ORIGINAL ARTICLE

Smartphones for Smart Eyes

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ABSTRACT

Objective: To determine the usage of smart phone for academics and educational purposes among ophthalmologists.

Methods: It was a cross sectional study conducted during June to December 2017, in the department of Ophthalmology, Peoples Medical College Hospital Nawabshah, which included ophthalmologists of different cities. 100 participants including consultants, postgraduate residents and registrars of ophthalmology departments were included in the study. A questionnaire was provided to them through emails, messengers and phone calls and the answers were recorded and analysed by SPSS 25.

Results: A total of 100 participants were included in study among which 52 (52%) were consultants, 42 (42%) were postgraduate residents and 6 (6%) were registrars. 52 (57.8%) of the participants use android phones and 38 (42.2%) use iPhone. 20 (20%) of the participants most often use their phone's flash light, 24 (24%) of the participants use the camera of their phones to capture the findings in patient's eye, 26 (26%) participants do not have any book downloaded in their phones and 8 (8%) do not use any website. 76 (76%) of the participants use messengers for group discussions and 24 (24%) do not use any messenger.

Conclusion: Recent gadgets are proved to be very useful in field of ophthalmology. These gadgets are replacing expensive equipment and resulting in efficient patient care in a cost-effective way. Therefore, ophthalmologists should try to make the most of these smartphones for smart eyes, both for ophthalmologists and patients.

Key Words: Smart Phones, Androids, iPhone, Applications, Websites, Pdf Books

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INTRODUCTION:

A smart phone is a mobile phone with an advanced mobile operating system that combines the features of a personal computer operating system with features useful for mobile or hand held device. Most smartphones can access the internet, have a touchscreen user interface, with an LCD or LED, can run third party apps, music players and camera phones[1].

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Within the last few years extraordinary advances have occurred in the field of cell phones and other handheld devices. Physicians including ophthalmologists are equally affected by this technological explosion. About one of every two physicians uses smartphone and increase in this number is expected[2]. A survey on mobile phones ownership showed that 99% of health professionals own a mobile phone, and among those 81% are smartphones, currently the most popular of which is Apple iphone[3]. The android phones have an operating system by Google. The smartphones use in basic science laboratory has significantly increased as the calculators, timers and other digital aids are replaced by these phones[2]. These smartphones have a variety of useful applications for doctors[2], particularly the google search engine helps almost everyone in many aspects including assignments, presentations,

research works, and recent advancements in medicine are commoner ones as it can also help diagnosing difficult cases[4].

Ophthalmology as a whole is a gadget centered speciality, as we have to carry a phone, a digital camera and personal digital assistant to communicate with ward, document findings, access medical information and to remain organized. In addition, all of these tasks are now easily achieved with one smartphone only. Smartphones, particularly the iPhone/Android phones, have utility in virtually every part of an ophthalmologic examination[5]. At present 621 surgical apps are available, 121 out of which are related to ophthalmology[6]

There are several benefits of smartphone use for ophthalmologists and their patients as well. Ophthalmology applications are converting the mobile phones into medical devices[7].

The potential use of these smartphones in ophthalmology can broadly be categorised as:

a. Testing Tools (near-vision cards, color vision plates, pupil gauge and ruler, fluorescein light, pen light, pediatric fixation targets, worth four dots test, accommodation targets, amsler grid and OKN drum)
b. Patient education Tools (self-testing, sending emails directly from the phone)
c. Physician education and reference tools (ophthalmic text books, and reference programs as Will's eye manual, Epocrates)
d. Calculators and other office-based tools (digital camera to take pictures of anterior segment, fundus biomicroscopy and indirect ophthalmoscopy findings, display suitable images of MRI and OCT scans directly)[2,3,7].

Another very important aspect of smartphones is there capability to store a variable data regarding patients' information, disease progression and treatment record for a long period of time[6].

Apart from all these aspects, the other important aspect of smartphones use is the side effects of excessive use. A study conducted on house staff and inpatient faculty shows that smartphones were used during rounds for patient care 85% residents, 48% faculty, reading/ responding to personal texts/e-mails 37% residents, 12% faculty, and other non-patient care uses 15% residents, 0% faculty. Nineteen percent of residents and 12% of faculty believed they had missed important information because of distraction from smartphones. Residents and faculty agreed that smartphones "can be a serious distraction during attending rounds," and nearly 80% of faculty believed that smartphone policies should be established[8].

A study conducted in Rawalpindi Pakistan shows that 95.8% of medical students have smartphones and 4.2% use simple cell phones. 41.46% of smartphone users are using medical apps while 24.08% are aware of these apps but they don't use them[9].

There is not much research in Pakistan regarding the impact of smartphone use in ophthalmologists.

METHODS:

It was a cross sectional study that was conducted during June to December 2017, in the department of Ophthalmology, Peoples Medical College Hospital Nawabshah. The participants were ophthalmologists, including consultants, postgraduate residents and registrars working in different hospitals of different cities. A structured questionnaire was provided to them directly or via emails, social media forums, messages, and some of them were interviewed on phone calls to answer the questions. We inquired about the type of phone that they use, and how they make the most of their phones for academic purpose. The answers were recorded and analysed by SPSS version 25.

RESULTS:

A total of 100 participants were included in study among which, according to the designation 52 (52%) were consultants, 42 (42%) were postgraduate residents and 6 (6%) were registrars. (figure. I)

Regarding the use of smart phones, 42 consultants use smart phones while 10 of them use conventional phones. All 42 postgraduates and all 6 registrars use smart phones. (chart I)

52(57.8%) of the participants use android

phones and 38(42.2%) use iPhone (figure II). Among android phone users 24(46.1%) were consultants, 24(46.1%) were postgraduate residents and 4 (7.6%) were registrar.

18(47.3%) consultants are iPhone users, 18 (47.3%) postgraduate residents and 2(5.2%) registrar use iPhone. (chart II)

20(20%) of the participants most often use their phone's flash light, 38 (38%) sometimes use the flash light and 42 (42%) never use it. Only 4(7.6%) consultants use flash light most often, 22(42.3%) sometimes use it and 26 (50%) never use their flash light to examine their patients.

16 (38%) postgraduate residents most often use their phone's flash light, 12 (28.5%) sometimes use the flash light and 14 (33.33%) of them never use it.

None of the registrars most often use the flash light, 4(66.66%) sometimes use the flash light and 2(33.33%) never use the flash light. (chart III)

Regarding camera use 24(24%) of the participants use the camera of their phones to capture the findings in patient's eye, 50(50%) of them sometimes use the camera and 26(26%) of them never use the camera to capture the findings.

Among the 24 participant who most often use camera to record the findings, 10(41.6%) were consultants, 14(58.33%) were postgraduate residents and none of the registrars. The 50 participants who sometimes use their camera, 22 (44%) are consultants, 24(48%) are postgraduate residents and 4(8%) are registrars. Among those who never use their camera to capture the findings, 20(76.9%) are consultants, 4(15.3%) are postgraduate residents and 2 (7.6%) are registrars. (chart IV)

Regarding the pdf books download in smart phones 26(26%) participants do not have any book downloaded in their phones, 16(16%) have Kanski, 4(4%) have American academy of ophthalmology course, and 54(54%) have more than one book on their phones. (figure III)

The websites use by the participants shows that 8(8%) do not use any website, 10 (10%) use Eyewiki.com (American academy's website), 4 (4%) use pubmed.com 78 (78%) use google search engine to visit miscellaneous websites according to the topic in search.

All the 8 participants who do not use websites are consultants (100%), 8 out of 10 eyewiki users are consultants (80%), and 2 are registrars, all the 4 pubmed users are postgraduate residents (100%), 36 (46.1%) consultants, 38 (48.7%) postgraduate residents and 4 (5.1%) registrars use miscellaneous websites. (chart V) 76(76%) of the participants use messengers for group discussions and 24(24%) do not use any messenger. (figure IV) Among the messenger users, 38(50%) are consultants, 32(42%) are postgraduate residents and all 6(4%) are registrars while 14(58.3%) consultants, 10(41.6%) postgraduate residents do not use any messenger. (chart VI)

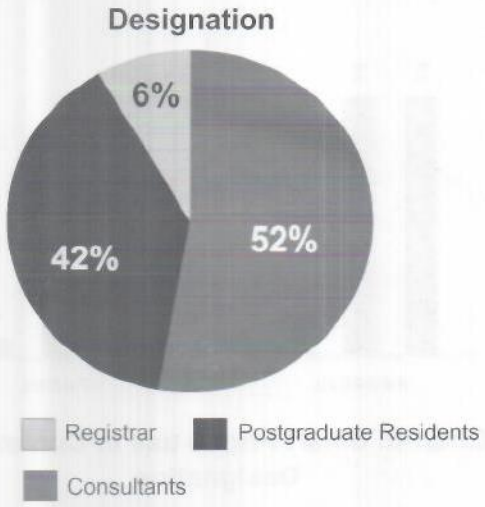

Figure. I: Designation of Participants

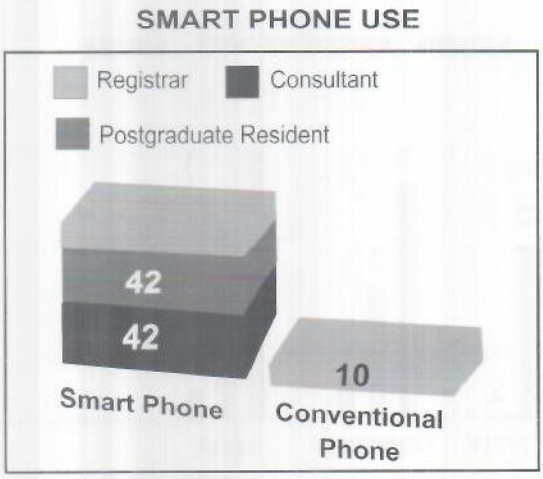

Chart-I: Smart Phone use among Participants

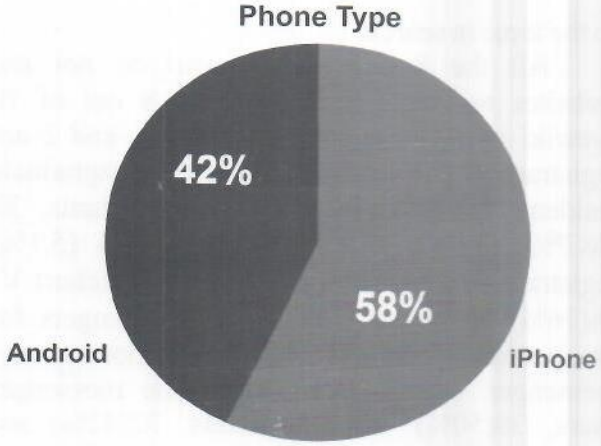

Figure. II: Type of Smartphone System

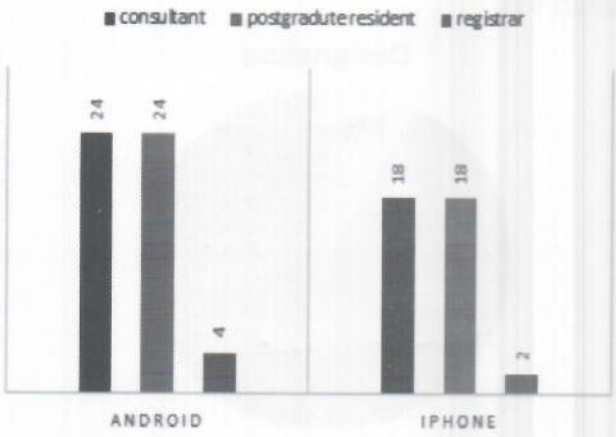

Chart-II: Smart Phone use in Context of Designation

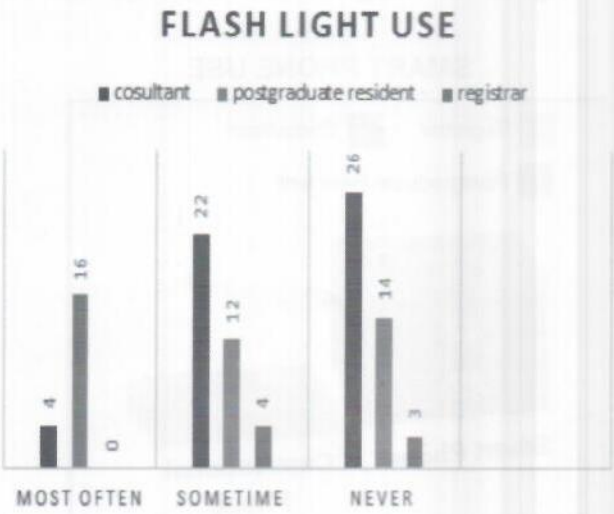

Chart-III: Flash Light Use

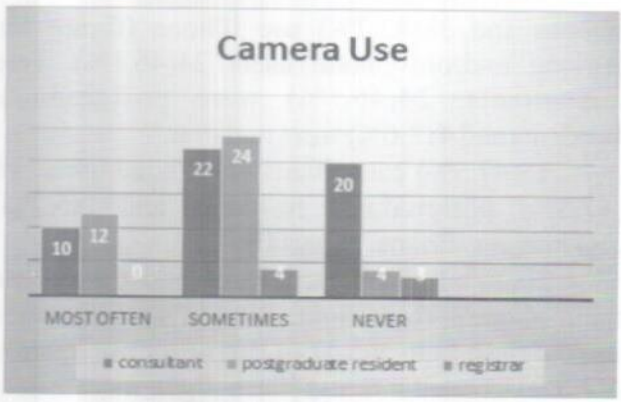

Chart IV: Camera Use

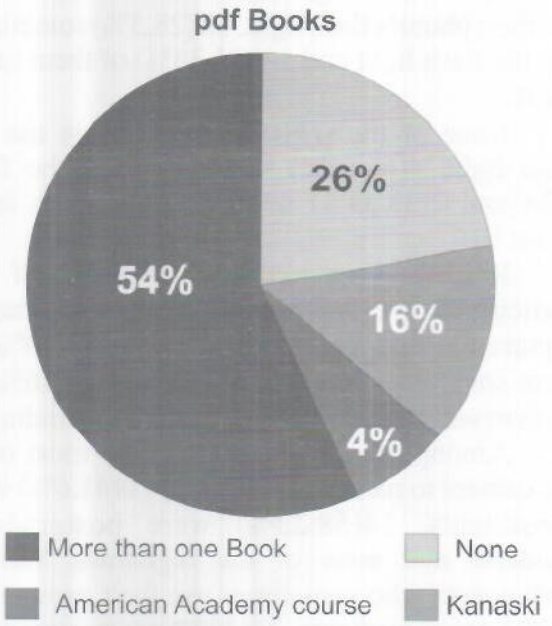

Fig-III: pdf Books Downloaded on Phone

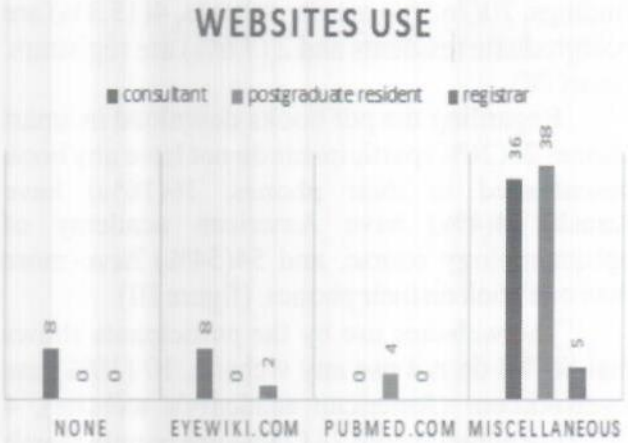

Chart-V: Websites Use

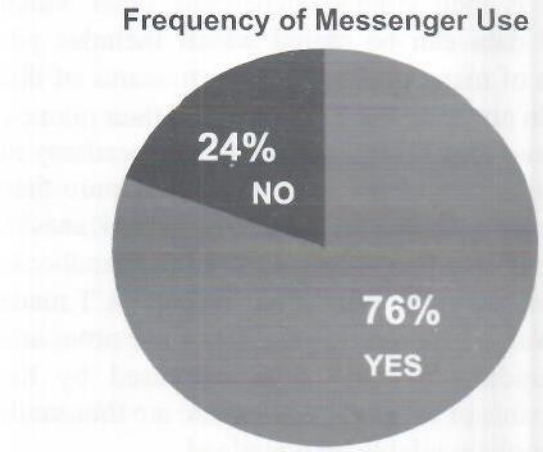

Figure. IV: Frequency of Messenger Use

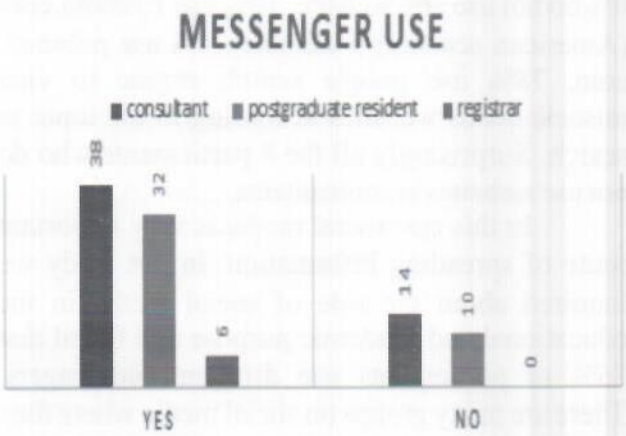

Chart-VI: Messenger Use

Image I: Magnifi photoadapter for iPhone (www.arcturuslabs.com) and iExaminer PanOptic Ophthalmoscope (www.welchallyn.com)

DISCUSSION:

The present era is the era of technology and many things that were considered as impossible in the past are now matter of just a touch. The invention of smart phone is one of the most astonishing happenings to the world that has enabled the humans to hold an entire universe in their hands. These are multifunctional automated devicemobile phone with progressive figuring competence and connectivity. The practice of smartphone has empowered to not only make telephone calls and text messaging, but also offers unconventional functionality and facility to run numerous advanced applications, surf the web, send and receive e-mails, generate and display pictures, videos and office documents. Technological developments with growing number of available applications, as well as reduced costs, led to a massive use of smart phones[6].

Smart phones are being converted into medical devices with advent of Ophthalmology related applications and more than 342 diverse ophthalmological applications are accessible[6]. Commonly Apple's iOS and Google's Android are two utmost used systems amid healthcare experts, some reviews resolute the Apple iPhone to be the most widespread smartphone among the ophthalmologists globally[6].

In our study we have found that 90 out of 100 participants use smartphones which resembles the study conducted in USA in 2012 which concluded that 81% of the physicians use smart phones[10] and American society of Cataract and Refractive Surgeons study that concluded that 83% of ophthalmologists use the smart phone[11].

Our study declared that 58% of the participants use android phones while 42% use iPhones which is also supported by Mohamad Jebraeily et al in their study which shows that 53% medical students use android phone while 32% use the iOS system[12]. Nevertheless, the iPhone (Apple Inc, Cupertino, CA) stands out amongst other phones for the reason that it has exceptional interface and its immense source of third-party add-on software[13]. In our study 46.1% of the consultants and 46.1% of the postgraduate residents are shown to use android system while

7.6% registrars use android phones. While only 5.2% of the iPhone users are registrar, 47.3% are consultants and 47.3% are postgraduate residents. It shows that there is not a big difference among android system use and iPhone use in our study. All the postgraduate residents and registrars in our study use smartphones.

An important feature of smartphones is flash light that is very useful in different situations of daily life. In ophthalmology pen torch has an inevitable role and this flash light in the smart phone can be used in place of pen torch particularly in certain emergency situations where the doctors can not have the access to clinical tools. In this study 20% of the participants most often use their phone's flashlight instead of pen torch, 38% sometimes use the flashlight and 42% never use it. The results suggest that it should not replace the pen torch, however it can sometimes be used in non ideal situations.

The field of ophthalmology is photography based and Ophthalmic photography is an extremely focussed form of medical imaging dedicated to the study and treatment of disorders of the eye. But it is achieved by the use of highly specialized equipment used to describe parts of the eye like the cornea, iris, and retina[14]. But today it can be done by using the camera of the smartphone, these pictures than can be shared via social media groups, can be used in making presentations and making diagnosis. In our study 24% of the participants most often use their phone's camera to capture images of findings, 50% sometimes use the camera while 26% never use it.

The results suggest that it is now a common and useful practice to document the findings via photographs. Not only the external eye surface can be photographed but also fundus photography can be done. One most simple way is to turn on the flashlight and put the phone on video mode, hold a 20D lens in front of the dilated eye and start recording the fundus findings[15]. The 20D lens is easily available in refraction trial box so it is the cheap, simple and effective way of fundus photography. Nowadays some gadgets are also introduced which can be connected to phone's camera and fundus pictures can be taken (image I) Another important and useful feature of smart phones is their storage, depending upon which alot of data can be stored which includes pdf version of many books. 26 % participants of this study do not have any book stored in their phones, 16% have Kanski, 4% have American academy of ophthalmology course, and 54% have more than one book on their phones which includes Kanaski, American academy course, Oxford handbook, OCT angiography, Will's eye manual, OCT made easy, Wong, FRCS cakewalk, Chua eye notes and OCT updates. These books are used by the participants of the study while there are thousands of the books available for download.

The smartphones have search engines and internet connectivity which enable us to connect to the world and can surf many websites. In this study 8% do not use any website, 10% use Eyewiki.com (American academy's website), 4% use pubmed. com, 78% use google search engine to visit miscellaneous websites according to the topic in search. Surprisingly all the 8 participants who do not use websites are consultants.

In this era, social media is very important route of spreading information. In our study we inquired about the role of social media in the educational and academic purpose and found that 76% of participants use different messengers. There are many groups on social media where they share their knowledge, discuss different diseases and their management and inform each other about latest happenings in their setups.

On the other hand, there are many applications that can be downloaded on the phone and be used as testing tools for doctors and for patients. A near vision card, Amsler grid, Ishihara color plates, and a pupil gauge are some examples of applications that are available on a smartphone. Although these tools can not substitute office-based testing under ideal conditions, but these can be helpful, in the setting of inpatient consults and emergency room visits. The smartphone can be used to display educational videos, diagrams, and clinical photographs and deliver a suitable way to instruct patients and their families about various ophthalmic conditions and treatment options[6].

CONCLUSION:

Recent gadgets are proved to be very useful in field of ophthalmology. These gadgets are replacing expensive equipment and resulting in efficient patient care in a cost-effective way. Therefore, ophthalmologists should try to make the most of these smartphones for smart eyes, both for ophthalmologists and patients.

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