

The Prevalence of Mobile Phone Use in the School Going Children in North Al Batinah Region of Oman: A Cross Sectional Study

Najam Siddiqi¹, Muhammad Humza Kamal³, Faisal Moin², Mohammad Amir Rafei³, Fatma Al Shehi³, Rana Al Maqbali³, Aisha Salim Al Battashy³, Arwa Abdullah Al Mujaini³, Fatima Hassan Al Belushi³, Samira Mohammad Gondal³, Reem Al Maqbali³, Mira Abdullah AlSulitni³, Mariam Begum Mohammad³, Bibi Amina Poli³, Aliya Juma Al Saadi³, Alba Musabah Al Mubaishi³, Anood Salim Al Rawahi³, BasantSamyAamer³

¹Department of Anatomy and Neuroanatomy, College of Medicine and Health Sciences, National University of Science and Technology, Oman.

²Department of Medicine, College of Medicine and Health Sciences, National University of Science and Technology, Oman.

³Medical students, College of Medicine and Health Sciences, National University of Science and Technology, Oman.

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The use of mobile phones has become increasingly common among general population, but how much has it increased among the young school going population remains to be seen. Our objective was to investigate the prevalence of mobile phone use, during and after school hours, and its ownership in the primary and secondary section students in Oman. We surveyed 414 students in Cycle 1 and 1438 students in Cycle 2 in the city of Sohar, North Al Batinah region of Oman. Students completed a paper-based questionnaire about mobile phone use, the apps they use and whether their parents keep a check on their cell phone use. 86% of primary section students reported using a mobile phone whereas 91% of students in secondary section reported use of mobile phone. Most popular mobile use among the primary section students were playing games on mobile phones whereas, secondary section students mostly used their phones to access internet. 86.7% of primary section students said that their parents were aware of how they used their mobile phones compared to 83.4% students in secondary section. Smart phone ownership and its use in school going students in Oman has increased from the past and is the almost the same in both the students groups. Students now start using mobile at a much younger age; however, the parents are well aware of the contents on their children's mobile devices and sometimes even take away their mobile phone as punishment.

Keywords: School going children, use of mobile phone use, electromagnetic waves, North Al Batinah region in Oman.

The trend of having your own mobile phone and its increased use is surging even more rapidly in the college and school going children. It is worrisome as electromagnetic waves emitted

from mobile phones have been found to cause many adverse health effects. A report published by International Central Institute for Youth and Educational Television (IZI) in 2019 revealed the

prevalence of mobile phone ownership and usage among the school going students in Europe¹. According to this report, in students of age ranges between 7-12 years (primary section students); phone ownership and usage was 88% in Sweden, 35% in UK and 22% in France. In the older students of age ranges from 12-19 years (secondary section students); phone ownership and usage was 81% in France, 83% in UK, 95% in USA and 99% in Switzerland¹.

Children are more vulnerable to electromagnetic waves because their skull bones are thinner and they will be exposed for a longer duration as they grow old. During fetal development and early childhood, there are embryonic and adult stem cells which are more sensitive to electromagnetic waves^{2, 3, 4}. In 2011, Volkow *et al* conducted a study taking PET scan of the brain while the person was talking on mobile held up to the ear. High rates of glucose consumption were noticed by the part of the brain close to the mobile phone as compared to the rest of the brain⁵. This spike in brain activity due to electromagnetic waves from the cell phone may permanently alter brain function^{6,7}. Children's brain is still developing and many neurological connections are being formed over time and this exposure may delete synaptic connections hence it's an area of great concern⁵.

An ipsilateral acoustic neuroma and glioma of the brain after 10-year use of mobile phone was also reported⁸. An increase in the incidence of childhood brain tumors has been reported in United Kingdom, United States, Japan and Australia³. Research from Sweden, Denmark, UK, Finland and Germany in 2009 suggested that if timely interventions were not taken, especially in children and teenagers, incidence of primary brain tumors will increase^{8, 9}.

International Agency for Research on Cancer, part of WHO, has listed mobile phone into the same carcinogenic hazard classification as lead, engine exhaust and chloroform¹⁰. Childhood leukemia in children exposed to electromagnetic fields has already led to its inclusion as a "possible human carcinogen" by the International Agency for Research on Cancer^{11, 12, 13}.

Mobile phone and internet addiction

have been reported as community health problem in adolescents^{14, 15}. A study by Sohn *et al* in 2019 also showed that using social media and watching TV were among the leading causes of problematic smartphone use (PSU)^{16,17}. In this increasing trend of using mobile phones among school going children, we wanted to explore where children in Oman stand compared to the rest of the world. It will provide us an insight as to how many of them are using mobile phones and for what activities are they using it the most.

Hypothesis

The mobile phone ownership and prevalence of its use among the students of primary and secondary sections in schools of Oman has increased rapidly.

Objectives

To know the prevalence of mobile phone use by the teenagers going to school in North Al Batinah region of Oman

To know the percentage of children bringing their phones to school and using it during the school hours

To know how the teenagers going to school use their mobile devices during the day

To know if their parents are aware of their usage and if they intervene in any way to regulate its use

To know if they are using headphones or Bluetooth

MATERIAL AND METHODS

This study was approved by the Intuition Research Board of College of Medicine and Health Sciences National University (formerly Oman Medical College) and the ethics committees of Ministry of Education and Ministry of Health in Oman. It is a cross-sectional type of study utilizing a paper-based survey in schools located in North Al Batinah region in the city of Sohar. The participants were divided according to the Omani School system into Cycle 1 (Primary section, Grade 1-4) and Cycle 2 (Secondary section, Grade 5-10). 13 schools participated in this study in the city of Sohar. Omani public schools were Al Safaa school, Um Salim school, Al Hikma school, Al Karama school, Al Hambar school, Ahmed Bin Saeed school, Sulaiman Bin Abad school and Sohar secondary school. Among the private schools

five had participated which were Pakistan school Sohar, Indian school Sohar, Bangladesh school Sohar, Sohar International school and Al Batinah International School.

The survey form was categorized in four sections: 1. Demographic data, 2. Mobile phone ownership data, 3. Mobile phone use during and after school hours, 4. Role of parents in keeping track of their children’s mobile phone use.

The PI and a group of medical students participating in this research project visited the above mentioned schools in the city of Sohar in North Al Batinah region. The project and its research objectives were explained to the principals, headmasters and other respective teachers. The questionnaire forms were then handed over to the principal which were sealed in envelopes for different grades. The respective class teachers explained the objectives of this research to

the students and made them understand how to fill the forms. Name was an optional field; however, other details were mandatory. The forms were filled during school hours, after filling the consent form and then collected and sealed in envelopes initially provided and these were then collected by PI on a later date. The data was entered into google survey forms, which were online counterparts of the paper-based survey. Any form which was incomplete was not included in the study and this allowed for easy data analysis.

RESULTS

Section 1: Demographic data

A total of 1985 students participated in this research and were grouped according to their section; 414 students participated from primary section or cycle 1 and 1438 participated from

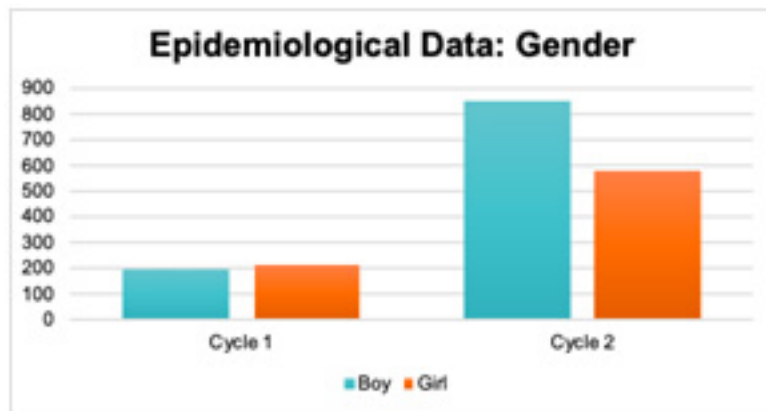


Fig. 1. a) Gender distribution in primary and secondary sections

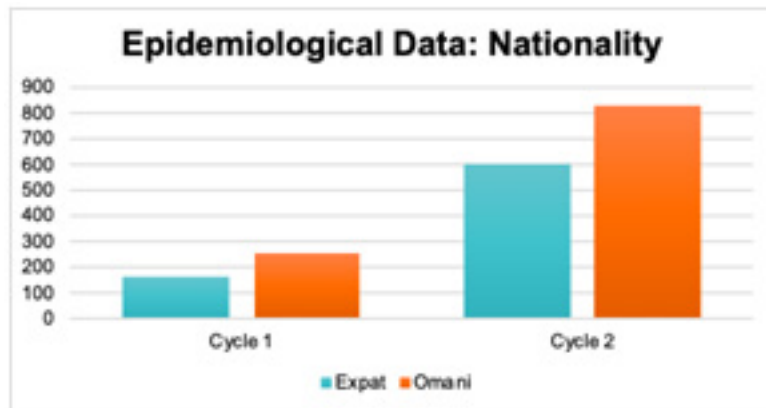


Fig. 1. B) Omani students are more in both primary and secondary sections

secondary section or cycle 2. 133 forms were incomplete and so they were removed from this study. The average age of primary section students (cycle 1) was 9.54 ± 0.911 years and for secondary section students (cycle 2) was 14.04 ± 2.16 years. The female student population is higher in primary section by a slight margin of 9%, whereas more males dominated in secondary section (Fig.1a). Omani student population is higher in both the sections respectively (Fig.1a, b).

Section 2: Smartphone ownership and use

86% of primary section students and 91% of secondary section students are using a smartphone actively (Fig 2a, b). Only 1% of primary section students and 5% of secondary section students bring their mobile phones to school because they are aware of the fact that the mobile devices are not allowed during school hours.

Section 3: Mobile phone use after school hours

Fig.3a and 3b show the use of the mobile phone after school hours. Primary section students were mostly playing games (87.4%) and watching videos (80.8%), while secondary students on the other hand used it mostly for accessing internet (88.8%) and taking pictures (87.8%).

11.5% of primary section students use their phones for calling formore than 2 hours/24 hours as compared to 54% of secondary section students (Table 1). When it comes to mobile phone use for downloading miscellaneous items, 23% of primary section students spend more than 2 hours/24 hours as compared to 50% of the secondary section students (Table 2).

More than 36% of primary section students reported using both headphones and Bluetooth everyday as compared to 54% of secondary section students.

Section 4: Parent's Role

Next half of survey was focused on parent's role on knowing the contents on their children's mobile device and if the parents limit the use of mobile phone. 86.7% of primary section students and 83.4% of secondary section students answered "Yes" to the question that parents are aware of the contents on their cell phone. The questions asked about the role of parents were as follows: Q1: Do your parents know what you do on the mobile? Q2: Do your parents limit the number of minutes you may talk on the phone? Q3: Do your parents use the cell phone to monitor your location? Q4: Do your parents take away the cell phone as punishment? Q5: Do your parents take away the cell phone as punishment? Results from parent's centered questions are shown in Fig.4.

DISCUSSION

Mobile phone ownership

An important finding in this study was an exponential increase of the smart phone ownership and use in school going students within the last five years. 91% of secondary section (grade 5-10) students owned a mobile phone in Omani schools in North Al Batinah region. In 2015, GSMA conducted studies in 4 countries (Bahrain,

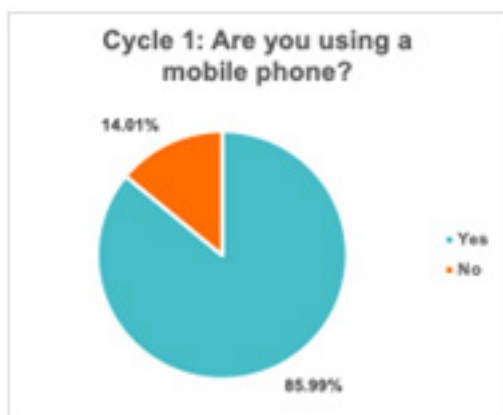


Fig. 2. a) 86% of primary section students are using mobile phones

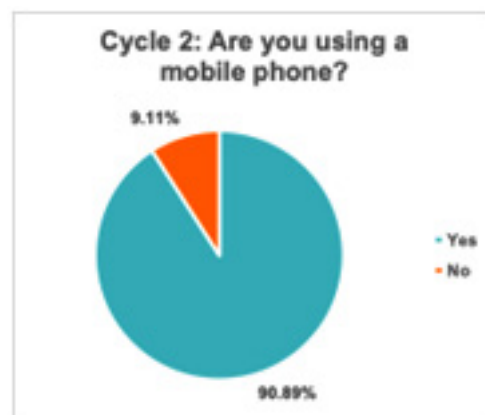


Fig. 2. b) 91% of secondary section students are using mobile phones

Philippines, Honduras and Japan) revealing that 66.7% of children used a mobile phone and out of them, Bahrain had the highest usage with 99% and Japan being the lowest with 57%¹⁸.

A cross sectional study conducted in Japan by on 295 high school students aged 15-19 reported that 98.6% of students owned a smartphone¹⁹. In another survey done in 2018 by Tokyo board revealed that 97.3% of metropolitan high school students used smart phones(Japan news)²⁰. The differences in these studies compared to the GSMA

can be attributed to the fact that GSMA studies combined both primary and secondary sections. The study conducted on high school children in Izmir, Turkey, reported 94% of the participants were using smart phones²¹. International data on youth and media (IZI) in 2019 revealed phone ownership at 81% in France, 83% in UK, 95% in USA and 99% in Switzerland¹. Our results from this study for secondary section show that students in Oman are on par in smartphone usage with their international counterparts.

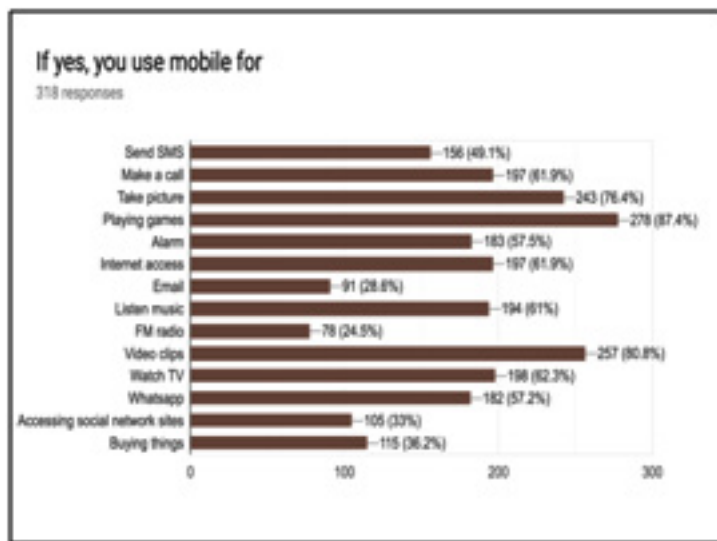


Fig. 3. a) This graph shows the way how the mobile phone was used the primary section students

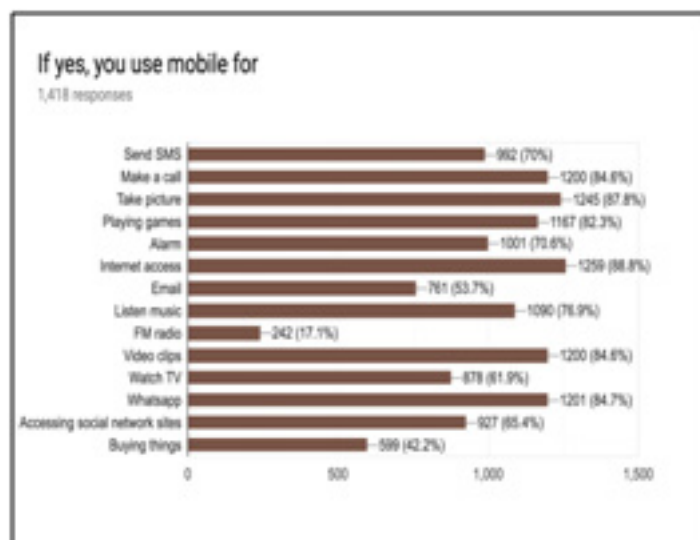


Fig. 3. b) This graph shows the way how the mobile phone was used the secondary section students

In 2019, 86% of children owned a smart phoned in primary section in Oman, which is almost the same as in secondary section (91%). A Hungarian study conducted by Mezei, Benyi& Muller on 4th grade students (n=1389) ages 10-11-year old showed that 76% owned a mobile phone²². The report by IZI in 2019 showed that, in Sweden in 2018, the use of mobile phone sharply increased from 10% among 6 years old to 88% in 10 years old. The same report shows that 35% of children aged 7-12 years in UK own a smartphone compared to 22% in France¹. This study in Oman revealed that primary section students in Oman had a higher percentage of mobile ownership than children from other countries. The average age range when the children first owned a smart phone is 10 years as reported by GSMA in 2014 and 2015²³.

Time spent on smart phones

Majority of the students were not taking their mobile phone to school, and those who were taking it were not using it during the school hours

because they knew that mobile phone use is not allowed during school hours. However, many schools around the world allow students to not only bring their mobile devices but encourage the use of internet for academic purposes. This is known as Bring Your Own Device (BYOD) initiative practiced in European countries and Canada among others²⁴. But recently mobile phone use by school going children has been found to be troublesome. Paris recently prohibited mobile phone use in the schools stating that it is a big distractor during teaching²⁵. Also, province of Ontario in 2019 banned students from using their smartphones in school without a supervising educator²⁶. A city in Norway, Stavanger, has also introduced a mobile phone ban while also limiting smaller children's access to school computers²⁷. Siao Hui Toh *et al* in his study on adolescents' pattern of cell phone use discussed how schools have implemented rules on use of mobile phones in schools²⁸.

Table 1. Mobile phone talking time per day

Mobile phone use while calling	Primary section	Secondary section
< 1 hour	57.4%	22.5%
1-2 hours	31.1%	23.4%
>2 hours	11.5%	53.9%

Table 2. Mobile phone downloading per day

Mobile phone use while downloading	Primary section	Secondary section
< 1 hour	24.6%	30.0%
1-2 hours	52.3%	19.8%
>2 hours	23.1%	49.8%

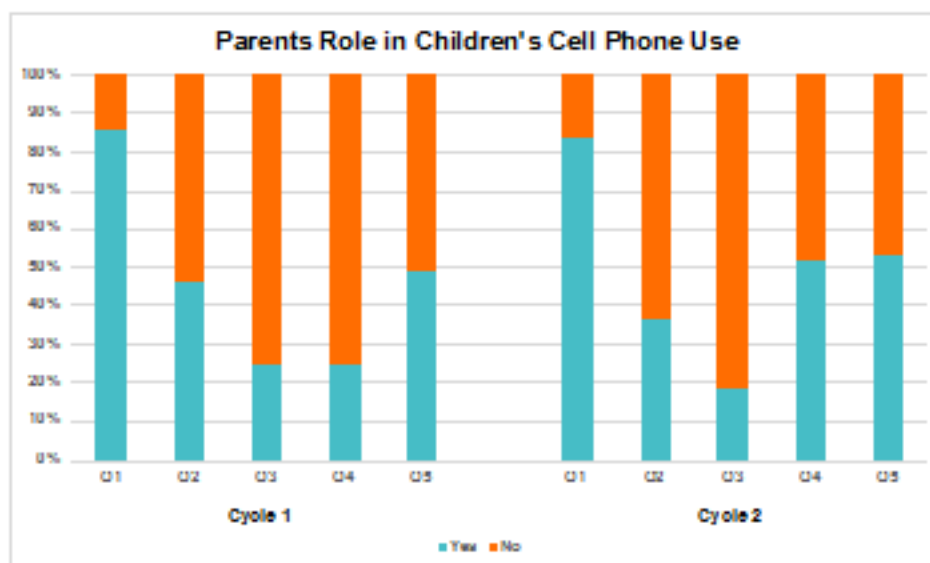


Fig. 4. Parents role in supervising their children's cell phone use in primary and secondary section students

In government schools of Oman, mobile phones are not allowed while the private schools are not that strict on the matter. In 2009, Japan education ministry had banned elementary and junior high school students to bring the mobile phones to school, however, now the ministry has lifted the ban.

Of the 418 primary section (Cycle 1) students, 61.9% used their cell phones to make calls compared to 84.6% of the secondary (Cycle 2) students. Comparing this to the Hungarian study, only 24% used their phones daily for phone calls²². But of course, the study in Hungary was done back in 2005 so how relevant it is today remains to be seen.

In Oman, 11.5% of students in primary section used the mobile for calling for more than 2 hours per day; however, it increased to 53.9% for the secondary section students. In Japan also, 10.5% of students used their mobile phones for more than 5 hours per day which resulted in sleep deprivation and insomnia¹⁹.

Mobile phone use of more than 2 hours per day specifically for social networking websites and online chats was associated with an increased risk of depression¹⁹. Motives for smartphone to gain peer acceptance was the most significant factor related to smartphone addiction²⁹.

Durusoy *et al.* from Izmir reported that headache, fatigue and sleep disturbances in students were found to be increased by 1.90, 1.78 and 1.53 times respectively for the students using a mobile phone²¹.

We also investigated how the smart phones were used by children when they were outside the school. primary and secondary section students fall behind the results from GSMA 2015 study which showed 90% of children using the camera app and 97% of children who owned a smartphone were accessing the internet¹⁸. Similar findings were seen by the report published by IZI in 2019 where internet access by school going students was 99% in UK, 97% in Germany, 94% in Finland, 93% in Brazil and 88% in France¹. The study in 2014 by GSMA had 88% of children watching videos on their smartphones which is comparable to our findings¹. 82% of Swiss children aged 12-19 years also watched videos on their smartphones¹. Typical problematic user were 10-14 years of age and studying at public school³⁰.

Our study shows that only 33% students from primary section and 65.4% from secondary section students use their phones for social networking websites such as Facebook, Snap chat etc. On the other hand, GSMA study in 2014 showed 89% access of social networking websites by the children which increased to 93% in the 2015^{18, 23}. 2018 data for 12 to 19 years old Swiss children showed 88% accessing social media. In USA, among 0-8 years old children, 73% watch video clips and 70% play games¹. whereas in Oman, 81% of primary section students watch videos and more than 87% play games. Lower self-esteem and loneliness leads to excessive smartphone use and smartphone gaming were associated with addiction^{32, 33, 34}.

We investigated where the students keep the mobile phone when they are inside or outside their home. Majority of the male students keep their mobile phones either in their trouser pocket or if wearing Omani dress, in the side pocket. It is reported that keeping the mobile phone in trouser pocket throughout life may cause erectile dysfunction and infertility due to low sperm count³⁵. Female students either keep it in their bag or in their hand. Carrying it in their bra has been linked to breast cancer development³⁶. When they are at home, majority of the male students keep their phones on the side table or inside the cupboard. Majority of the female students keep their phones with them on the bed or under the pillow when they sleep. Keeping the mobile under the pillow may expose the head and brain region to electromagnetic waves throughout night which may have adverse health effects. Many research papers have reported that female gender is more prone for excessive use and addiction^{30, 37, 38, 39}.

It is also recommended that wired headphones are the safest way to use a mobile for calls or listening to music. 36% of primary section students and 54% of the secondary section students in Oman reported using both wired headphones and Bluetooth devices which is fairly low.

Parents' role

Excessive use of mobile phone by school going children cannot be left unchecked. In this section we enquire the children if their parents were aware of their cell phone use and its contents. Results showed that 87% parents of primary and 83% parents of secondary school children

are equally aware of the mobile phone use and its contents. Our results fall in line with a study reported by Siao Hui Toh *et al.* on adolescents' pattern of cell phone use and how parents restrict the content accessed by their children²⁸.

Parent's attitude to children's upbringing plays an important role in their overuse of cell phone. If the parents are working or busy in their own schedule, then children will indulge more and more in exploring social media using mobile devices, which in turn will make them addicted to mobile phones and they will suffer from many new mobile related symptoms as discussed by Linda *et al.*²³. Parental neglect was significantly associated with smartphone addiction³⁹. Another study by Lee *et al.* reported that parental restriction increased likelihood of addiction³¹. Those parents whose attitude was warm and permissive saw children self-limiting themselves to lesser use of cell phones⁴⁰.

2018 data from USA revealed that 72% parents believed that their children are distracted by their mobile device. The report from IZI in 2019 also looked at whether parent check what their children are doing on their smart phones with Jordan at 69%, India 38%, Lebanon 54%, South Africa 44% and Vietnam 37%¹. 85% of Omani parents keep a check on what their children are doing on their phones which is higher than all the other countries. The parents in Oman are more concerned with their children because of their cultural values and upbringing.

Now due to the COVID 19 pandemic and the increase in online teaching, this trend of smartphone and other devices using WiFi will further surge with the availability of 5G Wi-Fi services which will contribute negatively towards creating an unhealthy environment for our children and the society as a whole.

One of the limitations of this study was the young age group of primary section students. Some of them were not able to fill the forms correctly as some of them were not sure of how much time they spent on mobile phone every day. This may have resulted in some discrepancies in results.

CONCLUSION

Our results prove our hypothesis that children start using mobile phones at a much

earlier age than expected and that the ownership and time spent on internet have both increased rapidly in the past few years throughout the world including Oman. There was almost no difference in the use of mobile phone among the primary and secondary section students in Oman. Although mobiles are not allowed in schools in Oman, there is an increased use of mobile phones by the young population outside the school which is comparable to the western world. Children are more sensitive to adverse health effects caused by mobile phones hence parents should restrict the use of mobile phone by their children.

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Conflict of interest

There is no conflict of interest of the author or any of the co-authors.

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