Original Research Article

Evaluation of efficacy of whatsapp messenger application in medical research education

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ABSTRACT

Background: There is lack of knowledge regarding research amongst medical students as it is not included in the present curriculum of MBBS. Hence authors have selected 'Medical Research' as a topic to evaluate the efficacy of WhatsApp messenger application as a teaching-learning tool. There is very limited research on impact of technological modalities like WhatsApp on education. Authors undertook this study to evaluate its efficacy as a tool to supplement medical research education and assess the perception of students about e-learning via WhatsApp messenger application.

Methods: A prospective analytical interventional study was conducted after obtaining ethical approval from the Institutional Ethics Committee. A self-designed comprehensive questionnaire was used to test the knowledge of medical students. A series of modules were sent and discussed on the WhatsApp study groups followed by assessment in change of the level of knowledge amongst the participants post intervention.

Results: Applying the paired t-test, the scores of the study participants showed a statistically significant increase in the post- intervention evaluation (Mean=10.13, Median=10, Range=0-21) as compared to the baseline knowledge regarding medical research as reflected in the pre intervention evaluation (Mean=6.76, Median=7, Range=0-16).

Conclusions: Growing availability of economical and user friendly smart phones in every generation has promoted use of WhatsApp by teachers as well as students. WhatsApp has the potential to supplement academic learning and become a natural educational modality. Necessary precautions could be taken to minimize the drawbacks expressed by the students to make it a more enjoyable and acceptable tool for teaching and learning.

Keywords: Education, E-learning, Medical research, Students, WhatsApp

INTRODUCTION

Smartphone offers advanced technologies with functionality similar as a computer. There were 468 million smart-phone users in India in 2017.[1] Due to such a vast availability of smart-phones there is an increased feedback from the user which improves communication and quality of information provided. WhatsApp is a free messenger application that works across multiple platforms like iPhone and android; it is widely used among undergraduate students to share files including images and videos to complement their classroom learning.[2] Information can be accessed in real time and shared by creating groups of like-minded people, becoming one of the fastest ways to disseminate facts.[3] There is an increasing evidence that these applications

have a significant potential to support the learning process and has major implications on pedagogies, allowing direct access to lots of online resources, more focus on student's creativity, autonomy, and responsibility on one's own learning.[4,5] Plana et al, studied the use of WhatsApp in English language among students in Spain and reported a rise in motivation and a greater enthusiasm for reading a foreign language.[6] Amry also demonstrated the effectiveness of WhatsApp social networking in comparison with face-to face learning in the Classroom.[7] In India, there are 459 medical colleges along with over 120 other teaching institutions, wherein medical teachers are now expected to undertake quality researchprojects.[8] Ray et al, have recently reported that the research output from 579 Indian medical institutions and hospitals over 10-year period from 2005 to 2014 has been poor, averaging to only 14.5 publications per institution per year. This is due to lack of knowledge about research in medical student as it is in not included in the curriculum of MBBS.[9] Hence authors have selected 'Medical Research' as a topic to evaluate efficacy of WhatsApp messenger application as a tool for teaching and learning method. There is very limited research on impact of technology like WhatsApp as a tool to supplement medical research education.

Aims and objectives of the study was to assess the efficacy of social media like WhatsApp messenger application in delivering knowledge regarding medical research amongst undergraduate medical students of India. Collation of perception of learners about e-learning via WhatsApp messenger Application

METHODS

This prospective analytical interventional study was conducted after obtaining ethical approval from the Institutional Ethics Committee. Final year (3rd Major M.B.B.S) Undergraduate medical students studying in Indian medical institutions were included in the study. Students not consenting to be a part of the study and those not having smartphone facilities were excluded from the study. The study was conducted online on WhatsApp messenger application over a duration of 4 months (June 2019-September 2019). An invitation to join the WhatsApp study groups was circulated via text messages and those consenting to be a part of the study were allowed to join the online WhatsApp groups prepared for the study. A total of two groups with 150 research participants each, were made. Besides students, each WhatsApp group also had five faculty members with knowledge in the field of medical research. A self-designed comprehensive questionnaire validated by the experts in the field of community medicine and pharmacology to assess the baseline knowledge of medical students in the following domains was prepared (Annexure 1):

- Formulating a Research Question
- Literature Search

- Study Designs
- Ethics in Clinical Research
- Designing a Protocol
- Biostatistics
- Medical Research Paper writing.

Out of 300 participants, 218 participants completed the pre-interventional evaluation test (incomplete responses were discarded). After the pre study evaluation of the baseline knowledge on various aspects of medical research of medical undergraduate students, the intervention in the form study modules (Table 1) on the above domains was sent on the groups as PDF files one after the other. Relevant articles pertaining to a module were sent on every Monday, Wednesday and Friday and the participants were expected to read the articles. The participants were also permitted to post their queries, if any, pertaining to the information provided on their respective groups which the faculty members would address by sending text messages or using audio-visual aid. After completion of each module, the participants were asked to attempt a small self-evaluation test based on the module consisting of 10 questions. The students received the answer key to the test and the explanations of the answers on the following day.

Table 1: Intervention-medical research education via whatsapp messenger application.

Module	Topic	No. of articles	Duration (in weeks)
1.	Formulating a research question	3	1
2.	Literature search	6	2
3.	Study designs	6	2
4.	Ethics in clinical research	6	2
5.	Designing a protocol	6	2
6.	Biostatistics	6	2
7.	Medical research paper writing	3	1
		Total duration = 12 weeks	

After all the modules, followed by their respective self-evaluation tests, were completed, the participants were administered the questionnaire again and changes in the level of knowledge in different domains were noted. A total of 160 participants completed the post-interventional evaluation test (incomplete responses were discarded). The scores were categorized as poor (0-8), average (9-15) and good (16-21). Analysis was done using SPSS software and the paired-t test was applied to the results to establish significance. Perception of students regarding e-learning through WhatsApp Messenger application was recorded by giving them a pre-validated checklist of advantages and disadvantages of WhatsApp messenger application as a teaching-learning tool. They were simply asked to choose from the given options, the aspects of

WhatsApp messenger application they perceived as advantageous or disadvantageous.

RESULTS

The scores of the study participants when analyzed using the paired-t test depicted a statistically significant increase (Figure 2-3) in the post- intervention evaluation (Mean=10.13, Median=10, Range=0-21) as compared to the baseline knowledge regarding medical research as reflected in the pre intervention evaluation (Mean=6.76, Median=7, Range=0-16) (Figure 1).
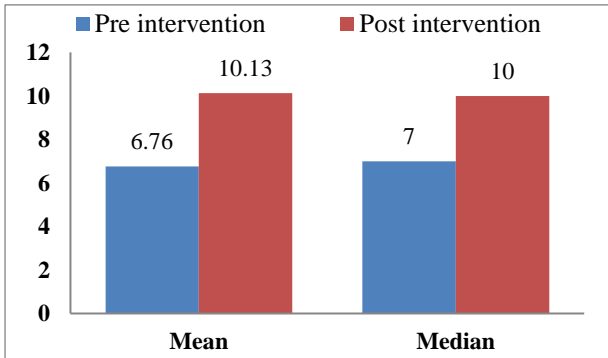

Figure 1: Comparison of mean and median between scores of pre and post intervention evaluation tests.
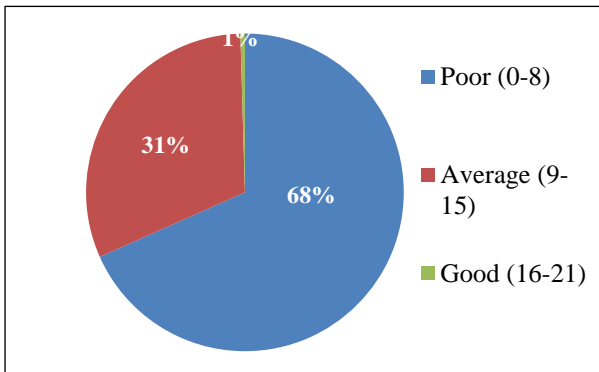

Figure 2: Scores of study participants in pre interventional evaluation test.
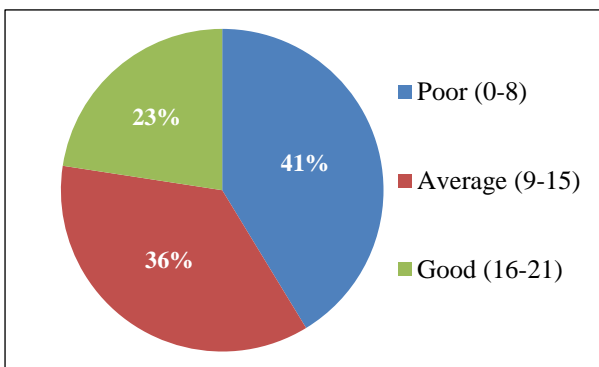

Figure 3: Scores of study participants in post interventional evaluation test.

Out of the 300 students enrolled for the study, only 218 completed the pre interventional evaluation while the number further dropped to 160 students who completed the post interventional evaluation.

Advantages of WhatsApp (Figure 4)

The number in the bracket refers to the number of students who felt that the respective feature of WhatsApp messenger application was advantageous as an e-learning tool

- Simple to use (155)
- Free of charge (35)
- Easily available and downloadable (135)
- Conducive environment for knowledge sharing (140)
- Sense of belonging to group (128)
- Increased interaction amongst students and facilitator (158)
- Doubts immediately cleared (156)
- Easy accessibility to learning material (155)
- Increased facilitator's availability (158)
- Learning anytime, anywhere (155)
- Provision of privacy and secure environment for learning (130)

Disadvantages/Challenges with WhatsApp (Figure. 5)

The number in the bracket refers to the number of students perceiving the respective features of WhatsApp messenger application as a disadvantage or challenge when used as an e-learning tool

- Unavailability of smart phone/ strong Wi-Fi connection hinders learning (30)
- Message flooding (55)
- Time consuming learning (60)
- Strain on eye (05)
- High expectation of teacher's availability (80)
- Huge amount of sources and learning material makes it confusing (15)
- Use of inappropriate language (28)
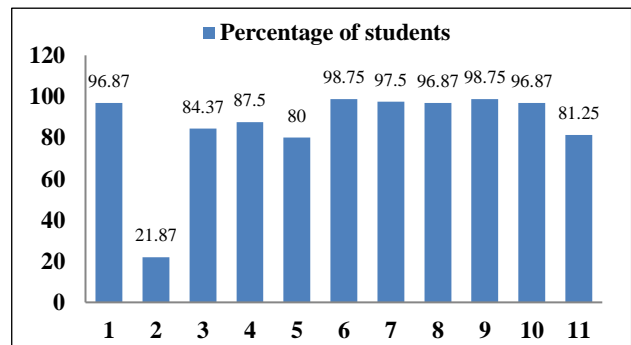- Personal attention cannot be given to students (23).

Figure 4: Percentage of students perceiving the respective features of WhatsApp messenger application advantageous when used as an e-learning tool.
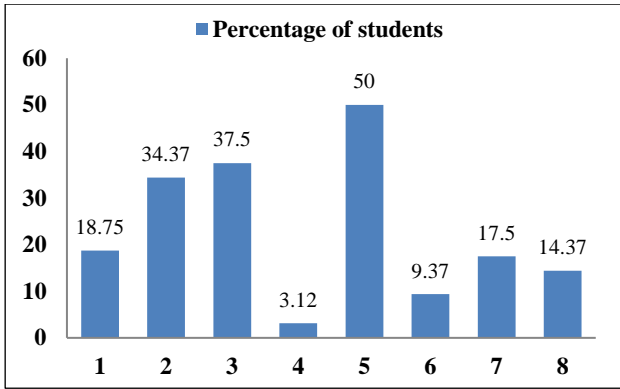
Figure 5: Percentage of students perceiving the respective features of WhatsApp messenger application as a disadvantage or challenge when used as an e-learning tool.

Figure 6: Screenshots of interactive discussions amongst research participants on study groups created on WhatsApp messenger application.

DISCUSSION

The underlying purpose of WhatsApp is to facilitate communication, and at its most basic level, education is nothing but communication. WhatsApp can provide a channel through which teachers can achieve faster and more seamless communication with their students. It can also increase the level of communication amongst students and create another avenue for learning.

As of today, it looks like that WhatsApp surely has advantages of low cost, simplicity, accessibility, efficiency and flexibility over other technological tools employed by the education system.[10] Until recently there was no technological tool which was used so extensively by both adults and students with same level of convenience. Today, students are addicted to social media websites and mobile applications, and it is perceived that this social media is wasting students'

valuable time. However, the same social media platforms can be used in more constructive ways for learning as the newer generation is techno-friendly. So, authors decided to evaluate efficiency and feasibility of WhatsApp messenger as an e-learning tool. As medical research is not covered in undergraduate curriculum, it was decided to take up this topic for teaching through this medium.

In the present study, two groups of 150 students each were created on WhatsApp and the teaching-learning activity was carried out on the same. It was observed that more interactions in the forms of questions, answers, sharing of learning material, asking difficulties as well as different emotional gestures of 'thank you', 'well done', etc. were observed (Figure 6). Rambe and Chipunza also observed that WhatsApp supports knowledge sharing between students and teachers.[11] In this study authors observed that students were found to express themselves freely in a non-restricted environment thus removing the low participation constraints characteristic of lectures. Bansal and Joshi also observed in their study that 82% students were eager to post videos, audios, texts on the problems and were also learning from others' posts.[12]

The scores of the study participants depict a statistically significant increase in the post-intervention evaluation (Mean=10.13, Median=10, Range=0-21) as compared to the baseline knowledge regarding medical research as reflected in the pre intervention evaluation. (Mean=6.76, Median=7, Range=0-16).

(Figure 1-3) Out of the 300 students enrolled for the study, only 218 completed the pre-intervention questionnaire while only 160 completed the post-intervention questionnaire. This shows that there was a dropout rate of 26.61% within a period of 12 weeks. Various measures like appreciating students for sharing learning material or providing them a certificate at the end of the study can help in reducing dropout rate.

Teachers' availability and Learning anytime anywhere were top two advantages of learning through WhatsApp which helped them in getting their doubts cleared immediately with 98.75% students agreeing to it. As reported by them in open ended questionnaire administered to them at the end of the study, they found WhatsApp interaction more friendly and comfortable than face to face interaction with the teacher. Every teacher had a different expertise which was an added advantage in this study. Bansal and Joshi agreed that learning through WhatsApp learning has educational benefits like immediate feedback; deeper clarity on issues; learning from other problems; healthy discussions; and availability of learning material all the time.[12] WhatsApp enables learning beyond the classroom's borders and the high availability of teachers to the students' questions can potentially enhance the learning process. 96.87% of students found it simple to use and easy accessibility to learning material. 73% percent students in a study of Bansal and Joshi found learning

anytime, anywhere convenient with disagreement coming only from those students who did not want to compromise on family time.[12]

Amongst technical advantages, most of the students (84.37%) found it easily available and downloadable. Free of charge was an advantage for very few (21.87%) as the college campus is still not Wi-Fi enabled and they had to take packages with mobile data which may increase the cost of data pack. Bouhnik and Deshenhad concluded that WhatsApp is simple and provides privacy along with low cost application as compared to other social network like Facebook or Twitter.[13]

Along with the advantages, there were many challenges faced by the students as well as facilitator during TL activity through WhatsApp. The most prevalent disadvantage as reported by students (50%) were having unfulfilled high expectations from teachers. Many of them (37.5%) found this method to be more time consuming.

Message flooding (34.37%) and use of inappropriate language (17%) were the other reported disadvantages observed in the present study. Since this group comprised of 150 students in the present study, it could have led to message flooding and consumption of more time to go screen the relevant data. Contrary to our expectations only 3.12% reported eye strain as a disadvantage.

Many students felt that there were no efforts by some students and some students shared learning material only to impress facilitator without actually learning about it. Bansal and Joshiin their study also observed that some students disagreed on the fact that WhatsApp provides collaborative learning and gave the reason that not everybody shared the content in the group.[12]

Use of inappropriate language was not witnessed in the present study. However, challenges such as the demand for constant availability, foul language and behavior may cause teachers to feel uncomfortable. It is also worth taking into account that operating such a group requires the teachers to invest time beyond their regular work hours, in addition to being swamped with messages.

One of the biggest limitations of the study was requirement of Wi-Fi connection within the college campus and students had to use mobile data for the sessions, where the data speed was low leading to delayed downloading as well as uploading of the learning material. Another important limitation of this study is the duration and a lack of comparative group. Long term comparative study with more time and more number of sessions, may throw more light on its efficacy in comparison to didactic lectures. Feedback from the faculty regarding increase in their stress level for answering the queries of the students could have been obtained.

CONCLUSION

Growing availability of economical and user friendly smart phones in every generation has promoted use of WhatsApp by teachers as well as students. WhatsApp has the potential of a natural educational technology and the qualities to contribute to education as a supportive modality. Constant availability of facilitator and learning anytime anywhere has made WhatsApp a new and convenient tool for teaching learning activity. Within this framework, there are a lot of disadvantages and unanswered questions regarding the use of this mobile application. Enabling a Wi-Fi in the college campus can make its use cost effective. Necessary precautions should be taken to minimize the drawbacks expressed by the students to make it more effective as an e-learning tool.

REFERENCES

1. Smart phone users in India. Available at: https://www.business-standard.com/article/news-cm/number-of-smartphone-users-in-india-likely-to-double-to-859-million-by-2022-119051000458_1.html. Accessed 5 September 2019.
2. Lenhart A, Madden M, Macgill AR, Smith A. Teens and social media. Pew internet and American life project. Washington DC: Pew Charitable Trusts. Retrieved. 2007;7:2012.
3. FOGG P. Professor: what to do when home is just another word for the office. Chron Higher Edu. 2010;54(21):12.
4. Shuler C. iLearn II: An Addendum An Analysis of the Games Category of Apple's App Store. The Joan Ganz Cooney Center at Sesame Workshop, New York, 2012. Available at: https://joanganzcooneycenter.org/wp content/uploads/2012/01/ilearnii.pdf. Accessed 6 September 2019.
5. Goodwin K. Use of tablet technology in the classroom. State of New South Wales (Australia): The NSW Curriculum and Learning Innovation Centre 2012.
6. Plana MGC, Escofet MIG, Figueras IT, Gimeno A, Appel C, Hopkins J. Improving learners' reading skills through instant short messages: A sample study using WhatsApp. 4th World-CALL Conference; Glasgow. 10-13 July 2013.
7. Amry AB. The impact of WhatsApp mobile social learning on the achievement and attitudes of female students compared with face to face learning in the classroom. 2014;10(22):1857-7881.
8. List of Colleges Teaching MBBS. Medical Council of India. Available at: http://www.mciindia.org/InformationDesk/ForStude

nts/Listof CollegesTeaching MBBS.aspx. Accessed 8 September 2019.

9. Ray S, Shah I, Nundy S. The research output from Indian medical institutions between 2005 and 2014. Current Med Res Pract. 2016;6(2):49-58.
10. Church K, De Oliveira R. What's up with whatsapp?: comparing mobile instant messaging behaviors with traditional SMS. In Proceedings of the 15th international conference on Human-computer interaction with mobile devices and services. 2013;352-361.
11. Rambe P, Chipunza C. Using mobile devices to leverage student access to collaboratively generated resources: A case of WhatsApp instant messaging. South African University International Conference on Advanced Information and Technology for Education; 2013.
12. Bansal T, Joshi D. A study of students' experiences of mobile learning. Global J Human-Soci Sci. 2014;14(4):26-33.
13. Bouhnik D, Deshen M, Gan R. WhatsApp goes to school: Mobile instant messaging between teachers and students. J Information Technol Edu: Res. 2014;13(1):217-31.

Cite this article as: Mulkalwar AA, Dashputra AV, Jaipuri AT, Sutar PV, Mulkalwar SA, Rathod H. Evaluation of efficacy of whatsapp messenger application in medical research education. Int J Res Med Sci 2020;8:265-71.

Annexure 1: Questionnaire for study participants (Scoring: 1 mark per correct answer, no marks for unattempted/incorrect answer, maximum marks-21).

1. All the following factors should be considered while formulating a research question except _____
   - Plausibility of the question
   - Likelihood of a positive result
   - Feasibility of the proposed design
   - Availability of the resources
2. MeSH stands for
   - Medical education and Surveillance History
   - Medical Search History
   - Medical ethics and Systemic Hierarchy
   - Medical Subject Heading
3. For cases of gastric cancer, if controls are patients of arthritis with a probable high exposure of NSAIDs, results would show _____ in estimate of result
   - Reduction
   - Increase
   - No change
4. Which of the following is/are the best Measure of Central Tendency to be used when there is bimodal or trimodal distribution of data?
   - Mean
   - Median
   - Mode
   - More than 1 option correct
5. The absolute risk of diarrhoea in children administered rotavirus vaccine is 15% and that in children without vaccination is 35%. What is the Number Needed to Treat (NTT)?
   - 5
   - 4
   - 3
   - 6
6. Snowball sampling is also known as _____ sampling.
   - Quota
   - Judgmental
   - Chain referral
   - Convenience
7. _____ is primarily responsible for submission, coordinating the revision and fulfilling the administrative requirements of publication
   - Principle Investigator
   - First author
   - Senior most author
   - Corresponding author
8. Match the following guidelines with appropriate study designs

1)CONSORT	a) Observational studies
2)STARD	b) Case report
3)STROBE	c) RCTs
4)CARE	d) Studies of diagnostic accuracy

   - 1-d, 2-b, 3-a, 4-c
   - 1-c, 2-d, 3-a, 4-b
   - 1-c, 2-d, 3-b, 4-a
   - 1-d, 2-b, 3-c, 4-a
9. According to the principles of ICH GCP, what is the most important consideration when conducting a trial?
   - Data accuracy
   - Protection of trial subjects
   - Statistical quality checks
   - Significance of outcome
10. What are the odds of rolling 3 on a 6-sided die?
    - 1 to 5
    - 1 to 6
    - 3 to 6
    - 1 to 1
11. Identify the style of referencing:
    Arrami M Garner H. A tale of two citations. Nature 2008;451(7177): 397-9. www.nature.com/nature.html (accessed 20 January 2008)
    - Harvard style
    - Vancouver style
    - AMA style
    - Stanford
12. Ideal method for removing the effect of confounding factor is __
    - Binding
    - Randomization
    - Matching
    - Statistical remodeling
13. Which of the following is a search engine used for medical literature?
    - MEDLINE
    - PubMed
    - NLM
    - NCBI
14. Method and data collection is designed to answer _____
    - Medical problems
    - Community health issues
    - Hypothesis
    - Social problems
15. _____ refers to soundness of study to answer the exact question that is posed
    - Reliability
    - External validity
    - Efficacy
    - Internal validity
16. Advantage of cohort over case control study is _____
    - Absence of ethical concerns
    - Absence of attrition bias
    - Determination of temporarily
    - Shorter duration
17. Feedback is an integral component of _____
    - Case series
    - Cross-sectional
    - Randomized control trial
    - Surveillance study
18. Study to find out association between per capita cigarette sale and rates of coronary artery disease in an area is a example of _____
    - Randomized controlled trial
    - Case control
    - Cohort study
    - Ecological study
19. Which of the following cannot be achieved by a descriptive study?
    - Trend analysis
    - Healthcare planning
    - Establishing association
    - Hypothesis generation
20. Which of the following is not concerned with medical ethics
    - Nuremberg code
    - Helsinki declaration
    - CARE Guidelines
    - CIOMS Guidelines
21. Alternative spellings and synonyms can be combined in literature search by the use of __
    - OR Boolean operator
    - MeSH
    - AND Boolean operator
    - More than 1 options correct