Journal of Pharmaceutical Research International

33(47B): 894-902, 2021; Article no.JPRI.74443
ISSN: 2456-9119
(Past name: British Journal of Pharmaceutical Research, Past ISSN: 2231-2919, NLM ID: 101631759)

Evaluation of Cognitive Functions and Emotional Disturbances in Elderly Patients using Smart Phone Mobiles

Mufeetha[1], G. Sridevi[2*] and S. Preetha[2]

[1]Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Science, Saveetha University, Chennai-600077, Tamil Nadu, India.
[2]Department of Physiology, Saveetha Dental College and Hospital, Saveetha Institute of Medical and Technical Sciences, Chennai-77, Tamil Nadu, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2021/v33i47B33199
Editor(s):
(1) Dr. P. Veera Muthumari, V. V. Vanniaperumal College for Women, India.
Reviewers:
(1) Mônica Barbosa de Sousa Freitas, FCU, USA.
(2) Lam Weng Hoe, Universiti Tunku Abdul Rahman, Malaysia.
Complete Peer review History: https://www.sdiarticle4.com/review-history/74443

Original Research Article

Received 04 August 2021
Accepted 08 October 2021
Published 05 November 2021

ABSTRACT

Background: Research shows that smartphones can lead to brain affects which slowly ability and start to store information remotely outside the brain brings mental laziness. When people are given smart- phones they reduce the memory storing. So, the present study planned to evaluate the Emotional disturbances and cognitive functions and language skills among android mobile non-users and users

Methods: A study population involved 20 adults in the age group of 50-70 years. They were divided into two groups. Group 1- Subjects who were not using any mobile phone but were using landline Group 2-Subjects on regular use of Smartphones. Battery cognitive tests were assessed using MINI mental state examination and the levels of orientation, memory, attention, language, abstraction and recall was analyzed. The results were tabulated and statistically analyzed using an independent sample t test. The emotional status was assessed based on a cross-sectional study using a depression questionnaire performed among 100 elderly subjects in the age group of patients from private dental colleges. The data was collected and analyzed using SPSS software version 23.

**Corresponding author: E-mail: sridevig.sdc@saveetha.com;*

Results: As the result of mobile phones as it causes diseases. Apart from cancer, mobile phones influence our brain and nervous system. They may cause decreased attention, sleep disorders, headache, shortness of temper, and depression, mostly among elders.
Conclusion: The study concluded an innovative finding that Mobile phone usage causes more cognitive changes in middle aged and they must be educated with the harmful effects of more and frequent usage of mobile phones. And they should impact with their family and relatives

Keywords: Mobile phones; cognitive; brain; mini mental state; innovation.

1. INTRODUCTION

The brain is one of the most complex organs in the human body. It is made up of more than 100 billion nerves that communicate with trillions of connections called synapses. Memory refers to the processes that are used to acquire, store, retain, and later retrieve information. Use of smartphones had gradually increased over users and people started getting addicted to its usage. Much research has been done on smartphone usage and its impact on all adolescents for so many years. But reports on smartphone addiction and changes in cognition and memory related changes in geriatric population is still lacking [1–4].

There are certain harmful health effects, which might be caused by the immoderate use of cell phones. According to modern research, the most menacing problem is the connection between cell phones and cancer. Even though the data remains controversial, most scientists agree that there is a certain threat from using cell phones too much. It is reported that people who talk on the phone for several hours a day are 50% more likely to develop brain cancer. The reason for this is the radio waves produced by mobile phones. It is calculated that every minute the human brain receives about 220 electromagnetic impulses, which are not necessarily harmful, but which definitely affect the brain in cases of prolonged impact [5][6]. Recent studies report two types of brain cancer may occur – glioma and acoustic neuroma. Apart from cancer risk, mobile phones influence our nervous system [7–10]. They may cause headaches, decreased attention, shortness of temper, sleep disorders and depression, mostly among teenagers. Radio waves are not the only reason for such symptoms. It is the sad reality that nowadays many people, especially youth, experience lack of human contact, and they try to compensate for it by mobile-phone communication, which is not an adequate substitute for personal intercourse. Adolescence is not an easy period of life, and at that time a young person is especially vulnerable. In cases of excessive mobile phone use there is a possibility of becoming addicted to the phone; the real world seems to fade in comparison with hours-long chats and hundreds of messages. These aspects cause psychological problems, as people start to feel uncomfortable in face-to-face communication [11–14]. Our team has extensive knowledge and research experience that has translate into high quality publications [15–19].

Previous reports reported the physiological changes produced by android phone users. But there were scanty reports on the emotional and cognitive changes after android phone usage. So, the present study aimed to evaluate the emotional disturbances and cognitive functions and language skills among android mobile non users and users.

2. MATERIALS AND METHODS

A study population involved 20 (sample size = 20) adults in the age group of 50-70 years. They were divided into two groups.

Group 1- Subjects who were not using any mobile phone but were using landline.
Group 2-Subjects on regular use of Smartphones.

The inclusion criteria involve healthy elderly population and exclusion criteria involves elderly subjects without any history of depressive or psychosomatic illness, Alzheimer' s disease and dementia. A Battery of cognitive tests were assessed using MINI mental state examination was used as a tool to assess the cognitive functions of the participant and the levels of orientation, memory, attention, language, abstraction and recall was analysed.

The emotional status of the participant was analysed using a cross-sectionalstudy by a depression questionnaire performed among 100 elderly subjects (sample size =100) using mobile phones in the age group 50-70 yrs. The results were tabulated and statistically analysed using an independent sample t test. The data was

collected and analysed using frequency analysis and Chi square test in SPSS software version 23.

3. RESULTS

Mini mental state examination showed that Visuospatial executive, naming and orientation was significantly lowered in Smartphone users compared to non-smartphone users. ($p< 0.05$) But attention, language, abstraction and delayed recall showed a decreased score in smartphone users but the value was not statistically significant. ($p< 0.05$).

The emotional state was analysed using frequency analysis of Depression scale in the survey and the findings revealed that about 54% are from age group 30 to 40 years 30% are from the age group 40 to 50 years 11% are from the age group 50 to 60 years 5% or from above 60. About 33% who answered is male and 66% are female and 1% do not prefer. For the question Are they really satisfied with their life 67% people said Yes and 33% of people said no. Because of the phone usage they really dropped many of the activities and interests and the answer was 49% said Yes and people 51% said no. (Fig. 1).

Do they really feel that life is empty and 60% of people said yes and 39% said no**.**Whether people get bored often even after using mobile phones 57% said Yes and 43% said no.Are they in good spirits most of the time 50% said yes and 50% said no. Are they afraid that something bad is going to happen to them 56% said yes and 44% said no (Figure 2). Do they feel happy most of the time and 49% said yes and 51% said no. Do they feel helpless? 57% said yes and 43% said no. They preferred to stay at home rather than going out and doing new things 55% yes and 45% said no. Do they feel they have more problems with memory than most normally 59% said yes and 41% said no (Figure 3) **.**Do they think it is wonderful to be alive 61% said yes and 39 % said no. Duty full energy 47% said yes and 53% no.

Do they feel that their situation is hopeless? 41% said yes and 59% said no. Do they think most people are better off than they are? 67% said yes and 33 % said no (Fig. 4).

3.1 Cross Tab Evaluation

The Association between gender and feeling of helplessness was analysed. Majority of females about 60% stated yes compared to male respondents (45%) and the value was statistically significant. Pearson chi square value = 0.019 ($p<0.05$) (Fig. 5).

The Association between gender and feeling of better off than they are was analysed. helpless was analysed. Majority of female about 70% stated yes compared to male respondents (55%) and the value was statistically insignificant. Pearson chi square value = 0.17 ($p<0.05$) (Fig 6).

4. DISCUSSION

During the process of aging the most affected basic cognitive functions are attention and memory. Deficits of attention and memory are physiologically affected at these early processing stages of cognition during old age. Higher-level cognitive functions like language processing and decision making are also affected by process of aging age. The smartphone has become ubiquitously very important in our everyday life. Recent researchers have focused on how smartphone and its-related effects influence on cognitive functions [20]. Previous reports supported our findings stating that"when cell phone use becomes an addiction, the behavior becomes stressful and might lead to depression" Although many age groups show addiction to smart and android phones, Elderly group are more prone for cell phone addiction because they have completed all their responsibilities in life and are in dependance on their son or daughter for their daily requirements [21–25].

Table 1. Represents the scores of mini mental state examination

Parameters	Smartphone users	Non smartphone users
Visuospatial executive	1.40± 1.65	4.10±3.107
Naming	1.00± 0.667	2.10±1.101
Attention	0.70± 0.823	1.10± 0.738
Language	0.40± 0.516	1.10± 0.876
Abstraction	0.30± 0.483	1.10± 0.738
Orientation	2.70± 2.003	5.50± 0.850
Delayed recall	.90±.994	0.260±1.265

Values are expressed as mean ± Stdev

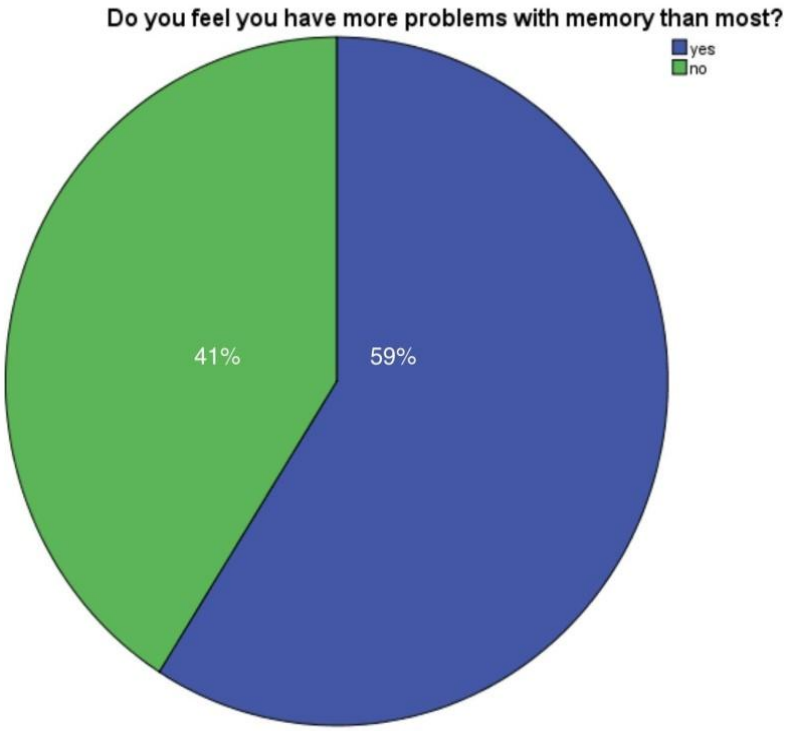

Fig. 1. Represents do they feel they have more problems with memory than most. Blue colour represents yes and green colour represents no. 59% said that they feeling that they have more problems with memory than most

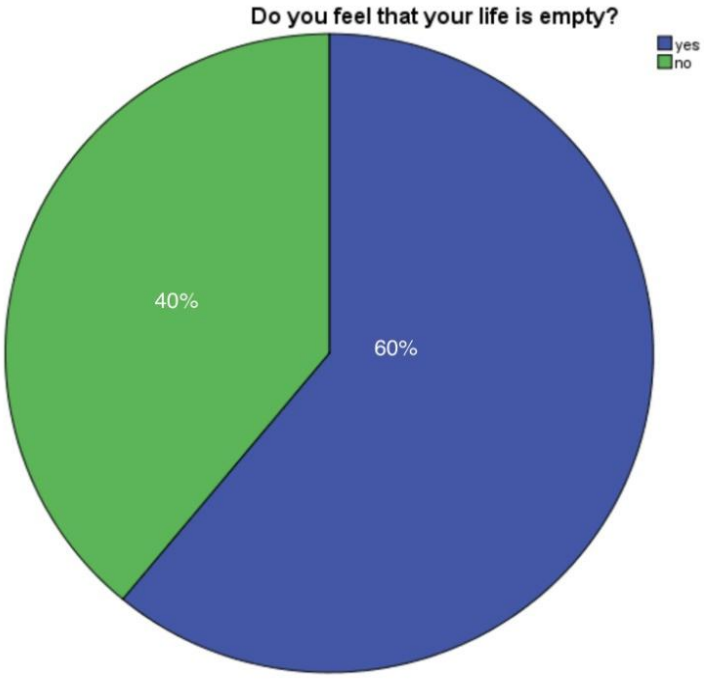

Fig. 2. Represents do they feel that their life is empty. Blue colour represents yes and green colour represents no. 60% said that they feel that their life is empty and 40% said they do not feel that their life is empty

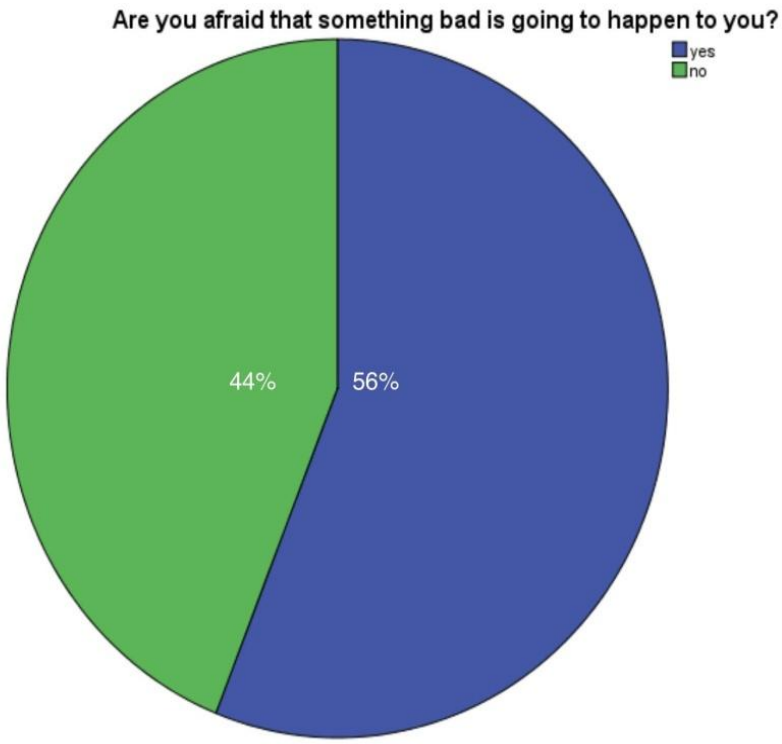

Fig. 3. Represents do they fear that something bad is going to happen to them. Blue colour represents yes and green colour represents no. 56% said that they are afraid something bad is going to happen to them. 44% said that they are not afraid something bad is going to happen to them

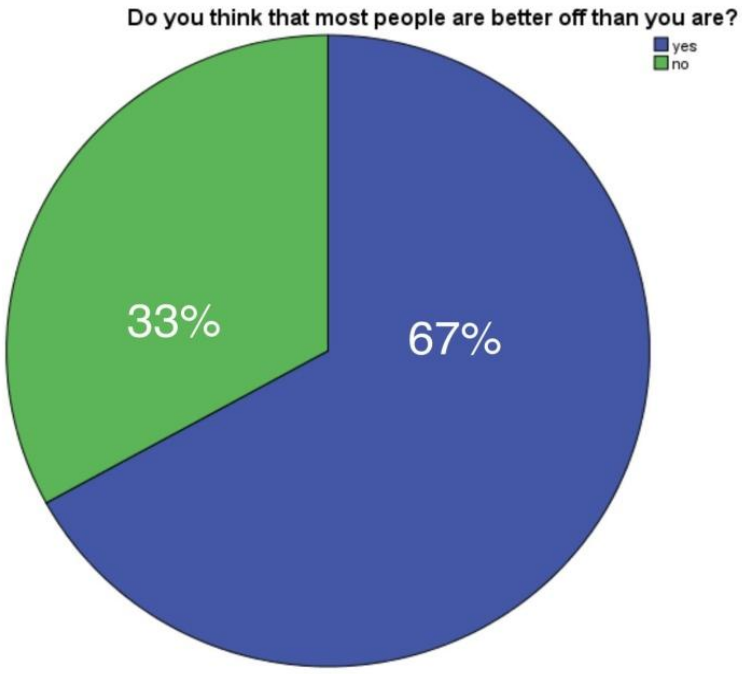

Fig. 4. Represents do they think most people are better than them.Blue colour represents yes and green colour represents no. 67% said that they think most people are better than them.33% said that they do not think most people are better than them

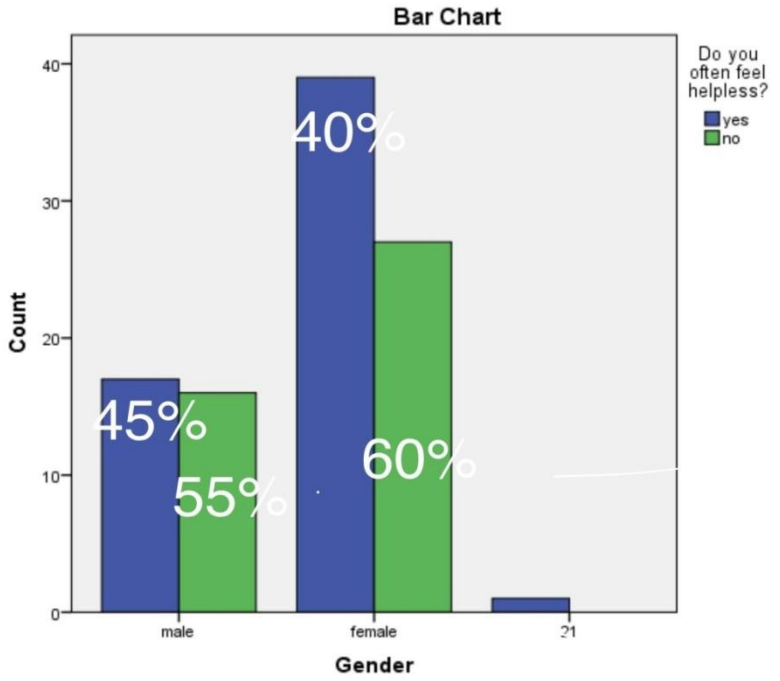

Fig. 5. Bar graph represents the association between gender of participants and do they feel that they often feel helpless; Blue colour indicates yes and green colour indicates no. It is very evident that females are more helpless compared to males and the value was found to be statistically significant and the pearson chi square value is 0.019, (p < 0.05).

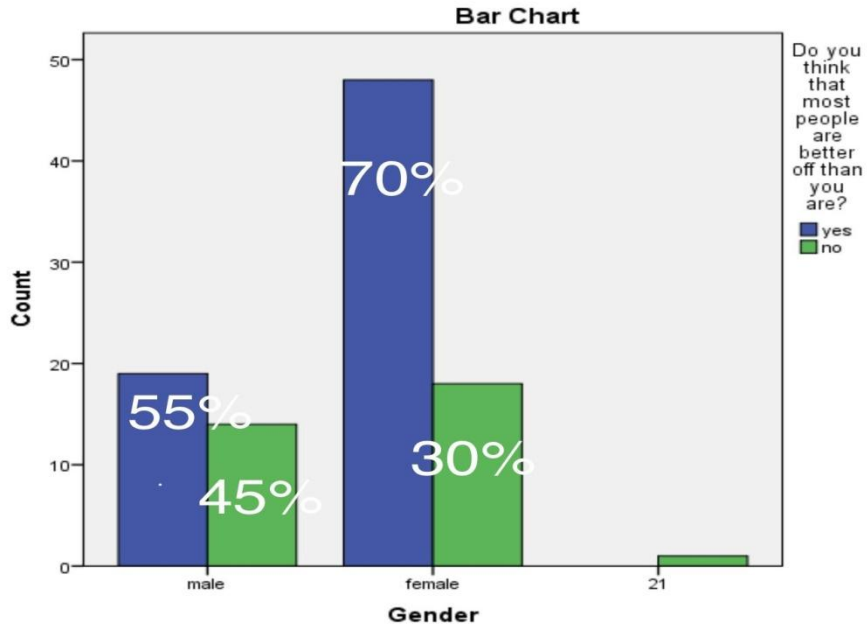

Fig. 6. Bar graph represents the association between gender of participants and do they think that most people are better off than they are. Blue colour indicates yes and green colour indicates no. Females think that they were better off compared to males and the association was found to be statistically insignificant and the pearson chi square test value is 0.17, (p> 0.05)

In consistent with our findings, previous reports claim that Excessive use of smartphone paired with negative attitude and feeling of anxiety and dependency on gadgets may increase the risk of anxiety and depression [26-28].

Also studies reported that based on usage time, usage frequency and notifications reception may also play a role in potential changes in human beings. The inability to inhibit the tendency to check the regular messages can have a negative impact on the productivity at workplace , low motivation, and self-efficiency [29-32].

Working memory is one of the core components of higher cognitive functions with limited capacity to store information temporarily. There is confounding evidence that mere presence of one's own smartphone reduces performance in a working memory task in human beings [33].

A study by Reinecke et al.2017 explored the psychological health effects and effect of digital stress on 1,557 German internet users aged 14 to 85 and reported smartphone usage was related to perceived stress and had an indirect impact on depression and anxiety too. De-Sola Gutiérrez et al. revealed that the problematic cell phone usage had been associated with sleep deficit, depression, anxiety, and stress [34].

5. CONCLUSION

Thus, it can be concluded that the excessive smartphone use had a negative psychological effect. So, the elderly people must be aware of the ill effects of cell phone usage so that addiction induced depression and emotional disturbances can be prevented.

6. LIMITATIONS OF THE STUDY

The limitation of the present study is that the sample size is small. Further if the sample size is increased, it would add more statistical significance.

FUTURE SCOPE

The study can be done in higher sample size with the inclusion of more neurophysiological techniques to predict the extend of cognitive loss in elderly subjects.

FUNDING

Organisation name from which the student received funding. Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Science, Saveetha University.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

It is not applicable.

ACKNOWLEDGEMENT

The authors would like to thank the study participants for their participation for their kind cooperation throughout the study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Vergani L, Marton G, Pizzoli SFM, Monzani D, Mazzocco K, Pravettoni G. Training cognitive functions using mobile apps in breast cancer patients: Systematic review. JMIR mHealth and uHealth. 2019;7:e10855.
   Available: https://doi.org/10.2196/10855.
2. Nambi G, Kamal W, Es S, Joshi S, Trivedi P. Spinal manipulation plus laser therapy versus laser therapy alone in the treatment of chronic non-specific low back pain: A randomized controlled study. Eur J Phys Rehabil Med. 2018;54:880–9.
3. Saraswathi I, Saikarthik J, Senthil Kumar K, Srinivasan KM, Ardhanaari M, Gunapriya R. Impact of COVID-19 outbreak on the mental health status of undergraduate medical students in a COVID-19 treating medical college: A prospective longitudinal study. Peer J. 2020;8:e10164.
   Available:https://doi.org/10.7717/peerj.10164.
4. Website n.d. 6. Santhakumar P, Roy A, Mohanraj KG, Jayaraman S, Durairaj R. Ethanolic extract of *Capparis decidua* fruit ameliorates methotrexate-induced hepatotoxicity by activating Nrf2/HO-1 and PPARγ mediated pathways [Internet]. Indian Journal of Pharmaceutical

Education and Research. 2021;55:s265–74.
Available:http://dx.doi.org/10.5530/ijper.55.1s.59.

5. Beatty WW. Cognitive and emotional disturbances in multiple sclerosis. Neurologic Clinics. 1993;11:189–204.
Available:https://doi.org/10.1016/s0733-8619(18)30177-4.
6. Prakash AKS, Devaraj E. Cytotoxic potentials of S. cumini methanolic seed kernel extract in human hepatoma HepG2 cells. Environmental Toxicology. 2019;34:1313–9.
Available:https://doi.org/10.1002/tox.22832
7. Strelets V. EEG mapping in patients with emotional and cognitive disturbances. Electroencephalography and Clinical Neurophysiology.1997;103:37.
Available:https://doi.org/10.1016/s0013-4694(97)88073-3.
8. Rajakumari R, Volova T, Oluwafemi OS, Rajesh Kumar S, Thomas S, Kalarikkal N. Grape seed extract-soluplus dispersion and its antioxidant activity. Drug Development and Industrial Pharmacy. 2020;46:1219–29.
Available:https://doi.org/10.1080/03639045.2020.1788059.
9. Website n.d. . Tahmasebi S, Qasim MT, Krivenkova MV, Zekiy AO, Thangavelu L, Aravindhan S, et al. The effects of oxygen–ozone therapy on regulatory T- cell responses in multiple sclerosis patients [Internet]. Vol. 45, Cell Biology International. 2021;1498–509.
Available:http://dx.doi.org/10.1002/cbin.11589.
10. Vivekanandhan K, Shanmugam P, Barabadi H, Arumugam V, Daniel Raj Daniel Paul Raj D, Sivasubramanian M, et al. Emerging therapeutic approaches to combat COVID-19: Present status and future perspectives. Front Mol Biosci. 2021;8:604447.
11. Monaco F, Comi C. Anticonvulsvant drugs and cognitive functions in elderly patients with epilepsy. Behavioral Neurology in the Elderly. 2001;403–9.
Available:https://doi.org/10.1201/b14249-19.
12. Wadhwa R, Paudel KR, Chin LH, Hon CM, Madheswaran T, Gupta G, et al. Anti-inflammatory and anticancer activities of Naringenin-loaded liquid crystalline nanoparticles *In vitro*. J Food Biochem. 2021;45:e13572.
13. Ezhilarasan D. Critical role of estrogen in the progression of chronic liver diseases. Hepatobiliary & Pancreatic Diseases International 2020;19:429–34.
Available:https://doi.org/10.1016/j.hbpd.2020.03.011.
14. Egbuna C, Ifemeje JC, Udedi SC, Kumar S. Phytochemistry: Volume 1: Fundamentals, Modern Techniques, and Applications. CRC Press; 2018.
15. Needhidasan S, Samuel M, Chidambaram R. Electronic waste - an emerging threat to the environment of urban India. J Environ Health Sci Eng. 2014;12:36.
16. Saravanan M, Arokiyaraj S, Lakshmi T, Pugazhendhi A. Synthesis of silver nanoparticles from Phenerochaete chrysosporium (MTCC-787) and their antibacterial activity against human pathogenic bacteria. Microb Pathog. 2018;117:68–72.
17. Gupta P, Ariga P, Deogade SC. Effect of monopoly-coating agent on the surface roughness of a tissue conditioner subjected to cleansing and disinfection: A contact profilometric in vitro study. Contemp Clin Dent. 2018;9:S122–6.
18. Devi VS, Gnanavel BK. Properties of concrete manufactured using steel slag. Procedia Engineering. 2014;97:95–104.
19. Krishnaswamy H, Muthukrishnan S, Thanikodi S, Arockiaraj G, Venkatraman V. Investigation of air conditioning temperature variation by modifying the structure of passenger car using computational fluid dynamics. Thermal Science 2020;24:495–8.
Available:https://doi.org/10.2298/tsci190409397k.
20. Hadjiev D, Mineva P. Cerebral blood flow changes in elderly hypertensive patients and cognitive functions. Stroke. 2007;38.
Available:https://doi.org/10.1161/strokeaha.107.496919.
21. Darmawati I, Lindayani L, Taryudi T. Home based-exercise using mobile application to improve cognitive functions in patients with hypertension: A quesy experimental design. Enfermería Global. 2020;19:409–26.
Available:https://doi.org/10.6018/eglobal.411601.
22. Kamath SM, Manjunath Kamath S, Jaison D, Rao SK, Sridhar K, Kasthuri N, et al. In vitro augmentation of chondrogenesis by

Epigallocatechin gallate in primary Human chondrocytes - Sustained release model for cartilage regeneration. Journal of Drug Delivery Science and Technology 2020;60:101992.
Available:https://doi.org/10.1016/j.jddst.2020.101992.

23. Barabadi H, Mojab F, Vahidi H, Marashi B, Talank N, Hosseini O, et al. Green synthesis, characterization, antibacterial and biofilm inhibitory activity of silver nanoparticles compared to commercial silver nanoparticles. Inorganic Chemistry Communications 2021;129:108647.
Available:https://doi.org/10.1016/j.inoche.2021.108647.
24. Bharath B, Perinbam K, Devanesan S, AlSalhi MS, Saravanan M. Evaluation of the anticancer potential of Hexadecanoic acid from brown algae Turbinaria ornata on HT–29 colon cancer cells. Journal of Molecular Structure 2021;1235:130229.
Available:https://doi.org/10.1016/j.molstruc.2021.130229.
25. Shabgah AG, Ezzatifar F, Aravindhan S, Zekiy AO, Ahmadi M, Gheibihayat SM, et al. Shedding more light on the role of Midkine in hepatocellular carcinoma: New perspectives on diagnosis and therapy. IUBMB Life 2021;73:659–69.
Available:https://doi.org/10.1002/iub.2458.
26. Howell SN, Robinson SE, Griesbach GS. 1139 Sleep Disturbances In Chronic Stroke Patients: Emotional And Cognitive Impact. Sleep 2020;43:A433–4.
Available:https://doi.org/10.1093/sleep/zsaa056.1133.
27. J PC, Marimuthu T, C K, Devadoss P, Kumar SM. Prevalence and measurement of anterior loop of the mandibular canal using CBCT: A cross sectional study. Clin Implant Dent Relat Res. 2018;20:531–4.
28. Wahab PUA, Abdul Wahab PU, Madhulaxmi M, Senthilnathan P, Muthusekhar MR, Vohra Y, et al. Scalpel versus diathermy in wound healing after mucosal incisions: A split-mouth study. Journal of Oral and Maxillofacial Surgery 2018;76:1160–4.
Available:https://doi.org/10.1016/j.joms.2017.12.020.
29. Zakharov VV, Lokshina AB, Yakhno NN. Cognitive impairment in non-demented elderly persons with mild emotional disturbances. Journal of the Neurological Sciences 2009;283:269.
Available:https://doi.org/10.1016/j.jns.2009.02.117.
30. Sridharan G, Ramani P, Patankar S, Vijayaraghavan R. Evaluation of salivary metabolomics in oral leukoplakia and oral squamous cell carcinoma. Journal of Oral Pathology & Medicine. 2019;48:299–306.
Available:https://doi.org/10.1111/jop.12835
31. Mudigonda SK, Murugan S, Velavan K, Thulasiraman S, Krishna Kumar Raja V. Non-suturing microvascular anastomosis in maxillofacial reconstruction- a comparative study. Journal of Cranio-Maxillofacial Surgery 2020;48:599–606.
Available:https://doi.org/10.1016/j.jcms.2020.04.005.
32. Website n.d. R H, Hannah R, Ramani P, Ramanathan A, Jancy MR, Gheena S, et al. CYP2 C9 polymorphism among patients with oral squamous cell carcinoma and its role in altering the metabolism of benzo[a]pyrene [Internet]. Vol. 130, Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology. 2020;306–12.
Available:http://dx.doi.org/10.1016/j.oooo.2020.06.021.
33. Abreu W, Abreu M. Current Perspectives on Frailty in the Elderly, Evaluation Tools and Care Pathways. Frailty in the Elderly - Physical, Cognitive and Emotional Domains [Working Title] 2020.
Available:https://doi.org/10.5772/intechopen.92281.
34. Igumnov SA. Clinical and expert assessment of emotional state and cognitive functions of patients with cerebrovascular diseases. European Psychiatry. 2007;22:S300.
Available:https://doi.org/10.1016/j.eurpsy.2007.01.1018.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle4.com/review-history/74443