Zahedan, Iran

## ARTICLE INFO

## Article history:

Received 26 June 2016

Received in revised form 31 January 2017

Accepted 12 February 2017

## Keywords:

Phantom vibration

Syndrome

Phantom ringing

Mobile phone

Smartphone

Medical students

Iran

## ABSTRACT

**Background and aim:** Mobile phone abuse can cause pathologic stress that may lead to addictive behavior such as Phantom Vibration Syndrome (PVS) and Phantom Ringing Syndrome (PRS). The current study aimed to determine the PVS and PRS due to mobile phone use in students of Qom University of medical Sciences in Iran.

**Design:** Cross-sectional study.

**Participants:** The participants were 380 students selected by proportional stratified random sampling method in each stratum.

**Measurements:** Data were collected by a self-administered questionnaire and analyzed by descriptive and analytic statistical methods including *t*-test, chi square and analysis of variance.

**Findings:** The prevalence of PVS and PRS due to mobile phones in students of medical sciences was estimated to be 54.3% and 49.3%, respectively. PVS was higher in female students than in males while the PRS was higher in male students. There was a significant relationship between PVS and using social networks such as Viber, WhatsApp, and Line. In addition, a significant association was observed between PVS and friend-finding, chatting and entertainment.

**Conclusion:** Studies should be done in the future to assess the long-term complication of overusing mobile phones. In the current study, the prevalence of PVS and PRS in half of students is considerable.

© 2017 Elsevier B.V. All rights reserved.

## 1. Introduction

Today, psychosomatic syndromes are emerging in mobile phone users who are frequently checking their phones when their phones are in “silent/not ringing” or “vibrated” modes (Hemmert, 2008). As such, an intermittently perceived hallucination is defined as phantom vibration syndrome (PVS) or ‘vibrant anxiety’ and Phantom Ringing Syndrome (PRS) or ‘ringing anxiety’, respectively in mobile phone users who feel that their mobile phones are vibrating or ringing when indeed it is not the case (Drouin et al., 2012; Hemmert, 2008; Lin et al., 2013b; Rosenberger, 2015).

PVS and PRS are common forms of hallucination in the general population, especially in teenagers and adolescents (Lin et al., 2013b). According to recent statistics, the prevalence of Iranian mobile phone and internet usage in Iran has increased to 85% and 35%, respectively. Moreover, 22% of Iranian users and 58% of teenagers connect to the internet by their smartphones or Tablets (The Official Portal Of Measuring Information Society Of Iran, 2014). Text messaging using in social networks of smartphones was increased consequently, due to high internet access in recent years and a sharp increase occurred in mobile communications worldwide including Iran (Drouin et al., 2012; Dixit et al., 2010; Payne et al., 2012; Ramesh et al., 2008; Lenhart et al., 2010; Mohammadsalehi et al., 2015). According to recent studies in this area, the prevalence of PVS was estimated to be 68% in Rothberg's study (Rothberg et al., 2010), 78.1% in Lin (Lin et al., 2013b) and 89% in Drouin's study (Drouin et al., 2012). Based on the stress-related

\* Corresponding author.

E-mail address: [ansarih88@gmail.com](mailto:ansarih88@gmail.com) (H. Ansari).

situations in medical students, PRS has lower prevalence in the population ranging from 27.4% to 54.2% (Lin et al., 2013b).

Based on few studies (Drouin et al., 2012; Lin et al., 2013a, 2013b; Rothberg et al., 2010) conducted on PVS and PRS, it has been found that using vibration mode in mobile phones and the state of being medical students are seen as two important factors for PVS and PRS (Lin et al., 2013b). Moreover, carrying mobile phones for long hours, carrying them in bosom pocket and stressful workload are other related determinants (Lin et al., 2013b; Rothberg et al., 2010; Drouin et al., 2012; Lin et al., 2013a; Bianchi and Phillips, 2005). In addition, it is suggested that exploration of psychological traits and stress are also the related factors of PVS (Rosenberger, 2015). Therefore, the current research was conducted on medical students, having mobile phones, in order to assess the prevalence of PVS and PRS and the related factors of these phenomena.

## 2. Materials and methods

This cross-sectional study was carried out on students of Qom University of Medical Sciences in January 2015. Proportional stratified random sampling method was used to select 380 undergraduate students with each faculty being defined as a stratum. Inclusion criteria consisted of studying at Qom University of Medical Sciences and being at least in the second term of educational program. Students who were unwilling to participate in the study were excluded. Informed consent was taken from all participants and the ethical committee of Qom University of Medical Science approved the study protocol.

A tailor-made self-administrated questionnaire was used for data collection. The questionnaire was constructed based on the literature review (Lin et al., 2013a, 2013b; Rothberg et al., 2010) and using Drouin et al. (2012) questionnaire as the primary draft. This questionnaire was validated by experts and has high reliability coefficient. The main theme in the current study was “Do you experience the phantom/ringing vibrations?” The other items asked about the frequency of phantom/ringing vibration on a scale that ranging from 1 = rarely to 5 = usually. Moreover, the inconvenience of using smartphone and social networks including the effect of overuse of smartphone on relatives' discontent, family relationship, and social activity was assessed by three different questions in likert-scale format ranging from 0 = never to 5 = usually. In addition, the participants were also asked about demographic characteristics, type of using smartphones, type of using and the purposes of android applications of social networks.

### 2.1. Statistical analysis

Overall, 363 participants responded to the questionnaires and the response rate was 95.5%. Data were entered into SPSS software (Chicago Inc.) for the purpose of statistical analysis. Descriptive statistics including percentage, mean, and standard deviation were used for central and deviation indexes. Chi-square test was used to compare the demographic characteristics, the use and the purposes of using android-related social networks in smartphones among students labeled as PVS/PRS and normal ones.

## 3. Results

The mean age of all 365 students was  $21.76 \pm 3.2$  years. Overall, 69.1% were female and 87% single and 47.7% lived in the university dormitories. Table 1 shows the demographic characteristics of study population in more detail. Most of students (53%) were in the third and fourth term of the educational program. Moreover, 81.3% had smartphones and using internet among them was estimated to be 74%. The participants reported that 29.93% of them used smartphones for text/messaging and internet less than one hour

**Table 1**  
Demographic characteristics of studied students.

| Demographic Characteristics | N                    | %   |      |
|-----------------------------|----------------------|-----|------|
| Age                         | <19 years            | 66  | 18.2 |
|                             | 20–21 years          | 148 | 40.8 |
|                             | 22–23 years          | 87  | 24   |
|                             | >24 years            | 54  | 14.9 |
| Gender                      | Female               | 251 | 69.1 |
|                             | Male                 | 112 | 30.9 |
| Resident place              | Dormitory            | 173 | 47.7 |
|                             | Home                 | 178 | 52.3 |
| Marital status              | Single               | 318 | 87   |
|                             | Married              | 42  | 11.6 |
| Educational level           | General physician    | 125 | 35   |
|                             | Bachelor             | 236 | 65   |
| Faculty                     | Medical              | 100 | 27.5 |
|                             | Dental               | 31  | 8.5  |
|                             | Nursing ad midwifery | 79  | 21.8 |
|                             | Paramedical          | 85  | 23.4 |
|                             | Health               | 67  | 18.5 |

and 28.9% more than three hours, daily. In addition, 24.5% and 16.67% of the participants reported using smart phones 1–2 h and 2–3 h, respectively.

The prevalence of PVS and PRS in medical students were calculated to be 54.3% and 49.3%, respectively. In addition, 70.1% of all participants experienced at least one type of PVS or PRS. Furthermore, 32.5% (118 students) were affected by both PVS and PRS. The frequency distribution of severity of PVS or PRS is presented in Table 2. According to the findings in Table 3, gender was a significantly related factor of PVS and PRS ( $p < 0.05$ ). Place of residence was another effective factor in PRS occurrence ( $p = 0.005$ ) and age was a determining factor of PVS ( $p = 0.027$ ). Nevertheless, no significant relationship was seen between PVS and PRS with marital status and educational level ( $p < 0.05$ ). Place of residence was not a significant factor of PVS ( $p < 0.05$ ). Moreover, there was no significant relationship between PVS and PRS and faculty, educational term, number of active SIM-cards and mobile phones ( $P < 0.05$ ).

Based on the results shown in Table 4, there was not any significant relationship between the occurrence of PRS and using social networks including Viber, WhatsApp, Tango, Line, and Instagram in smartphones. In addition, no difference was observed between students affected and unaffected by PRS regarding the purpose of using android-related social networks including scientific activities, communication with family or friends, chatting or friend-finding and entertainment ( $p > 0.05$ ). Nevertheless, a significant difference was observed between students who were affected by PVS and others in using social networks such as Viber, WhatsApp, Tango and Line ( $p < 0.05$ ). Moreover, PVS was more common in students that used social networks for friend-finding and chatting while it was lower in students that used smartphones for entertainment ( $p < 0.05$ ).

Fig. 1 shows the severity of difficulties due to using smartphone and android-related social networks. According to Fig. 1, relatives' discontent in 31.1% of students was reported to be more than the

**Table 2**  
Distribution the severity of phantom ringing/vibration experience among studied students.

|                 | Phantom Ringing n(%) | Phantom Vibration n(%) |
|-----------------|----------------------|------------------------|
| Never           | 184(50.7)            | 166(45.7)              |
| Seldom          | 117(32.2)            | 110(30.3)              |
| Once a month    | 16(4.5)              | 21(6)                  |
| Once a week     | 20(5.7)              | 25(7.1)                |
| Daily           | 8(2.3)               | 17(4.8)                |
| More than daily | 7(2)                 | 12(3.4)                |

**Table 3**  
Comparing the affecting to phantom vibration and phantom ringing based on the demographic characteristics.

| Demographic characteristics |                   | Phantom ringing<br>Yes n(%) | P value | Phantom vibration<br>Yes n(%) | P value |
|-----------------------------|-------------------|-----------------------------|---------|-------------------------------|---------|
| Sex                         | Female            | 141(57.1)                   | <0.001  | 135(54.7)                     | <0.001  |
|                             | Male              | 38(34.2)                    |         | 62(55.9)                      |         |
| Marital status              | Single            | 157(50.2)                   | 0.787   | 170(54.3)                     | 0.320   |
|                             | Married           | 22(52.4)                    |         | 195(59.5)                     |         |
| Resident place              | Dormitory         | 99(57.9)                    | 0.005   | 97(57.1)                      | 0.251   |
|                             | Home              | 75(43.4)                    |         | 92(52.9)                      |         |
| Educational level           | General physician | 61(50)                      | 0.609   | 64(52.5)                      | 0.528   |
|                             | Bachelor          | 117(50.2)                   |         | 131(56.2)                     |         |
| Age group                   | Under 19 years    | 30(45.5)                    | 0.805   | 30(45.5)                      | 0.027   |
|                             | 20–21 years       | 74(51.7)                    |         | 88(61.1)                      |         |
|                             | 22–23 years       | 44(50.6)                    |         | 53(60.9)                      |         |
| Educational term            | Over 24 years     | 25(46.3)                    | 0.720   | 23(42.6)                      | 0.171   |
|                             | Under 4           | 70(48.6)                    |         | 78(54.2)                      |         |
|                             | 4–6               | 50(48.5)                    |         | 61(59.2)                      |         |
| Number of SIM-card          | Over 7            | 29(54.7)                    | 0.516   | 23(43.4)                      | 0.339   |
|                             | 1                 | 120(50)                     |         | 122(54.5)                     |         |
|                             | Over 2            | 65(50.4)                    |         | 74(57.4)                      |         |
| Umber of mobile phones      | 1                 | 133(50.2)                   | 0.388   | 145(54.5)                     | 0.313   |
|                             | Over 2            | 40(47.6)                    |         | 49(58.3)                      |         |

**Table 4**  
Prevalence of using android-related social networks in student with and without phantom ringing and vibration syndrome.

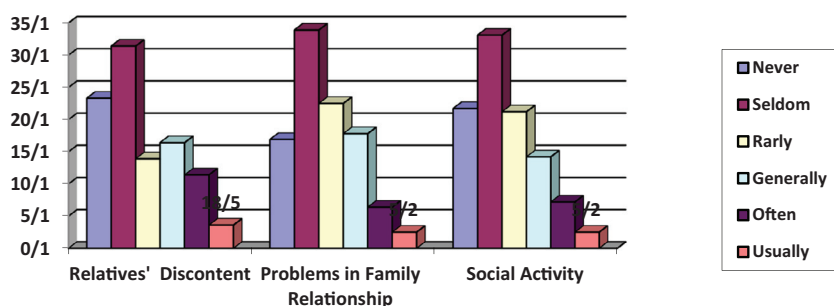
| Affecting to              |                                      | Phantom ringing |            |         | Phantom vibration |            |         |
|---------------------------|--------------------------------------|-----------------|------------|---------|-------------------|------------|---------|
|                           |                                      | Yes<br>n(%)     | No<br>n(%) | P value | Yes<br>n(%)       | No<br>n(%) | P value |
| social networks           | Viber                                | 105(50.5)       | 103(49.5)  | 0.457   | 130(62.2)         | 79(37.8)   | <0.001  |
|                           | WhatsApp                             | 110(50.2)       | 103(49.5)  | 0.50    | 129(58.9)         | 90(41.1)   | 0.041   |
|                           | Tango                                | 37(50.7)        | 36(49.3)   | 0.51    | 46(63)            | 27(37)     | 0.079   |
|                           | Line                                 | 61(47.7)        | 67(52.3)   | 0.291   | 197(61.7)         | 49(38.3)   | 0.037   |
|                           | Instagram                            | 47(46.5)        | 54(53.7)   | 0.241   | 61(60.4)          | 40(39.6)   | 0.122   |
| Using social networks for | Educational and scientific           | 36(50)          | 36(50)     | 0.552   | 38(52.8)          | 34(47.2)   | 0.382   |
|                           | Communication with family and friend | 90(47.9)        | 98(52.1)   | 0.229   | 105(55.6)         | 84(44.4)   | 0.485   |
|                           | Friend-finding and chatting          | 15(51.7)        | 14(48.3)   | 0.5     | 24(82.8)          | 5(17.2)    | 0.001   |
|                           | Entertainment                        | 74(51.4)        | 70(48.6)   | 0.214   | 90(45.7)          | 107(54.3)  | 0.011   |

level “generally”. Moreover, problems in family relationship and social activity disorder were reported to be more than the level “generally” in 26.4% and 23.7% of participants.

**4. Discussion**

Participants reported that using smartphones over one hour per day is more than 70% and according to the results, the prevalence of PVS and PRS was 54.3% and 49.3%, respectively. In the study by Drouin et al., the prevalence of PVS was 89% and 40% of students experienced phantom vibration once a week (Drouin et al., 2012). Moreover, Lin et al. showed that the prevalence of PVS at the

baseline was 78.1% which increased to 95.9% after three months of medical internship and then assumed a decreasing trend to 93.2% in the sixth month and 80.8% in the twelfth month (Lin et al., 2013b). In addition, based on Lin’s study (Lin et al., 2013b) the PVS prevalence decreased to 50.2% two weeks after the medical course. Meanwhile, the same pattern was observed in medical students for PRS during medical internship and the baseline prevalence of 27.4% increased to 84.9%, 87.7%, and 86.3% in the third, sixth, and twelfth months of internship and returned to 54.2% two weeks after the end of internship course. Therefore, the baseline prevalence of PVS was higher than our results while the PRS prevalence was lower. Furthermore, the prevalence of these syndromes was higher in



**Fig. 1.** The inconvenience of using smartphone and android-related social networks in relatives' discontent, family relationship, and social activity.

students of mid-sized Midwestern US university studied by Drouin et al. (2012). Hence, it seems that PVS and PRS in Iranian students is lower than that of other studies. The differences between different studies could be due to the higher use of smartphone and higher access to the internet in the developed countries (Mohammadbeigi et al., 2016b).

Overall, 70.1% of all participants experienced either PVS or PRS. Furthermore, 32.5% were affected by both PVS and PRS. Therefore, the overuse of social networks in smartphones for chatting, friend-finding, online games and other diversions affect sleep quality and the psychological behavior of medical students and is related to lower efficacy of medical training (Ghamari et al., 2010; Hong et al., 2012; Mohammadbeigi et al., 2016b). Moreover, PRS in 14% and PVS in 20.7% are experienced at least once a week. These results showed that one-fifth of students are affected by these emerging psychological diseases weekly. In Midwestern US university survey (Drouin et al., 2012), 40% of students experienced phantom vibration at least once a week, which rate was higher than the results of the current study. Based on the results of this study, approximately 25% of studied participants reported that their life activities are affected by inconvenience due to smartphone overuse and social networks at least in one of three outcomes including family relationship, relatives' discontent, and social activities. Nevertheless, 3.6% of participants reported that the category of "usually" exposed to difficulties in family relationship, 2.5% in relatives' discontent, and 2.5% social activities. The problems in life due to experiencing the hallucinations were observed to be 2% in two cross-sectional studies (Drouin et al., 2012; Rothberg et al., 2010) and it was less than 2% in medical students at the baseline and increased to 6% in the third month of internship of medical students (Lin et al., 2013b). Therefore, despite the high prevalence of PVS in the population, severe problems were observed in a small number of users.

However, it has been suggested that personality traits, depression, stress, and anxiety increased simultaneously with the increase of PVS and PRS (Lin et al., 2013b; Rosenberger, 2015; Lin et al., 2013a). The complexity of psychological disorders due to the over-use of smartphone, internet, and social networks are predictors of social dysfunction (Carbonell et al., 2012; Lin et al., 2013b; Lenhart et al., 2010; Mohammadbeigi et al., 2016b). However, according to recent studies due to high stress-related experiences in medical students (Schwenk et al., 2010; Bayati et al., 2009; Mohammadsalehi et al., 2015), the psychological disorders such as depression, phantom vibration, and ringing and anxiety may increase and affect learning and education but return to the lower points after the medical course ends (Bayati et al., 2009; Ghamari et al., 2011; Ghamari et al., 2010; Ibrahim et al., 2013). Moreover, higher internet and mobile phone over-use are related to some additional psychiatric disorders such as insomnia, social dysfunction, depression, poor sleep quality, and anxiety (Jenaro et al., 2007; Carbonell et al., 2012; Bianchi and Phillips, 2005; Mohammadbeigi et al., 2016b, 2016a). Carbonell et al. showed that chat applications and Messenger followed by social networking applications and games are the most important causes of problematic internet use in Spanish teenagers and young students (Carbonell et al., 2012). However, due to high usage of internet by smartphones in both medical students and medical staff, the implementation of interventional programs for increasing life and communication skills beside the side effect of android systems is deemed indispensable.

## 5. Conclusion

The prevalence of PVS and PRS in medical students was near 50%. Although the PVS and PRS prevalence in current study was lower than that in other studies, morbidity in half of students is

considerable. Therefore, controlled behavior in using new technologies and electronic devices in adolescents especially in medical students is necessary for preventing psychological disorders. Regarding the limited studies about PVS and PRS, the authors suggest future studies be done to assess the long-term complications of mobile phone overuse.

## Conflict of interest

None.

## Source of funding

Qom University of Medical Sciences.

## Contribution of authors

**A M;** Contributions to the conception, design of the work; analysis, and interpretation of data and Final approval of article.

**N M;** Contributions to the conception or design of the work; interpretation of data for the work; and Final approval of the article.

**E M;** Contributions the acquisition and analysis of data for the work and Final approval of the article.

**Z A** Contributions the acquisition and analysis of data for the work and Drafting the article.

**A A;** Contributions to the conception or design of the work analysis, or interpretation of data for the work; and Final approval of the article.

**H A;** Contributions to the conception or design of the work and Final approval of the article.

## Acknowledgements

The authors are very grateful for research Vice-Chancellor of Qom University of Medical Sciences as well as all women who participated in the study.

## References

- Bayati, A., Beigi, M., Salehi, M., 2009. Depression prevalence and related factors in Iranian students. *Pak. J. Biol. Sci.* 12, 1371–1375.
- Bianchi, A., Phillips, J.G., 2005. Psychological predictors of problem mobile phone use. *CyberPsychol. Behav.* 8, 39–51.
- Carbonell, X., Chamarro, A., Griffiths, M., Oberst, U., Cladellas, R., Talarn, A., 2012. Problematic internet and cell phone use in Spanish teenagers and young students. *Ann. Psychol.* 28, 789–796.
- Dixit, S., Shukla, H., Bhagwat, A., Bindal, A., Goyal, A., Zaidi, A., Shrivastava, A., 2010. A study to evaluate mobile phone dependence among students of a medical college and associated hospital of central India. *Indian J. Community Med.* 35, 339.
- Drouin, M., Kaiser, D., Miller, D., 2012. Phantom vibrations in young adults: prevalence and underlying psychological characteristics. *Comput. Hum. Behav.* 28.
- Ghamari, F., Mohammad, B.A., Mohammad, S.N., 2010. The association between mental health and demographic factors with educational success in the students of Arak Universities. *J. Babol. Univ. Med. Sci. (JBUMS)* 12, 118–124.
- Ghamari, F., Mohammadbeigi, A., Mohammadsalehi, N., Hashiani, A.A., 2011. Internet addiction and modeling its risk factors in medical students, Iran. *Indian J. Psychol. Med.* 33, 158–162.
- Hemmert, F., 2008. Ambient Life: Permanent Tactile Life-like Actuation as a Status Display in Mobile Phones. *Adjunct Proc. of the 21st Annual ACM Symposium on User Interface Software and Technology (UIST)*, Monterey, California, USA.
- Hong, F.-Y., Chiu, S.-I., Huang, D.-H., 2012. A model of the relationship between psychological characteristics: mobile phone addiction and use of mobile phones by Taiwanese university female students. *Comput. Hum. Behav.* 28, 2152–2159.
- Ibrahim, A.K., Kelly, S.J., Adams, C.E., Glazebrook, C., 2013. A systematic review of studies of depression prevalence in university students. *J. Psychiatr. Res.* 47, 391–400.
- Jenaro, C., Flores, N., Gómez-Vela, M., González-Gil, F., Caballo, C., 2007. Problematic internet and cell-phone use: psychological, behavioral, and health correlates. *Addict. Res. Theory* 15, 309–320.

- Lenhart, A., Purcell, K., Smith, A., Zickuhr, K., 2010. Social Media & Mobile Internet Use Among Teens and Young Adults. Millennials. Pew Internet & American Life Project, ERIC Number: ED525056. . <https://eric.ed.gov/?id=ED525056>.
- Lin, Y.-H., Chen, C.-Y., Li, P., Lin, S.-H., 2013a. A dimensional approach to the phantom vibration and ringing syndrome during medical internship. *J. Psychiatr. Res.* 47, 1254–1258.
- Lin, Y.-H., Lin, S.-H., Li, P., Huang, W.-L., Chen, C.-Y., 2013b. Prevalent hallucinations during medical internships: phantom vibration and ringing syndromes. *PLoS One* 8, e65152.
- Mohammadbeigi, A., Valizadeh, F., Mirshojaee, S.R., Ahmadli, R., Mokhtari, M., Ghaderi, E., Ahmadi, A., Rezaei, H., Ansari, H., 2016a. Self-rated health and internet addiction in Iranian medical sciences students; prevalence, risk factors and complications. *Int. J. Biomed. Sci.: IJBS* 12, 65.
- Mohammadbeigi, A., Valizadeh, F., Saadati, M., Sharifimoghadam, S., Ahmadi, A., Mokhtari, M., Ansari, H., 2016b. Sleep quality in medical students; the impact of over-use of mobile cell-phone and social networks. *J. Res. Health Sci.* 16, 46–50.
- Mohammadsalehi, N., Mohammadbeigi, A., Jadidi, R., Anbari, Z., Ghaderi, E., Akbari, M., 2015. Psychometric properties of the Persian language version of Yang internet addiction questionnaire: an explanatory factor analysis. *Int. J. High Risk Behav. Addict.* 4, e21560. doi:<http://dx.doi.org/10.5812/ijhrba.21560> PMID: 26495253 | PMCID: PMC4609498.
- Payne, K.F.B., Wharrad, H., Watts, K., 2012. Smartphone and medical related App use among medical students and junior doctors in the United Kingdom (UK): a regional survey. *BMC Med. Inform. Decis. Mak.* 12 doi:<http://dx.doi.org/10.1186/1472-6947-12-121>.
- Ramesh, J., Carter, A., Campbell, M., Gibbons, N., Powlett, C., Moseley, H., Lewis, D., Carter, T., 2008. Use of mobile phones by medical staff at Queen Elizabeth Hospital, Barbados: evidence for both benefit and harm. *J. Hosp. Infect.* 70, 160–165.
- Rosenberger, R., 2015. An experiential account of phantom vibration syndrome. *Comput. Hum. Behav.* 52, 124–131.
- Rothberg, M.B., Arora, A., Hermann, J., Kleppel, R., Marie, P.S., Visintainer, P., 2010. Phantom vibration syndrome among medical staff: a cross sectional survey. *BMJ* 341.
- Schwenk, T.L., Davis, L., Wimsatt, L.A., 2010. Depression stigma, and suicidal ideation in medical students. *JAMA* 304, 1181–1190.
- The Official Portal Of Measuring Information Society Of Iran, 2014. ICT Facts and Figures In Iran; ICT Development Index Status [In Persian]. . [http://www.itc.ir/portals/0/ICT\\_F&F\\_IRAN\\_1393\\_930605\\_Ver1.00.pdf](http://www.itc.ir/portals/0/ICT_F&F_IRAN_1393_930605_Ver1.00.pdf).