ISSUES AND CHALLENGES IN E-PHARMACY

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ABSTRACT
The radical development of internet services in recent years has fostered the trend of buying various products online. Due to the launch of numerous online pharmacies in India, the number of medical purchases made online is also steadily rising. These online pharmacies give customers numerous benefits, including pharmaceutical delivery to their homes, significant savings, and tempting promotions. Despite these advantages for the customers, there are growing safety concerns about these online purchases. For instance, the quality of the medications, the illogical dispensing, and the absence of oversight are the main issues raised by these online pharmacies, which need to be managed through appropriate laws.

INTRODUCTION
A pharmacy that sells pharmaceutical products online and ships them to customers is known as an "e-pharmacy." Everything is simple and practical thanks to the internet. They are extremely popular, and more and more people are employing them instead of walking to nearby pharmacy stores. E-pharmacy is undoubtedly more convenient for consumers, but one should also consider the rules for online drug sales because they have a direct impact on consumers' health. The pharmaceutical industry in India is rapidly shifting from the traditional physical store to the online medium. E-pharmacies have several advantages over traditional pharmacies, including the ability to save customers time, money, and inconvenience. The Indian online pharmacy sector, however, faces certain challenges, the primary one being non-adherence of pharmaceutical companies to the prescribed regulations. The online pharmacy industry in India is still in a developing phase and has not reached its full capacity. It is crucial to understand the causes that have contributed to this paradigm shift in customer preferences because many large offline pharmaceutical companies have already shifted to a digital platform for their operations. The availability of high-speed internet has made smart phones a platform from which consumers can buy anything, anytime, at a discounted price. Such a type of flexibility is one of the main reasons why people are opting for e-commerce today. The best current business model may be seen in online commerce. This trend can also be seen in the increasing demand for pharmaceutical products through e-platforms, along with the benefits provided by e-pharmacy. The dangers involved must not be overlooked.

OBJECTIVES OF THE STUDY
- To understand the dangers of ordering prescription drugs online.
- To understand the existing regulatory framework for e-pharmacy.
- To derive significant conclusions from the study regarding e-pharmacy

REVIEW OF LITERATURE
1) **Prashanti, S. Sravani, and Saleha Noorie** conducted a study titled "A Review on Online Pharmacy" (2017), they highlighted the increase in sales of pharmaceuticals through the online mode. They also suggested that, while it is simple to buy medicines online, doing so carries the risk of self-medication. They attempted to provide information about the advantages and disadvantages of using an online pharmacy versus traditional store purchases, and they advised buyers to always use a prescription when purchasing online medicines.

2) **Deepika, Ravinder Singh, Thakur Gurjeet Singh, Manjinder Singh, Balraj Saini, Rupinder Kaur, Sandeep Arora, and Rajinder Singh** aim to provide insights into the increase in use of online purchasing, including pharmaceutical products, in their research paper titled "Status of E-Pharmacies in India: A Review" (2020). They have highlighted the benefits that are attracting customers to e-pharmacy purchases and also expressed their need regarding safety of buyers also suggested about the finalisation of proposed regulations in India and changes in current situation **Parag A Inamdar,** in his study titled "A STUDY OF CONSUMER PERCEPTION TOWARDS ONLINE PHARMACY" (2021), researcher tried t provide about the growth of e-pharmacy industries in lockdown, also he has presented benefits and drawback of e-pharmacy in his paper and suggested about need of buyer to make more responsible decision while buying pharmaceutical products.
3) **Anand Navin Baid and Arijit Ghosh) published a paper titled "**FACTORS AFFECTING CONSUMER SHIFT TOWARDS E-PHARMACIES" (2021)**.**In this paper, they have tried to investigate the elements that influence customers' decisions to buy prescription medications and other medical purchases online. They also suggested that customers buying routine medicine online may be provided with customer loyalty incentives like loyalty points or free delivery. **Ms. Amruta Pawar** has published a paper titled "Role of Digitalization in the Pharmaceutical Sector" (2020). The researcher in this paper stated about how pharmaceutical businesses, which are highly regulated, have entered the online mode and need to be strictly regulated. She further stated that the various benefits of online pharmacies will change the traditional one-way relationship into a two-way relationship between medical practitioners and patients through digitalization.
   Shruti Srivastava, Dr. Arun Bhadauria, Dr. Sunil Dhaneshwar,Dr.Suneel Gupta In their research titled "E COMMERCE IN PHARMACEUTICAL BUSINESS India: Prospects and Challenges" (2018), they have highlighted the benefits of e-commerce, which have led to a boom in e-pharmacy. In this paper, they have tried to make predictions about the current environment and its outcomes. They further stated that the availability of medicines at lower prices in e-pharmacy is possible due to the elimination of middlemen. They suggested customers should try to obtain more information before making health care decisions through websites.

Issues & Challenges of e-pharmacy:

Some of the general issues observed in case of buying medicine from e-pharmacy

Patients are unable to consult with a knowledgeable pharmacist prior to purchasing medicine if they have any questions, whereas this is always possible when purchasing medicine in-store. There are also possibilities of increased self-medication, which may increase the risk of buying the wrong medicines. The buyer may also have confusion while buying as the same brand may have different medicines. Some medicines need to be stored at a particular temperature to maintain their efficacy, but during transportation it may not be possible to maintain the required temperature. While purchasing, the customer may also get incorrect medicines as they may be purchased without prescriptions, and there are also more possibilities of buying unnecessary antibiotics due to their easy availability, which may be harmful with continued consumption.

Present Regulatory framework for e-pharmacy:

This are some of the regulatory frame work in regards to operations of e-pharmacy companies in India.

- Drugs and Cosmetics Act, 1940
- Drugs and Cosmetics Rules, 1945
- The Pharmacy Act, 1948
- Drugs and Magic Remedies (Objectionable Advertisement) Act, 1954 and Rules, 1955
- Indian Medical Council Act, 1956 and code of ethics regulations, 2002
- Narcotic Drugs and Psychotropic Substances Act, 1985
- Information Technology Act, 2000

- Indian Medical Council Act, 1956 and code of ethics regulations, 2002
- Pharmacy Practise Regulations, 2015

Year	Current situation with India's e-pharmacies Regulations
Dec-15	Drug Controller General of India notifies that all e-pharmacies must comply with drugs and cosmetic act 1945.
Sep-16	Office of the Drug Controller General of India recognizes the inadequacy of existing legal regime for e-pharmacy.
Nov-16	Launch of self-regulation code of conduct for the E-pharmacy sector to ensure the highest professional standards and consumer safety
Aug-17	Government of India formulates draft pharmaceutical policy 2017 which encourages E-pharmacies in the interest of consumers.
Sep-18	Union ministry of health mandates e-pharmacies to register with CDSCO to strong retaliation from AIOCD
Dec-19	Delhi High court bans online sale of medicines across India, however Madras High court places only a temporary ban and orders the government to issue regulation.
Oct-19	Government fails to introduce e-pharmacy framework within a period of 100-day deadline due to pressure from AIOCD

E- Pharmacy draft rule, 28th Aug, 2018

The department-related Parliamentary Standing Committee on Commerce Ministry has recommended to the central government that the draught e-pharmacy rules published nearly four years ago by the Union Health Ministry be finalised and implemented as soon as possible. The committee is concerned about the excessive delay in finalising the rules and regulations for the online pharmacy sector to control the online sale of medicines in the country. The Parliamentary Committee recommended that the Government Issue a thorough set of guidelines for e-pharmacy or e-health platforms in its report on "the promotion and regulation of e-commerce in India," which was given to the Chairman of Rajya Sabha. The Parliamentary Committee, led by Member of Parliament V Vijayasai Reddy, expressed outrage that the draught e-pharmacy rules have yet to be finalized, despite the fact that a high-powered committee was formed for the purpose years ago. They reiterated that an excessive delay in adopting a definitive regulatory framework will result in uncertainty, which is not favourable for the rapidly developing digital markets. While acknowledging the growth of e-commerce in the pharmacy and healthcare industries, the Committee expressed concern over the potential abuse of such channels for the distribution of questionable or unethical drugs as well as outdated, substituted, or fake medications in the absence of regulations. Given the potential harm it could do to end-user health in the event of misuse, strict regulation of the e-health and e-pharmacy businesses is crucial. It is obvious that there is huge potential for e-commerce in the pharmaceutical sector, and if online pharmacies in India are properly regulated, this might be advantageous for many parties. However, there is an urgent need to pass new legislation in India because there are now no regulations that are special to online pharmacies in this nation.

Through the use of a well-structured questionnaire, a survey is conducted on the issues and challenges of e-pharmacy through a Google Form, to which 103 respondents have responded and tried to give their views about the risk of purchasing from e-pharmacy and their satisfaction with e-pharmacy purchases.

Sr. No.	Question	Yes%	No%
1	Have you heard about E-pharmacy?	91.30%	8.70%
2	Have you ever purchased medicine online?	64.10%	35.90%

3	Do you think purchasing medicine online is risky?	67.00%	33.00%
4	Do you think uploading prescription online will be risky for a patient?	62.10%	37.90%
5	Do you feel that there are more chances of self-medication in e-pharmacy purchase?	81.60%	18.40%
6	Do you feel e-pharmacy is well regulated in India?	80.60%	19.40%
7	Do you think there is scope of e-pharmacy in India?	92.30%	6.80%
8	Are you satisfied buying medicine online?	73.80%	26.20%
9	If given a chance, what do you think you would buy medicine from?	Offline	Online
		56.30%	43.70%

Findings:

1) The above survey found the highest level of awareness of e-pharmacy, with 91.30% of respondents agreeing that they were aware of e-pharmacy.
2) More than 60% of the respondents have purchased from an e-pharmacy, indicating a preference for e-pharmacies.
3) As per the response given, it is found that 67% of respondents have found purchasing from an e-pharmacy risky.
4) According to respondents, around 62.10% feel that uploading a prescription online will be risky for a patient.
5) Most of the respondents feel that e-pharmacy encourages self-medication purchase among buyers, which is shown by their 81.60% agreement with it.
6) Around 80.60% of respondents feel that e-pharmacy is well regulated in India.
7) The majority of respondents agreed that there is a lot of potential for e-pharmacy in India, with 90% agreeing.
8) Buyers from e-pharmacy have demonstrated that they are pleased with their purchases, as evidenced by the fact that more than 70% of them agreed to this.
9) When given the option of purchasing offline or online, 56.30 percent of buyers indicated a preference for offline purchase.

Suggestions:

(1) It should be made compulsory for online pharmacy service providers to hire qualified pharmacists to handle the work of dispensing the medicines as per customer orders.
(2) To prevent the misuse of scheduled H and X drugs, proper restrictions should be made, and regular monitoring of e-pharmacies should be undertaken to check that they are correctly handling and dealing with this category of drugs.
(3) It is necessary to encourage the use of electronic prescriptions, and the use of scanned or photocopied prescriptions should be reduced, which will help prevent the submission of fraudulent prescriptions.
(4) Customers' data privacy should be ensured, and payments should be well secured, for which the relevant authority should develop adequate infrastructure.
(5) Government should create awareness about dangers of self-medication and try to spread Knowledge about do and don’ts to be followed while buying online medicines.
(6) There is a need for more advertising by e-pharmacy retailers to create more confidence among buyers about safety, security, and the benefits of e-pharmacy so more people will be willing to prefer their purchases from e-pharmacy.

(7) It is necessary to implement the E-Pharmacy draught rule on an urgent basis for the benefit of all stakeholder groups.

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POST IMPACT OF COVID – 19 ON PHARMACEUTICALS INDUSTRY IN DIGITAL MARKETING IN INDIA

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ABSTRACT:
The current COVID-19 pandemic has affected consumer behaviour in every aspect, including their spending, investments, cash reserves as well as their wellness and welfare. As a result, it is important to understand the factors influencing these changes.
The Corona virus outbreak, which started at the beginning of December 2019, had an impact on the human race's overall social, economic, and psychological order. People began to feel unease, mistrust, and fear as a result of virus's increasing toll on fatalities. The government enacted laws requiring social restrictions, and geographic quarantine in order to stop the spread of Covid-19. These restrictions compel populace to embrace new lifestyles, especially those that involve online shopping. The aim of study is to investigate how consumers' decisions to shop online are influenced by their views of utility, usability, and risk.
The provision of pharmacy services, in particular pharmacy movement of care options, is not immune to change, which has its own set of considerations and challenges. Given their significant influence on the situation, pharmacy services were greatly needed.

Introduction:

The new virus outbreak, also known as the coronavirus, was first noticed in Wuhan, China, in December 2019. The specific origins of the coronavirus, also known as COVID-19 (SARS-CoV-2), is unknown but is thought to be a zoonotic disease. On March 11, 2020, WHO proclaimed COVID-19 a global pandemic? A month later, on January 30, 2020, WHO designated COVID-19 as a Public Health Emergency of International Concern (WHO, 2020a; WHO, 2020b). Since the new coronavirus spreads from person to person, several nations have chosen a variety of strategies to break the chain. In this situation, the terms "social distance," "social isolation," "lockdown," "curfew," "quarantine," and "self-quarantine" became popular.
On March 24, 2020, the Indian Government imposed a 21-day nationwide lockdown to try to stop the spread of this dangerous illness. This restriction on movement affected the entire Indian population (Government of India, 2020). Further, the Indian government repeatedly extended the ongoing nationwide lockdown with stringent social segregation restrictions by assessing the present scenario as well as the demands of various state governments. The GOI (Government of India) implemented a number of restrictions during the first two lockdowns (from 24 March 2020 to 3 May 2020) to slow the spread of the coronavirus.
These restrictions include travel restrictions, work-from-home and stay-at-home orders, restrictions on any kind of public gatherings, followed by the closure of all social organizations, public transport, educational institutions, entertainment and amusement places, sealed borders not only with other countries but also between states, also identify and seal coronavirus hotspots within states. To ensure citizens' basic needs are met, only "essential goods" have been kept out of the nationwide

Lockdown. In such a situation, little is known about how consumer households manage the supply of essential goods. The aim of the current study is to fill this gap by using primary data collected directly from Indian consumer households to analyse the impact of the COVID-19 outbreak on their purchase of pharmaceutical products.

The recent growth of e-commerce in India has prompted the customer to purchase drugs through online websites. The online pharmacy is one of the items that will generate tremendous interest in the coming days. An online pharmacy is an online retailer of medically recommended drugs. Selling medicines via an online platform is nothing new. It has blossomed quite recently in this internet age. In the late 1980s, pharmacies in the United States began selling doctor-recommended drugs by mail. This mail order business then grew into the first online pharmacy, soma.com, in January 1999. Soon after, the online pharmacy was shipped to the UK. Assessments showed that by mid-2004 there were over 1,000 drug outlets. Pharmacy has remained the largest source of medicines for the Indian people so far. The far-flung territories of the nation also profit from retail drug stores, so to speak. Perhaps, since they are unfamiliar with the idea called online drugstore or the absence of basic prerequisites such as the Internet, a huge part of the Indian population does not buy medicines online. Despite this, things are currently evolving. With the rise of computer literacy, the availability of the Internet and the popularization of smartphones. Although the pharmacy shop was allowed to open during the lockdown situation, many people ordered their medicines and other pharmaceuticals from an online pharmacy. Good health is one of the basic and fundamental requirements for being human. Access to good healthcare facilities for its citizens is vital for the development of any nation. However, as the fastest growing nation in the world in terms of population, even for the government, it is difficult to ensure optimal health care at the public level, especially for people living in rural neighbourhoods. In such a scenario, the role of self-medication becomes very important in ensuring people's good health.

OBJECTIVE OF THE STUDY

Within the framework of the discussion above, this study examines the impact of Post Coronavirus Disease (COVID-19) on Indian consumers' essential pharmacy product purchase behaviour. Based on available literature and lenses, the researchers also examined consumers' buying behaviour through primary data.

- To understand the underlying factors which influence people to buy pharmaceutical products online.
- To study risks related with buying pharmaceutical products online.
- To study the changing pattern in consumer purchase behaviour towards buying pharmaceutical products from the e-commerce companies, during pandemic.
- To understand the buying of online pharmaceuticalproducts, post covid 19 pandemics
- To draw meaningful inferences from the study and give some suggestions to the ecommerce companies selling pharmaceutical products.

STATEMENT OF THE PROBLEM: The majority of people purchase their medicine from a medical store, which requires them to physically visit the store. Because of the customer's reliance on the medical store, retailers profit from it. They buyer is made to pay more than the true cost of the product. Customers will receive offers from medical websites that they would not normally receive from retailers. The study will help to understand the changes in buying of pharmacy products taken after post covid 19.

LIMITATIONS OF THE STUDY

- Study is limited to sample size of 115 respondents.
- Limited to online e-commerce industry.
- Information provided by the respondent may be biased.

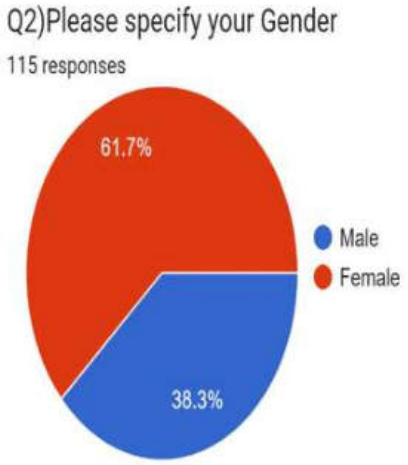
RESEARCH METHODOLOGY

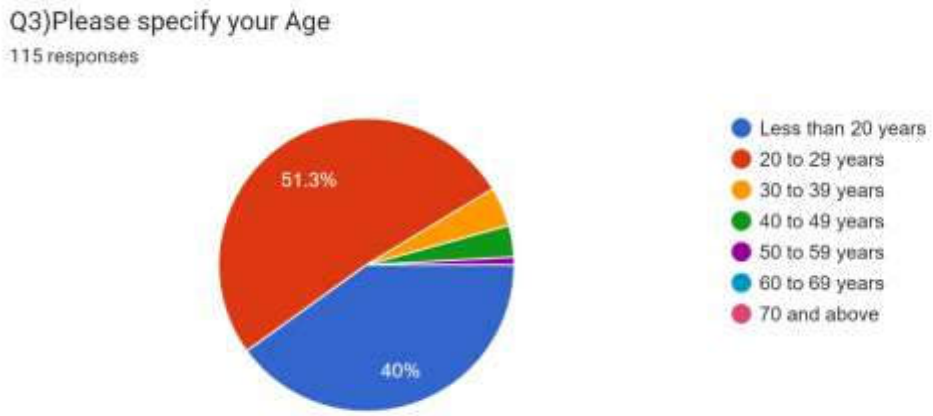
The research methodology used here is descriptive research. A sample size of 115 is selected randomly from the available population, and well-structured questionnairesare framed using google form according to the objectives of study.

Secondary research was conducted to review various research study related to the impact of E-Pharmacies pre, during and post COVID-19 pandemic. Secondary sources i.e., published articles, journals, newspapers, reports, books and website is used to collect secondary information.

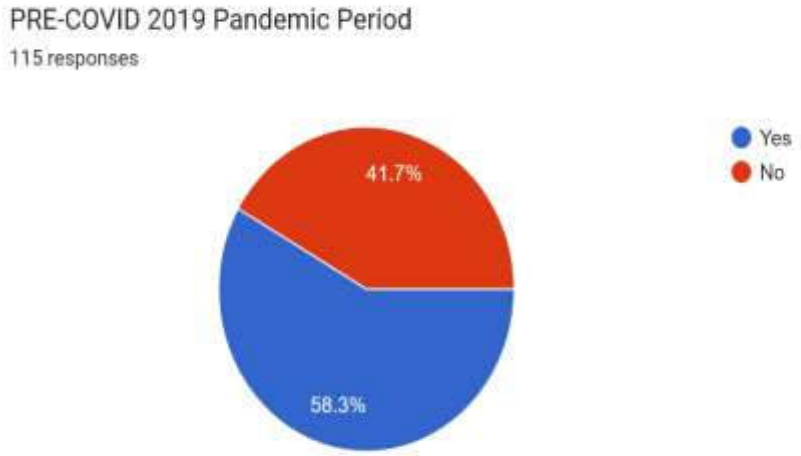
Review of Literature:

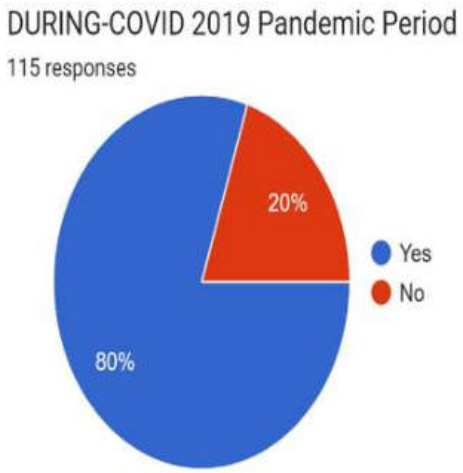
1) In Research paper by **SUMIT GOPALDAS DHAMANIA STUDY OF FACTORS AFFECTING ONLINE PURCHASE BEHAVIOUR WITH REFERENCE TO SURAT CITY IN INDIA THROUGH PRIMARY RESEARCH. (2022)** gives the insights about which are the factors which is affecting the online buying decisions and elaborates the various benefits which buyer gets through e-commerce purchasing like discounts and other various offers and benefits but as per the study the most common factor found was less price charged on online platform than compared to offline stores
2) **DR. RUBAID ASHFAQ (2022) THE DIGITAL AGE INVADES THE TRADITIONAL BUSINESS** in his research paper tries to give information on advantages of e-commerce and explains about the steps which the traditional business needs to take and get on to the digital world.
3) **SANDHYA BHATT (2022) ONLINE SHOPPING AND DECISION MAKING** in her research paper stated that e-commerce has a great future all over the globe as nowadays internet facility is available at lower price, but also stated some concerned issues which companies need to consider like security issues, quality issues, delay in delivery, differences in product shown on websites and actual delivered is found with differences, so it is necessary that sellers take care of this issues which is necessary for getting customers loyalty.
4) **MS. TARANJIT KAUR KAINTH DR. PUNEET BHUSHAN (2022) ONLINE BUSINESS IN INDIA: OPPORTUNITIES AND CHALLENGES IN LIGHT OF COVID-19** in this research paper it explains how online business is convenient during outbreak of coronavirus as it provides safety and convenience to buyers also with affordable smartphones the number of internet users have increased. The shift in consumer buying behaviour will now stay for longer period so starting online store will not only satisfy existing customers need but also future prospective customers. Government of India has also taken the initiative to make our country business go for digitalization, FDI will lead our country surpass US and become second largest ecommerce in the world by 2034, government of India is giving more emphasis on start-up, Udaan and digital India targeting to make a trillion-dollar online economy by 2025.
5) **BM Khalid & Pulikanti Priyanka Rani (2020) Impact of COVID-19 on pharmaceutical industry to adapt digital marketing** in their research work suggested that the companies need to train their employees and develop their digital skills so that the company can be ready to face challenges like covid-19, also company needs to keep some part of their budget on creating digital marketing campaign especially small pharmaceutical companies.

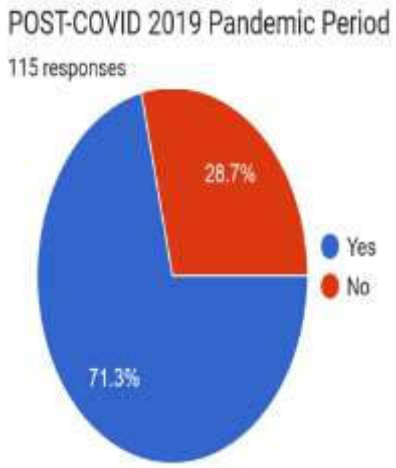




Q5) Please specify about your online buying from E-Pharmacy

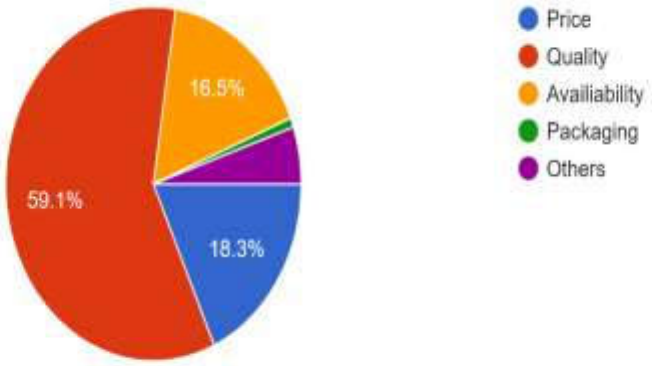

PRE-COVID 2019 Pandemic Period
115 responses
41.7%
58.3%
Yes
No


DURING-COVID 2019 Pandemic Period
115 responses
20%
80%
Yes
No


POST-COVID 2019 Pandemic Period
115 responses
28.7%
71.3%
Yes
No

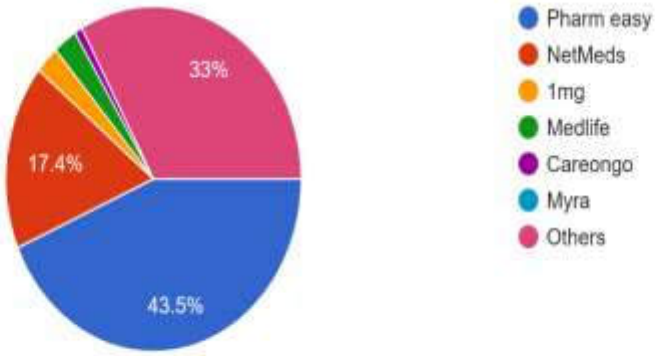
Q6) What are the Factors influencing you to suggest particular brand

115 responses



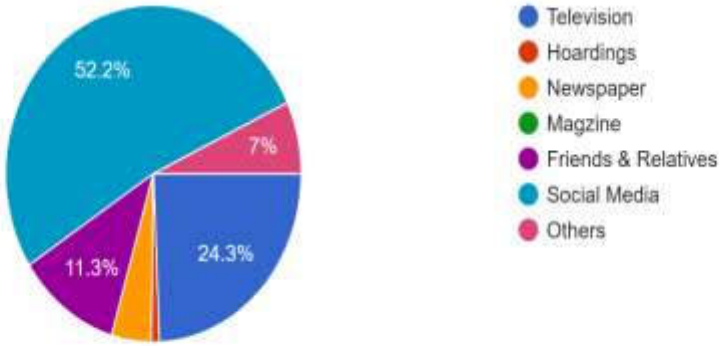
Q7)From which E-platform have you purchased pharmaceutical products post covid pandemic

115 responses



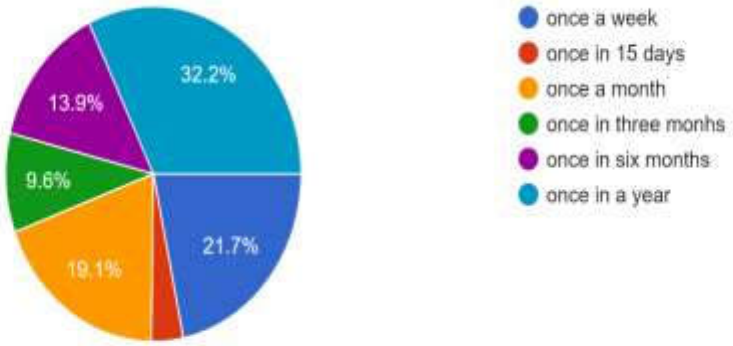
Q8) Where did you get to know about this E-Platforms

115 responses



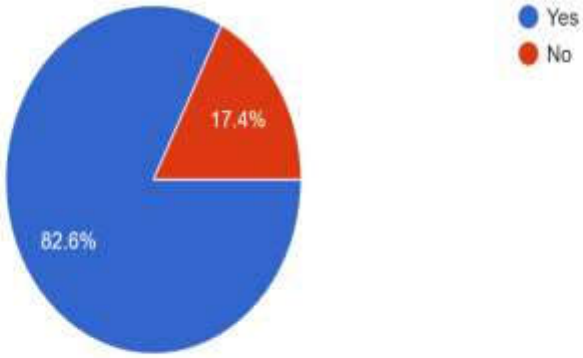
Q9) What is your frequency of buying online medicine

115 responses



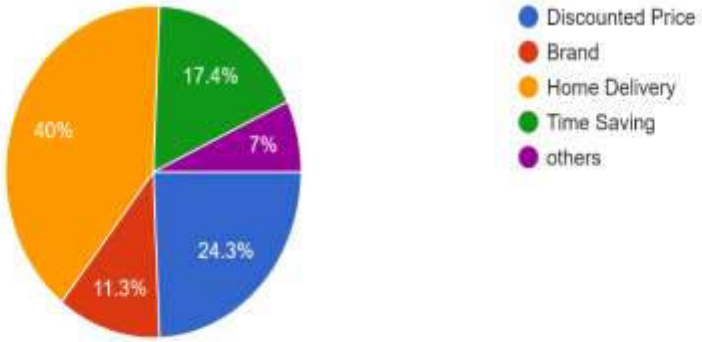
Q10) Does E-Pharmacy provide any seasonal Discount to their customers

115 responses

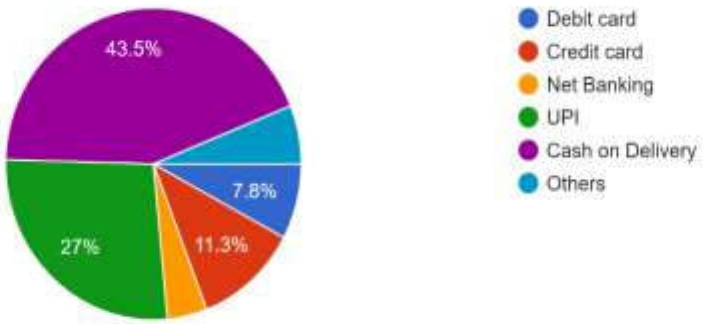


Q11) What factor attracts in online pharmacy purchasing

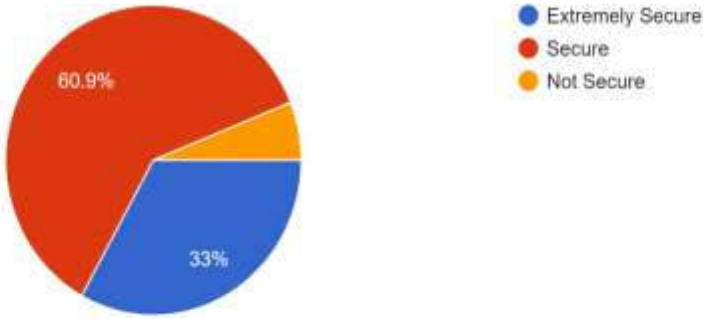
115 responses



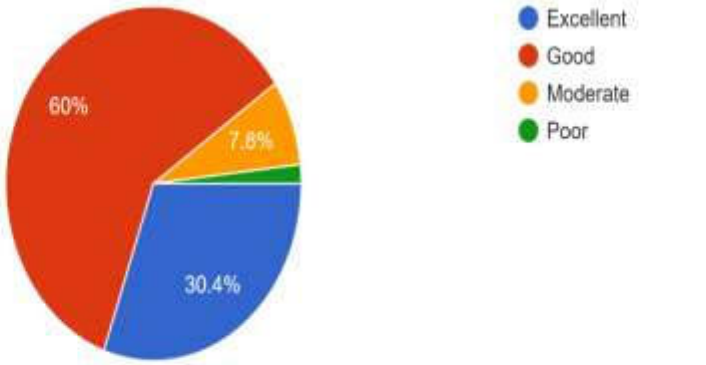
Q12) Which mode of payment is preferred in buying from E-Pharmacy
115 responses

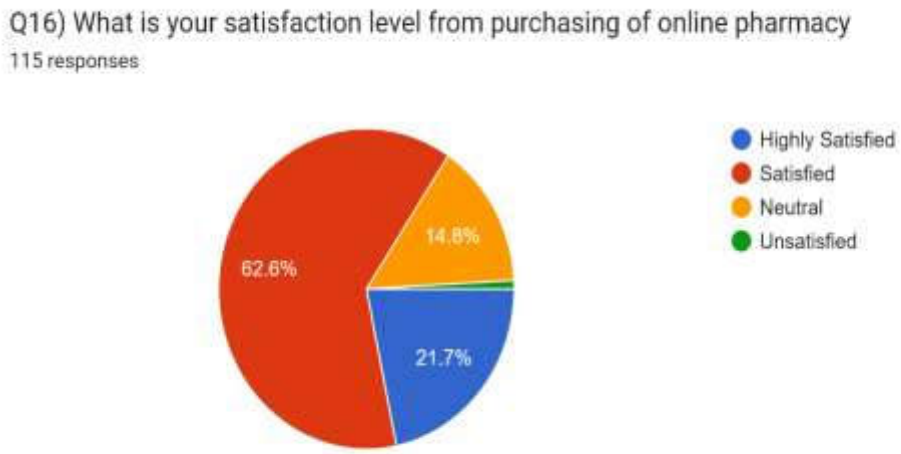


Q13) Do you find safety and security while purchasing in E-Pharmacy
115 responses



Q14) What is your opinion about online pharmacy websites
115 responses





FINDINGS & SUGGESTION:

Following are the findings of the study

- The online buying of the medicines was maximum during the Covid period
- The customers for medicines always believed in quality of the medicines and maximum qualitative medicines were purchased. They did not even think of money
- Most of the customers ordered medicines online through PharmEasy and also, they were influenced by the advertisements in the television
- The main factor which influenced the buyers was the discount factor which means PharmEasy always allowed discount on the price of the medicine and most likely part is the home delivery of the medicines
- The customers are satisfied with the online purchase of medicine through PharmEasy and they are very confident that purchase through gateway is very much secured

Suggestions:

- The validity of the medicine purchased should be genuine
- There is lots of competition in the market which may lead to unfair means
- The advertisements and websites may mislead the customers
- The government should have a control on the transactions of such organisations because cash transactions also take place.
- The government should also promote such organisation because there are people those who will not be able to go out and purchase and there by home delivery will be feasible

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ANTIBACTERIAL ACTIVITY OF Cd-DOPED ZnO NANOPARTICLES AGAINST GRAM- POSITIVE AND GRAM-NEGATIVE BACTERIA

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Abstract:
The antimicrobial activity of Cd doped ZnO nanoparticles against gram-positiveand gram-negative bacteria are discuss in this paper. The effects of particle size and concentration of Cd doped ZnO nanoparticles for antibacterial activity is studied using bacteriological test such as disc and well diffusion agar methods. Cd doped ZnO nanoparticle for antimicrobial activities is prepared via Sol-gel process. The crystalline structure, morphology and size of nanoparticles were characterized by transmission electron microscopy (TEM), X-ray diffraction spectra (XRD). Echerichia coli (E. coli), salmonella thiphy, pseudomonas fluorescence, proteus sp. Kelbsielia phemonia and Candida albicans were used as test microorganisms.

Key-words: *Nanoparticle, Cd doped ZnO, Gram-positive and Gram-negative, Transmission Electron Microscopy (TEM), X-ray Diffraction Spectra (XRD).*

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INTRODUCTION:

In recent years, ZnO has received increasing attention, owing to its unique optical, electrical, and chemical properties [1]. Among these properties, degradation of pollutants catalyzed by ZnO has been studied widely so far [2–4]. Furthermore, ZnO appears to strongly resist microorganisms [5, 6]. It is the most widely used nanomaterial as UV absorbers in textiles [7], hybrid solar cells [8], varistor fabrication [9], light-emitting diodes (LEDs) [10], wastewater treatment applications [11], and emission control [12]. ZnO-NPs has excellent biomedical properties to be effectively utilized as diagnosis, antimicrobial agent, bio-imaging, drug delivery, and in cancer treatment, etc. [13–15]. Compared to normal cells, ZnO-NPs exhibit a favorable capacity to destroy human cancer cells [16]. Most organic antibacterial agents are sensitive to temperature or pressure [17], while inorganic materials such as metal and metal oxide [18] have received more recognition over the past decade due to superior durability, less toxicity, greater selehgctivity, and heat resistance [19, 20]. Moreover, new approaches are needed for biomedical applications of ZnO-NPs to actively perform in antimicrobial and antibacterial activities [21, 22]. For this to happen, the properties and functionality of ZnO-NPs were needed to improve by incorporating other dopants materials that were some transition metal ions, e.g., Co2+ [23], Mn2+ [24], Ti4+ [25], La3+ [26], and Fe3+ [27], have been doped into ZnO. At present, most research focused on the influence of transition metal ions on the photocatalytic efficiency rather than the antimicrobial activity [28]. Our group has first prepared Cd-doped ZnO nanopowders by a sol-gel method.In this work, we performed the antibacterial study of Cd-doped ZnO nanoparticles on several bacteria of Gram-positive Candida albicans (fungi) and Gram-negative Echerichia coli (E.coli), salmonella thiphy, pseudomonas fluorescence, proteus sp. Kelbsielia phemonia and Candida albicans using a standard microbial method. The Cd-doped ZnO nanoparticles concentration effect on the MIC of various bacteria has been evaluated.

MATERIAL AND METHOD:

All chemicals and solvents were analytical grade and purchased from commercial sources.

Synthesis of Cd doped ZnO nanoparticles:

The Cd doped ZnO nanoparticles prepared by using sol-gel citrate method. The 2% Cadmium nitrates is added in zinc nitrate magnetically stirred with citric acid and ethanol at 80°C for 3 hrs to get homogeneous and transferring solution. The solution was further heated at about 130°C for 12 hrs in pressure vessel to form the gel precursor. The prepared product was subjected to 3hrs heat treatment at 350°C in muffle furnace and then milled to a fine powder. The dried powder then calcinated in range of 350° - 650°C in order to improve the crystalline structure of material.

Screening of antibacterial activity of Cadmium doped ZnO:

For screening of antibacterial activity of Cd-doped ZnO-NPs, all bacterial strains are sub-cultured from their pure cultures in Mueller–Hinton in Muller-Hinton Media solid agar Petri dish. The disc is 15 cm in diameter, sterilized by autoclaving for 15 min at 121 ºC, and was placed on bacterial cultured agar plate which were then incubated for 24 hrs at 37 ºC. The turbidity of bacterial culture is adjusted to freshly prepared 0.5 McFarland turbidity standard [29] equivalents to (1.5×108 CFU/mL) bacteria**.** Inhibition zone was monitored After incubation the presence of bacterial growth around the samples were observed and their diameter in millimeters was measured briefly.

Antibiotic resistance pattern of candida albicans:

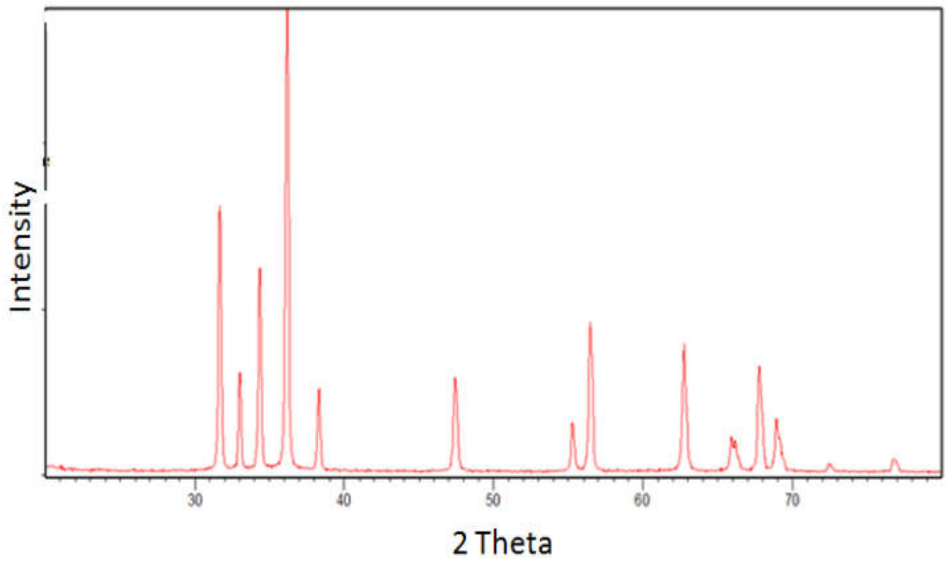
The Muller-Hinton Media used to culture the fungal and Fluconazol, Nystatin, Amphotericin B, Terbinafine HCL antibiotics were used to study for their resistance pattern according toDisk Diffusion Technique.

Anticandidal effect of the cd doped ZnO Nps in solid Media:

The fungal were cultured in Muller-Hinton Medium and Antibiogram disks of 0.01, 0.5, 1.0 and 1.5 % of cd doped ZnONps were prepared according to disk diffusion Technique. The disks were placed over the media and incubated at 37°C for 24 hr.

RESULT AND DISCUSSION:

X-Ray Diffraction: X-Ray diffraction pattern shows in Fig 1. (X-pert, PRO XRD System, Punjab) reveals crystalline nature of sample. The average crystalline size was 41nm obtained from FWHM of peak corresponding to 2Θ calculated by Debye –Scherer formula which is given by, $L = k \lambda / \beta \cos\Theta$ Where, L is the average size of crystal, K= 0.9 particle diameter, the λ (0.154 A°) is wavelength of X-Ray, β is full width at half maximum (FWHM) of the diffraction peak and 2Θ is the diffraction angle of diffraction.



Transmission Electron Microscope analysis: Transmission Electron Microscope (TEM), analysis was done using **Philips (technai 10)**. Thin films of sample were prepared on a carbon coated copper grid by just dropping a very small amount of sample on the grid, extra solution was removed using a blotting paper and then the film on the TEM grid were allowed to dry by putting it under incubator. In this technique, whereby a beam of electronics is transmitted through an Ultra-thin specimen, interacting with the specimen as it passes through. An image is formed from the interaction of and focused the electrons transmitted through the specimen. The image is magnified on to an imaging device. Figure-2 shows TEM images of Cd doped ZnO nanoparticles. .TEM observations revealed the formation of hexagonal shape cd doped zno nanoparticles of average particle size is 41.4, 59.0, 61 nm respectively. The results of TEM were supported by X-ray diffraction study.

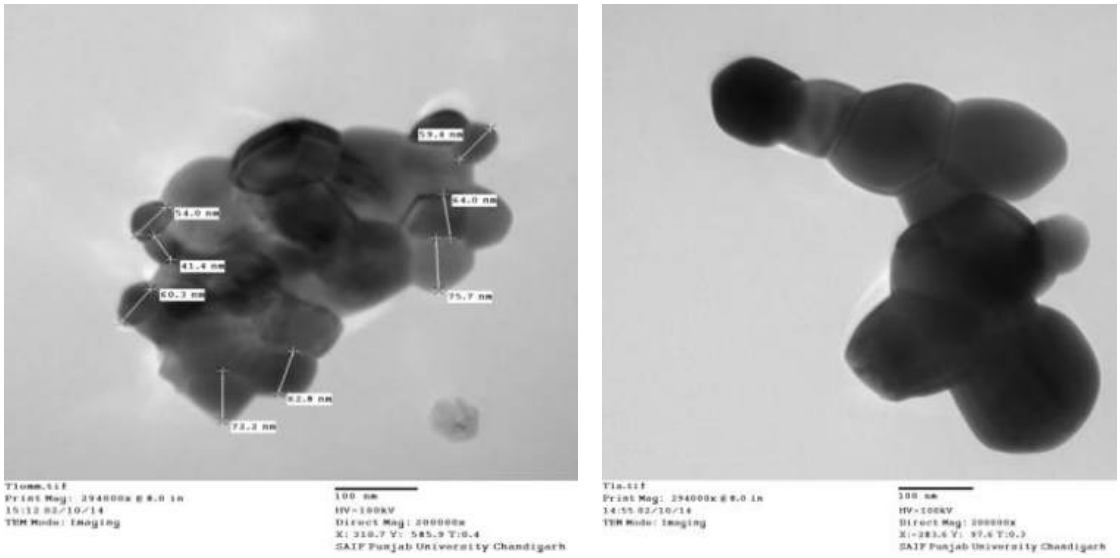
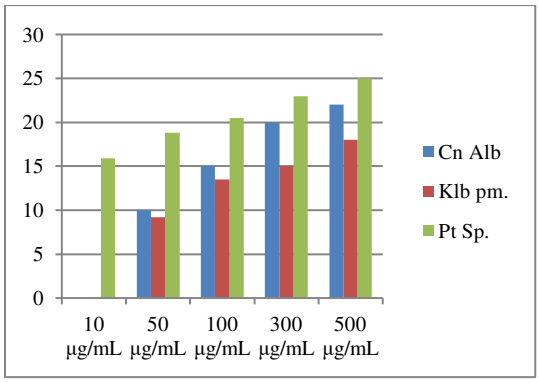


Fig 2: TEM pattern for Cd doped ZnO Calcinated at 650^0

Antifungal properties:

The antifungal activity of Cd doped ZnO *nanoparticles was* tested by the disc and well diffusion agar methods. The presence of an inhibition zone clearly indicated the antibacterial effect of ZnO nanoparticles. It has been seen in this study that by increasing the concentration of Cd doped ZnO nanoparticles in wells and discs, the growth inhibition has also been increased. The size of inhibition zone was different according to the type of Gram-positive and Gram-negative bacteria. The size and the concentrations of Cd doped ZnO nanoparticle was resistant to all of the antibiotics used in this study. Inhibition zone measurements show that by increasing the concentration of Cd doped ZnO the inhibition zone also increased. (6.9, 13.5, 18, 20.1, 22mm) respectively (Fig: 3). It has been known that Nanomaterials exhibit strong inhibiting effects towards a broadened spectrum of gram positive and gram-negative bacterial strain. According to several studies, it's believed that the metal oxides carry the positive charge while the microorganisms carry negative charges, this causes electromagnetic attraction between microorganisms and the metal oxides which lead to oxidization and finally death of microorganism's nanomaterials also could deactivate the cellular enzymes and DNA by coordinating to electron-donating groups. They cause pits in bacterial cell walls, leading to increased permeability and cell death. Finally, we could with this novel method, find a new way for inhibition of bacterial infections by use of Cd doped ZnO nanoparticles.



	Concentration of ZnO				
	10 µg/mL	50 µg/mL	100 µg/mL	300 µg/mL	500 µg/mL
candida Albicans	0	10	15	20	22
Kelbsielia phemonia	0	9.2	14	15	18
Proteus Sp.	16	19	21	23	25

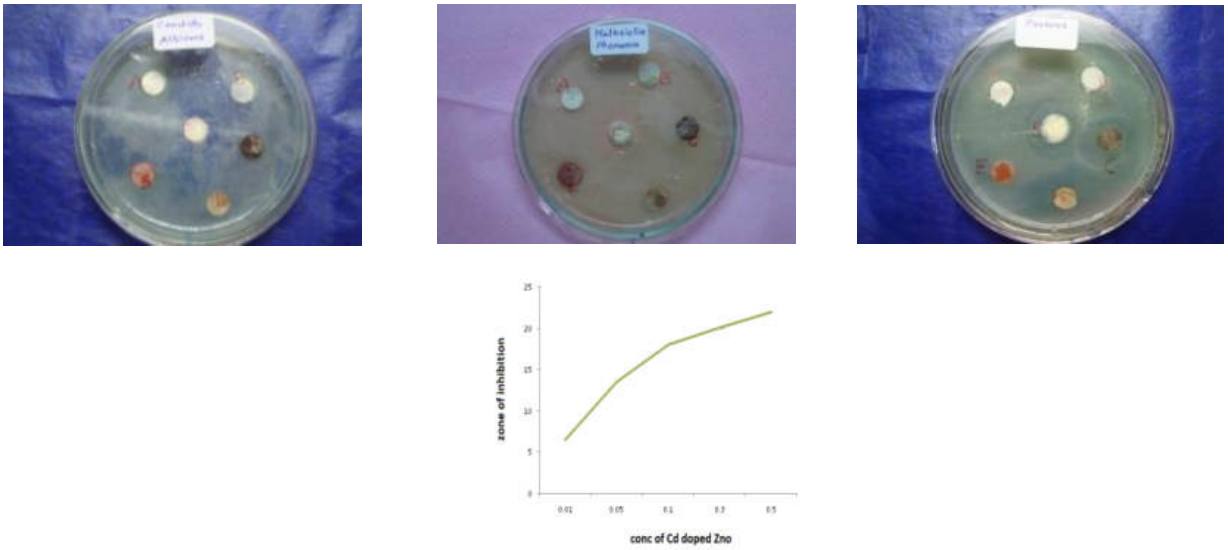
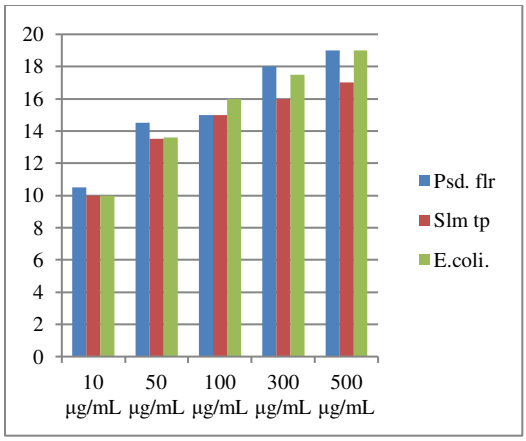


Fig 3: Antifungal activity of Cd doped ZnO against Candida albicans, Kelbsiela Phemonia and Proteus Sp.



	Concentration of ZnO				
	10 µg/mL	50 µg/mL	100 µg/mL	300 µg/mL	500 µg/mL
Pseudomonas. Furoscence	11	15	15	18	19
Salmonella thiphy	10	14	15	16	17
E. Coli.	10	14	16	18	19

Fig4: Antifungal activity of Cd doped ZnO against Pseudomonas fluroscence, Salmonella phemonia and E. Coli.

CONCLUSIONS:

Growth studies of different microbial cultures were performed in the presence of nanoparticles to observe their effect on the growth profile. This study shows that cd doped zno nanoparticles have great promise as antimicrobial agent against Gram-positive and Gram-negative bacteria. We assume that cd doped zno nanoparticles have greater affinity to surface

active groups of Gram-positive and Gram-negative bacteria, which may have led to its greater bacterial effect. Nanosized particles greatly influence the antimicrobial activity of the sample. This technique has its own advantage and is subjected to wider use in preparing nanoparticles.

ACKNOWLEDGEMENT:

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22. Economizing of Teaching Resources

Ms. Heena Singh

Abstract:

Education, like almost every other area of our society, has evolved in leaps and bounds in recent years. Traditional teaching techniques, based mainly on a teacher explaining a topic and students *taking notes,* may still be useful on occasion, but education today revolves more around **encouraging the student** to awaken their curiosity and desire to learn.

Whether it's the **drooping economy,** or a new teacher without a lot of resources, teachers are always looking for **how to save money,** to ensure they will have success in their classroom. Many schools are underfunded, which means if teachers want or need something for their classroom, then they either must learn how to be creative with the funding they are given, or have to spend their own money.

This paper throws light on that you don't have to spend a lot to ensure that your classroom and students are getting what it needs. A number of different teaching techniques have emerged due to this change in education. Many of these **teaching techniques** are not actually new however! The **use of technology in the classroom** has simply given education a new lease of life allowing us to approach old ideas in new ways.

Introduction:

Economizing of resources means using of resources in best possible way and to their fullest capacity. The fundamental issue that arises is scarcity of goods and services compared to the demand for them by consumers. Solving the economizing problem involves making decisions about best allocation of resources to produce the maximum out of it.

Education means a lot in everyone's life as it facilitates our learning, knowledge and skill. It completely changes our mind and personality and helps us to attain the positive attitudes

Educational System Transformation From the Gurukuls to the modern day classrooms we have witnessed a remarkable transformation the way we learn .Education tools or teaching aids have played a big role in the classrooms and how students engage in their studies .Teaching tools used now in classrooms are multidimensional in their nature Economising teaching is a biggest challenge in a country like India where individuals from different cultural, social, economic background come at one place to gain education.

"Education is a need of hour"

Strategies for Economising Teaching

Expenditure on education is now universally regarded as one f the most important components of investment on education. A good amount of resources are being invested in education, however, while several factors like increase in population urbanisation, improvement in economic standards have increased the demand for education but, the availability of actual resources are limited. The problem is more acute and serious in a country like India where there is rapid population increase, as a result educational expenditure has increased considerably over the years as the salaries of teaching and other expenditure are rising.

The annual expenditure on education generally represents somewhere from 2 to 6 percent of the gross national income and from 10 to 25 percent of the public budget. Education is one of the main enterprises as "the destiny of a nation is shaped in her class rooms"

Here are some of the ways to economise teaching in a country like India:

Less printing or paper less

Think about all of the paper that you use in your classroom, from **sending weekly newsletters home** to permission slips, you could probably fill a football stadium. All of this written correspondence is not only bad for the environment, but it's taking up a lot of your time. You have to type the letter, then make copies, then hand out the copies to the students. You can avoid all of this and save money by utilizing technology. In the beginning of the school year, ask parents to sign up for a weekly newsletter that comes via e-mail, and **start a class website** where parents can stay up to date with everything that is going on in the classroom. E-mail is free, and there are many free easy-to-use websites that you can use to start your own classroom website. Think of all that money being saved!

Ask for Donations

Ask parents for donations -- this may include used books, games, dress up clothes for the play area, or toys. E-mail parents politely asking them to consider donating and you will be surprised just how many parents will! You can even have students write thank-you letters as part of your language arts activity. If you don't feel comfortable asking parents for donations then you can ask strangers in said. Just go to **Donorschoose.org/teachers** and you can share you classroom needs and people in the community will find it for you. It's really that easy, and you will not have to spend a dime.

Explore More Group Work

Not only are cooperative learning groups more fun for students, but they also will save you money. Think about all of the money that you can save when students share materials. It's not always necessary for each student to have their own copy or individual textbook. All you have to do is divide students into groups and only purchase a few copies of the books that you need and let the groups share them. Or, if you're not using books, then just photocopy

a few worksheets and have groups use the same papers. Group work enhances student's communication skills and not to mention less papers for you to grade. It's a win-win situation.

Share with Co-Workers

Team-teaching is all the rage in schools today. If you're not one of the schools that are learning to work together in a collaborative work environment, then you should consider it. When you work together and share resources, you will save money. If your school doesn't have the funding, then you can even pool your money together and buy whatever you need for the classroom at half the cost.

Borrow or Buy Used

Every classroom needs books, and when you have your own classroom library, this can really take a toll on your wallet. Ask your school library, borrow from a fellow teacher, ask for donations, or go to your local yard sale and purchase books as little as a penny. Another option is to swap your books online at Amazon or Paper back swap. You don't have to pay anything but the shipping charges for these websites.

Buy in Bulk

Stores like BJ's Wholesale and Costco make it really easy for teachers to purchase a lot of items in bulk at low prices. The cost of paper and pencils can be reduced when you purchased them at bulk store, plus it will be reduced even further if you go in on the items with other teachers. If you think you won't need 1,000 pencils, think about who else in your school would to split the cost with you, or you can use them following school year.

Open Educational Resources

Open Educational Resources have stemmed from the 'Open' philosophy. The philosophy includes free sharing, duplication prevention. access to stakeholders, avoiding restrictive practices (copyright) along with the promotion of economic efficiencies.

Any teaching and learning material that is available on the internet and is accessible, without any fee, to anyone is known as Open Educational Resources.

OER include a plethora of resources from around the world namely complete courses, course modules, syllabi, lectures, assignments, quizzes, lab and classroom assignments, pedagogical materials, games, simulations, and more.

First introduced at the UNESCO conference, the term Open Educational Resources (OER) referred to providing free access to quality educational resources at the global level. According to OECD, 2007, OER refers to 'digitised materials offered freely and openly for educators, students, and self-learners to use and reuse for teaching, learning, and research'.

The process of learning and teaching plays a central role in the upliftment of the country as a global powerhouse. Along with informational content, it is helpful to identify learning resources by their granularity levels. A learning activity should be embedded with information content through digital assets (image, video or audio clip), information objects, learning objects, learning activities and/or learning design.

Within the past few years, OER related projects and programmes, from large institution-based or institution-supported initiatives to numerous small-scale activities, have witnessed a boom in the education sector.

NROER

The National Repository of Open Educational Resources (NROER). NROER is developed by CIET, NCERT. It was launched during the National Conference on ICT (Information and Communication Technology) for School Education. NROER was launched on 13 August 2013 in New Delhi in collaboration with the Department of School Education and Literacy, Ministry of Human Resource Development, Government of India. Metastudio, the platform hosting the repository is an initiative of Knowledge Labs, Homi Bhabha Centre for Science Education, Mumbai. NROER hosts a large number of educational resources in many subjects and in different Indian languages for Primary, Secondary and Senior Secondary classes. Resources are available in different formats like Video, Image, Audio, Document and Interactive. Apart from this, all NCERT books are available in Flipbook format. NROER is a collaborative platform, intended to reach the un-reached and institutions like SCERT, SIERT, SIE, Vigyan Prasar, CCERT, Gujarat Institute of Educational Technology (GIET), SIET and other stakeholders have a share in the educational content.

NPTEL

To improve the quality of higher education in India, IIT Madras came up with an initiative called NPTEL (National Programme on Technology Enhanced Learning) in the year 1999. As per this initiative, all the IITs, along with the IISc Bangalore would come up with a series of video lecture-based courses across all the streams of engineering. This initiative has gained wide popularity in India and the lectures are being used by several engineering students from across India.

Khan Academy is a non-profit educational organisation created in 2005 by Salman Khan with the goal of creating a set of online tools that help educate students. The organisation produces short lessons in the form of YouTube videos. Its website also includes supplementary practice exercises and materials for educators.

TESS-India

It is led by The Open University and Save The Children India, funded by UK Aid. It is a multilingual teacher professional development programme that aims at supporting India's national education policy through the use of freely available and adaptable OER. A collaboration between the educational experts and policymakers of India and UK, the OER focuses on the enhancement of pedagogic practices parallel to Language, Literary, Science,

Mathematics, and English. It aims at supporting learner-centers, inclusive, participatory, engaging and effective classroom pedagogy to influence the progress and achievements of students through quality schooling.

CK-12 Foundation

The CK-12 Foundation is a California-based non-profit organisation whose stated mission is to reduce the cost of and increase access to, K-12 education in the United States and worldwide. CK-12 provides free and fully customisable K-12 open educational resources aligned to state curriculum standards and tailored to meet student and teacher needs. The foundation's tools are used by 38,000 schools in the US, and additional international schools.

CK-12 was established in 2007 by Neeru Khosla and Murugan Pal to support K-12 Science, Technology, Engineering, and Math (STEM) education. The organisation first generated and distributed educational content via a web-based platform called the "FlexBook." CK-12 has updated its FlexBook platform and has begun to focus on concept-based, multi-modality learning. CK-12 is being funded by the Amar Foundation and by Vinod and Neeru Khosla.

Gooru

Teachers have millions of free online multimedia resources and quiz questions at their fingertips, often making it difficult and time-consuming to create a learning experience geared expressly for their students. Gooru is a free personalised learning solution that helps teachers to find, remix, and share collections of web resources on any K-12 topic.

Gooru organises all online learning content. It connects a community of educators and learners. It supports many different instructional uses and types of learners to improve all students' learning outcomes. Its online quiz environment gives students instant feedback on their progress and provides teachers with assessment results and learning resource suggestions.

ISKME - Institute for the Study of Knowledge Management in Education

An independent and education nonprofit platform, it aims at improving the practice of continuous learning, collaboration, and change in the education sector. Established in 2002, ISKME conducts social science research, develops research-based innovations, and facilitates innovation that improves knowledge sharing in education. ISKME supports innovative teaching and learning practices throughout the globe and is well known for its pioneering open education initiatives. ISKME also assists policymakers, foundations, and educational institutions in designing, assessing, and bringing continuous improvement to education policies, programs, and practice. As such, ISKME helps schools, colleges, universities, and the organisations that support them expand their capacity to collect and share information and create open knowledge-driven environments focused on learning and success.

Curriki

t is a free community that provides OER for K-12, which are contributed by members of the Curriki community including educators, parents, and other partners from over 193 countries. All the material is peer-reviewed to maintain the quality. It helps in cost savings to teachers, since the teachers can use Curriki OER, instead of using supplemental materials.

CONCLUSION

Thanks to the Open Movement, learning is literally just one click away. And the emergence of Open Educational Resources or resources that are licensed to be used and re-used in a broader as well as specific educational context, has made education extensively accessible and instantly available The process of learning and teaching plays a central role in the upliftment of the country as a global powerhouse. Along with informational content, it is helpful to identify learning resources by their granularity levels

8. Effective Strategies For Economizing Teaching

Ms.Trisha Sachdeva

SDV College

Abstract

Sustainable development is the need of present era and education is having a major role in achieving sustainability development. Education allow every human being to acquire knowledge, skills, value and builds decision making power. But education now a days is getting commercialized; focus is just to earn money not to gain knowledge

This paper tries to examine that what new strategies should be added to traditional teaching system to make the teaching process more knowledgeable. How technology will help in achieving the academic standards of students.

Introduction

Good quality education is essential for achieving a most sustainable world and for economic development. education promotes the development of knowledgements, skills require to create sustainable world . but now a days people are getting education for the sake of job not for knowledge. This is just commercialization of education. People want earning from education because they had paid huge amount for it. So we need to reduce the cost of teaching so that focus should be on knowledge. Technology tries to lower the expenses and improve the education as well.

Secondly our teacher system relies on only traditional method where focus is only to learn through memorization. Thereby not developing their critical thinking and decision-making skills.

Here are several strategies to make teaching more knowledgeable

1}. VAK learning style: The first evaluation is to find out if student learns better by hearing, seeing, or moving information as a part of processing it. Every person's learning style is either or a combination of auditory, visual, or kinesthetic (tactile) in terms of the way he or she learns best. No particular style is better than the others; it is all about what works best for the individual. The learning styles are put together by a system in which is VAK. VAK stands for Visual, Auditory, and Kinesthetic (Tactile). The theory is one prefers to learn through one of these sense channels. VisualLearning earning Style

2} Cloud campus: The Cloud Campus is designed from the ground up to be Software as a Service (SaaS) platform that facilitates flexible online learning and its blending with on-site instruction.

3} Flipped class rooms. A flipped classroom is an instructional strategy and a type of blended learning reverses the traditional learning environment by delivering instructional content, often online, outside of classroom. It moves activities, including those that may have traditionally been considered homework, into classroom. In a flipped classroom, students watch online lectures, collaborate in online discussions, or carry research at home while engaging in concepts in the classroom with the guidance of a mentor.

4} Learning Profile.: It means every students individual data should be prepared. To calculate what a child learned during a particular period of time. Online report should be prepared.

Technology not just help in improving quality but it helps in reducing the cost of teaching and make flexible. Some of the benefits of technology are

1} Cut back on printed material : Buying new textbooks, printing worksheets, and providing writing utensils cost money. These disposable items require a significant chunk of the budget each year, but it seemed like th were necessities until edtech arrived. Now, teachers can forego printing worksheets by assigning them digitall Even the study materials can be available online or through a specific program, negating the need for textbooks.

2} Online tools make recourse more accessible: Not all programs have a cost associated with them. Som districts are considering the development of an online resource that has no ongoing cost. This free tool would hel to lower the cost of edtech considerably, making it an obvious choice over the current expense of traditiona teaching. This online program would also make the resources more accessible to students at home. They can continue to engage with the materials during the afternoons and weekends to learn additional skills.

3} It reduce the cost of teacher labor: Teachers are often paid to perform manual tasks like grading that take up large chunks of valuable time. Instead, an educator may now be able to perform more meaningful work during planning periods instead of grading an endless pile of student worksheets. The cost of the teacher's time can be reallocated to a more important part of the school budget.

Meanwhile, artificial intelligence and automated grading systems drastically improve the quality of grading when it comes to multiple choice questions or fill-in-the-blank answers. Students can see their results much more immediately, allowing them to ask more questions and receive help before further testing.

4} Make education flexible. Teachers won't have to spend large portions of class time adjusting a lesson to suit a handful of slower learners any longer. Education can be accelerated with the personalization that is possible using

edtech. The flexibility inherent to many of these systems makes them ideal for a growing classroom with lots of learners.

Teachers can still monitor education effectively while catering to a much larger crowd using this technology. Budgets can continue to decrease without the associated negative effects of leaving children dazed and confused regarding a lesson. Using edtech to improve flexibility allows everyone to save both time and money when it comes to classroom expenses.

Conclusion

A sound education system is a prerequisite for development of nation so there is need to combine the traditional methods with modern Aids for better education system. And technology plays a major role in this. As it allows greater communication and improve practices. And that automatically leads to sustainable development.

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ANTIMICROBIAL ACTIVITY OF Al DOPED ZnO NANOPARTICLE AGAINST PATHOGENIC BACTERIA AND FUNGI

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ABSTRACT : *In this work, synthesis of Al doped ZnO nanoparticles is done by sol-gel method and characterization of synthesized Al doped ZnO nanoparticles is investigated by X-ray diffractometer (XRD) and Transmission electron microscope (TEM). Followed by antimicrobial growth inhibition and mechanistic activity of synthesized nanoparticles were also investigated. Followed by Synthesized nanoparticles have used against pathogenic bacteria staphylococci aureus (Gram positive) and kelbsielia phemonia (Gram negative) and candida albicans (fungi) and also studied its effect. The effect of size and concentration of Al doped ZnO nanoparticle on the antibacterial activity have done by bacteriological tests such as disc and well diffusion agar methods. These tests were performed in moller hinton agar method. This microbial analysis data indicates that synthesized nanoparticles have shown potential activities against tested bacteria and fungi. Comparison study of effect of size and concentration of Al doped ZnO nanoparticle against pathogenic bacteria is also done in this work.*

Keywords: *Al doped ZnO, Pathogenic bacteria, Candida albicans,* Staphylococci aureus, kelbsielia phemonia.

INTRODUCTION

Metal oxide nanoparticles and composite materials are widely applied in the field of research and development and diverse applications in industries including surface coatings, optoelectronics, bioengineering, bio-diagnostics, and agriculture [1-2]. Their intrinsic properties are mainly determined by size, shape, composition, crystallinity and morphology. Nanoparticles of Ag, CuO and ZnO are being used industrially for several purposes including amendments to textiles,
cosmetics, sprays, plastics and paints [3].The considerable antimicrobial activities of inorganic metal oxide nanoparticles such as ZnO, MgO, TiO_2, SiO_2 and their selective toxicity to biological systems suggest their potential application as therapeutics, diagnostics, surgical devices and nano-medicine based antimicrobial agents [4-7].

Among metal oxide nanoparticles, ZnO nanoparticles as one of the multifunctional inorganic
nanoparticles has many significant features such as chemical and physical stability, high catalysis activity, effective antibacterial activity as well as intensive ultraviolet and infrared adsorption with broad range of applications as semiconductors, sensors, transparent
electrodes, solar cells, etc. [8,9]. Also in recent years ZnO has received considerable attention because of its unique optical, piezoelectric, and magnetic properties [10]. In addition ZnO nanoparticles has the potential to impact many aspects of food and agricultural systems because of its antimicrobial efficacy especially with

the growing need to find alternative methods for formulating new type of safe and cost-effective antibiotics in controlling the spread of resisted pathogens in food processing environment [11-12].

Moreover, new approaches are needed for biomedical applications of ZnO-NPs to actively perform in antimicrobial and antibacterial activities [13-15]. For this to happen, the properties and functionality of ZnO-NPs were needed to improve by incorporating other dopants materials that were sought to be the transition metals (Fe, Mn, Cu, Cr) or biomolecules at the nanoscale [16, 17]. After doping with transition metals and biomolecules, the surfaces of these nanoparticles are modified to have excellent biocompatibility to effectively perform in antimicrobials, antioxidants, drug delivery systems, bio-imaging, and biosensors, etc [18].

Moreover, it has been shown that metal-doped ZnO nanoparticles have more antibacterial activity than undoped ZnO nanoparticles against both Gram-negative and Gram-positive bacteria [19, 20]. In this regard, the antibacterial potential of the synthesized Al-doped ZnO-NPs is also evaluated by the agar well diffusion method against clinical isolates of both Gram-positive (staphylococci aureus) and Gram-negative bacteria and Fungi(candida albicans).

MATERIALS AND METHODS:

All chemicals and solvents were analytical grade and purchased from commercial sources.

Synthesis of Al doped ZnO nanoparticles:

The Al doped ZnO nanoparticles prepared by using sol-gel citrate method. The aluminum nitrates is added in zinc nitrate magnetically stirred with citric acid and ethanol at 80 °C for 3hrs to get homogeneous and transferring solution. The solution was further heated at about 130 °C for 12hrs in pressure vessel to form the gel precursor. The prepared product was subjected to 3hrs heat treatment at 350 °C in muffle furnace and then milled to a fine powder. The dried powder then calcinated in range of 350 °C to 650 °C in order to improve the crystal structure of material.

Antifungal activity studies:

The disc diffusion method:

The modified disc diffusion method was used to evaluate the antimicrobial activity of Al doped ZnO NPs against Candida albicanes, staphyiococci, kelbsielia phemonia isolated from hospital environment was used in this study. This method was performed in Muller-Hinton Media solid agar Petri dish. The disc is 15 cm in diameter, sterilized by autoclaving for 15 min at 121 ºC, and was placed the cultured on agar plate which were then incubated for 24 h at 37 ºC and inhibition zone was monitored After incubation the presence of bacterial growth inhibition halo around the samples were observed and their diameter in millimeters was measured briefly.

Anticandidal effect of the Al doped ZnO Nps in solid Media:

The fungal were cultured in Muller-Hinton Medium and Antibiogram disks of 0.01, 0.05,0.5, 1.0 and 1.5 % of Al doped ZnONps were prepared according to disk diffusion Technique. The disks were placed over the media and incubated at 37°C for 24 hr.

RESULTS AND DISCUSSION

X-Ray Diffraction (XRD):

X-Ray diffraction pattern shows in Fig 1. (X-pert, PRO XRD System, Punjab) reveals crystalline nature of sample. The average crystalline size was 41nm to 65 nm obtained from FWHM of peak corresponding to 2Θ calculated by Debye – Scherer formula which is given by, $L = k \lambda / \beta \cos\Theta$ Where, L is the average size of crystal, K= 0.9 particle diameter, the λ (0.154 A°) is wavelength of X-Ray, β is full width at half maximum (FWHM) of the diffraction peak and 2Θ is the diffraction angle of diffraction. FWHM is calculated by warren's formula

$$B2 = (Bm2 – Bs2)$$

Where Bm is full width at half maximum of the sample and Bs the full width at half maximum of standard quartz.

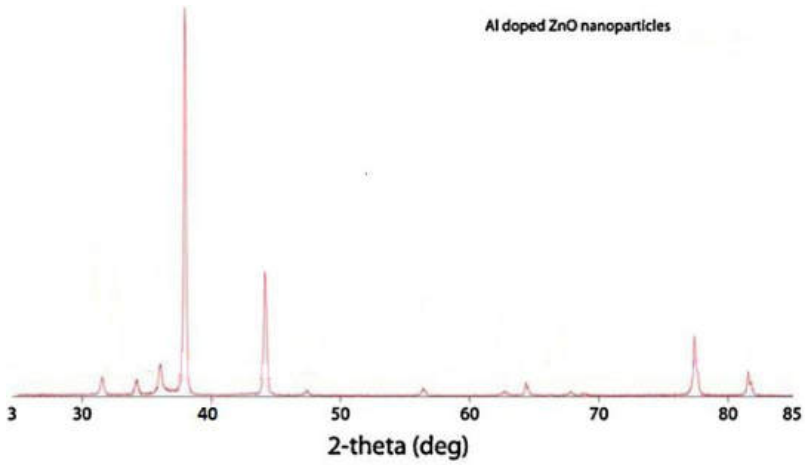

Fig 1: XRD pattern for Cd doped ZnO calcinated at 650

Transmission Electron Microscope (TEM) analysis:

Transmission Electron Microscope (TEM), analysis was done using Philips (technai 10). Thin films of sample were prepared on a carbon coated copper grid by just dropping a very small amount of sample on the grid, extra solution was removed using a blotting paper and then the film on the TEM grid were allowed to dry by putting it under incubator. In this technique, whereby a beam of electronics is transmitted through an Ultra-thin specimen, interacting with the specimen as it passes through. An image is formed from the interaction of and focused the electrons transmitted through the specimen. The image is magnified on to an imaging device. Figure-2 shows TEM images of Al doped ZnO nanoparticles. .TEM observations revealed the formation of hexagonal shape cd doped zno nanoparticles of average particle size is 41, 59, 65 nm respectively . The results of TEM were supported by X-ray diffraction study.

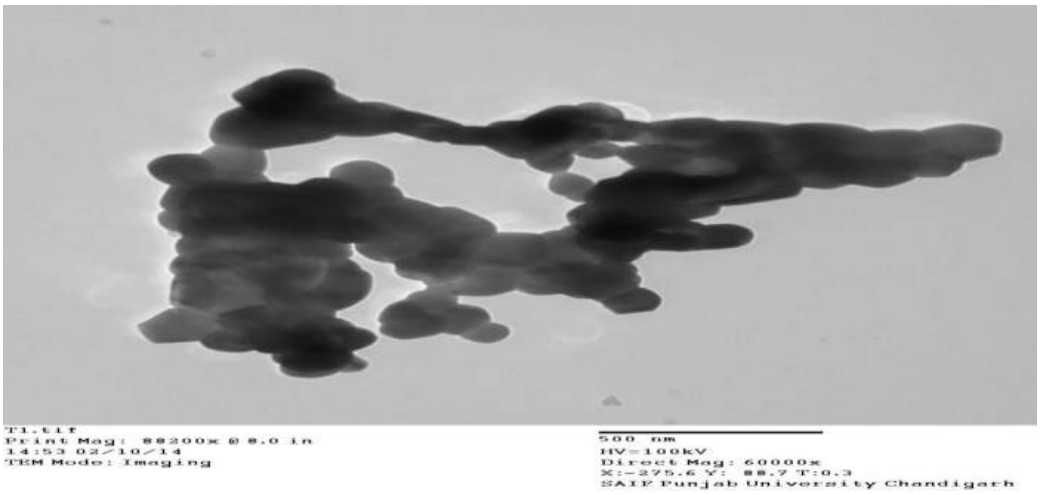

Fig 2: Transmission Electron Microscopic (TEM) Image of Al doped ZnO

Evaluation of antibacterial properties:

Figure 3(a), 3(b) and 3(c) shows agar diffusion test of Al doped ZnO nanoparticles dispersed in water media respectively against *candida albicans, staphylococci, kelbsielia phemonia* with inhibition zone around the cavity. The antifungal activity of Al doped ZnO nanoparticles was tested by the disc and well diffusion agar methods. The presence of an inhibition zone clearly indicated the antibacterial effect of ZnO nanoparticles. It has been seen that in this study that by increasing the concentration of Al doped ZnO nanoparticles in wells and discs, the growth inhibition has also been increased. The size of inhibition zone was different according to the type of bacteria and fungi, the size and the concentrations of Al doped ZnO NpS. was resistant to all of the antibiotics used in this study. Inhibition zone measurements show that by increasing the concentration of Al doped ZnO the inhibition zone also increased . (Shown in table i.e. fig 4). It has been known that nanomaterials exhibit strong inhibiting effects towards a broadened spectrum of bacterial strain. According to several studies, it's believed that the metal oxides carry the positive charge while the microorganisms carry negative charges. This reason for the difference in the antibacterial activity for different test microorganisms may be due to the difference in structure and thickness of the membrane cell wall. The antibacterial activity depends on the surface area and concentration, while the crystalline structure and particle shape have little effect. The presence of an inhibition zone clearly indicates that the mechanism of the biocidal action of ZnO involves disrupting the membrane.

(a) *(b)* *(c)*

Fig 3: Antimicrobial activity of Al doped ZnO against (a)Kelbsielia phemonia, *(b)*Staphylococci, (c) Candida albicans.

Sr. No.	*Micro-organisum (Bacteria/Fungi)*	*GM+Ve /GM-Ve*	*A 0.01%*	*B 0.05%*	*C 0.1%*	*D 1%*	*E 1.5%*
1	*Staphylococci,*	*+Ve*	*1.8mm*	*3mm*	*6.7mm*	*9.4mm*	*12.5mm*
2	*kelbsielia phemonia*	*-Ve*	*1.5mm*	*2.8mm*	*6mm*	*8.9mm*	*11.9mm*
3	*Candida albicans*	*+Ve*	*1.8mm*	*3mm*	*7mm*	*10mm*	*12mm*

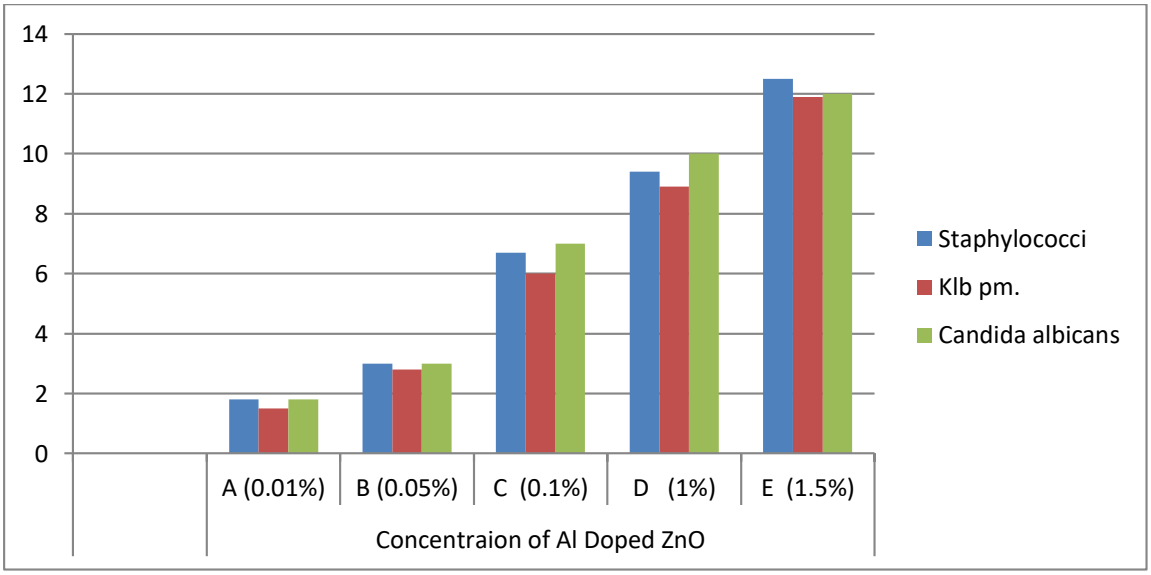

Fig 4: Minimum concentrations of Al doped ZnO nanoparticles at which zone of inhibition started to appear on (a) Candida albicans, *(b)* Staphylococci, (c) Kelbsielia phemonia.

CONCLUSION:

In summary the Al doped ZnO nanoparticles show antibacterial activity The growth inhibition ring of candida albicans, *staphylococci, kelbsielia phemonia* treated by Al doped Zno Nps were 12, 12.5 and 11.9 mm, respectively Growth studies of different microbial cultures were performed in the presence of nanoparticles to observe their effect on the growth profile. This study shows that Al doped zno nanoparticles have great promise as antimicrobial agent against. We assume that Al doped zno nanoparticles have good affinity to surface active groups of candida albicans *Staphylococci, kelbsielia phemonia*. Nanosized particles greatly influence the antimicrobial activity of the sample. This technique has its own advantage and is subjected to wider use in preparing nanoparticles.

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ROLE OF YOUTH TOWARDS ACHIEVING SUSTAINABLE DEVELOPMENT GOALS

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ARSTRACT

Sustainable development goal is the most important element for the development of each country. Sustainable Development Goals 2030 was given by United Nations with the hope that all nations together will be able to achieve it joining together as one Global nations. That is the reason it is also called as Global Goals. The dangers and damage are witness by the whole world. Sudden climate changes, unemployment, poverty, mitigation has become serious issue across the global.
Youth can act as a catalyst agent in improving and achieving the Sustainable Development Goals 2030. Youth are young minds with new ideas, positive attitude, critical thinking can contribute towards the saving the global. There are different ways and means through which the youth can be helping hand toward achieving the targets in a very collaborative, effective and long run solutions to the current and upcoming issues faced by all countries. It becomes the responsibility of Young generation to take the lead and become be mediator and saviour to make a better place to live a quality life.

The concept of sustainable development can be interpreted in many ways, manners, and forms but at its core is an approach to development that looks to balance different, and often competing, needs against an awareness of the environmental, social and economic limitations we face as a society. We are already witnessing the damage from large-scale financial crises caused by irresponsible banking, to changes in global climate resulting from our dependence on fossil fuel-based energy sources. The longer we pursue unsustainable development, the more frequent and severe its consequences are likely to become, which is why we need to act now. Living within our environmental limits is one of the central principles of sustainable development. One implication of not doing so is climate change.
But the focus of sustainable development is far broader than just the environment. It's also about ensuring a strong, healthy, and just society. This means meeting the diverse needs of all people in existing and future communities, promoting personal wellbeing, social cohesion, and inclusion, and creating equal opportunity.

"Sustainable development is development that meets the needs of the present, without compromising the ability of future generations to meet their own needs."

Sustainable development is the overarching paradigm of the United Nations. The concept of sustainable development was described by the 1987 Brundtland Commission Report as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

There are four dimensions to sustainable development – society, environment, culture and economy – which are tangled, not separate. Sustainability is a paradigm for thinking about the future in which environmental, societal and economic considerations are balanced in the pursuit of an improved quality of life. For example, a prosperous society relies on a healthy environment to provide food and resources, safe drinking water and clean air for its citizens.

Many a times we get confused between sustainable development and sustainability. Sustainability is often thought of as a long-term goal (i.e. a more sustainable world), while sustainable development refers to the many processes and pathways to achieve it (e.g. sustainable agriculture and forestry, sustainable production and consumption, good government, research and technology transfer, education and training, etc.).

In 2015, 195 nations agreed with the United Nation that they can change the world for the better.This will be accomplished by bringing together their respective governments, businesses, media, institutions of higher education, and local NGOs to improve the lives of the people in their country by the year 2030.

The 17 sustainable development goals (SDGs) to transform our world:
1: No Poverty 2: Zero Hunger 3: Good Health and Well-being 4: Quality Education 5: Gender Equality 6: Clean Water and Sanitation 7: Affordable and Clean Energy 8: Decent Work and Economic Growth 9: Industry, Innovation and Infrastructure 10: Reduced Inequality 11: Sustainable Cities and Communities 12: Responsible Consumption and Production 13: Climate Action 14: Life Below Water 16: Peace and Justice Strong Institutions 17: Partnerships to achieve the Goal

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.

The population of the world is projected to increase by 98,830,797 people in 2022 and reach 8,046,949,318 in the end of the year. The natural increase is expected to be positive, as the number of births will exceed the number of deaths by 98,415,064.

Today, there are 1.8 billion people between the ages of 10-24—they are the largest generation of youth in history. Close to 90 per cent of them live in developing countries. Their numbers are expected to grow—between 2015 and 2030 alone, about 1.9 billion young people are projected to turn 15 years old.. Connected to each other like never, young people want to and already contribute to the resilience of their communities, proposing innovative solutions, driving social progress and inspiring political change. They are also agents of change, mobilizing to advance the Sustainable Development Goals to improve the lives of people and the health of the planet.

One of the Key aspects in order to achieve the Sustainable Development Goals (SDG) is certainly to provide youth with the right competences and skills to reach them.
The World Youth Report on "Youth and the 2030 Agenda for Sustainable Development", prepared by the United Nations Department of Economic and Social Affairs (UN DESA), examines the mutually supportive roles of the new agenda and current youth development efforts

Far from being mere beneficiaries of the 2030 Agenda, young people have been active architects in its development and continue to be engaged in the frameworks and processes that support its implementation, follow-up and review. The adoption of the 2030 Agenda represented the culmination of an extensive three-year process involving Member States and civil society, including youth organizations, in the development of specific goals and targets—and marked the beginning of a 15-year journey to achieve sustainable development by 2030.

The active engagement of youth in sustainable development efforts is central to achieving sustainable, inclusive, and stable societies by the target date, and to averting the worst threats and challenges to sustainable development, including the impacts of climate change, unemployment, poverty, gender inequality, conflict, and migration. While all the Sustainable Development Goals are critical to youth development.

The best channel, medium or role that can be played towards achieving Sustainable development goals is our Youth. Role of youth --they are catalyst agents for the peace and security .Their role in the workforce and economic development of our nation represent at

any given moment, one -third of the workforce. Youth are fearless, discipline, enthusiastic, full of zeal, ambitious, critical thinker. They are an important asset of the country and can change the world the better to have quality of life not only for the existing generation but all coming generation The young minds are fresh, naive they have potential and strength. Youth is also important in the social change - future leaders, the more we invest in them we can surely witness a notable change and drivers of societal transformation especially in the diverse development

How to get Youth involved towards achieving Sustainable Development Goals 2030

Youth are the torchbearers of the 2030 Agenda – young people all over the world are contributing to achieving the Sustainable Development Goals. Here are a few easy ways youth can get involved:

1. Get involved in a local NGO

Participating in a local NGO is a worthwhile way of supporting sustainable development efforts. When they work with this local NGOs, they would not only learn but they would also work with them hand in hand and would contribute towards the development of these NGOs as well as contributing towards development of those poor and needy by guiding them for their development.

2. Get engaged in local politics

The engagement of young people in local politics is crucial to raising awareness of youth-related issues and demanding change. Engaging the youth in the local politics shall be important as they will be very close and near to the problems and issues challenges which is face as well as they would contribute towards the various activities which are run by this local politics. Political commitment and adequate resources may help young people to have the potential and can make the most effective transformation of this world into a better place for all

3. Join Youth4Peace to help promote and maintain international peace and security

Youth4Peace is an UN-led initiative that supports young people's participation in peacebuilding. It recognizes that young people play active roles as agents of positive and constructive change and helps them achieve this.

4.Seminars and conferences

organising various functions and seminars to make them aware of organising various seminars and function is the prime responsibility of the organization and the educational institutions where the youth is right now so that we can make them aware of what is sustainable development goals and how their role will be contributing towards the development of the nation and to the world as a whole

5.Engaging in field activities

Engaging youth in the day to day activities of the people around them. They could understand what is happening in and around their surrounding and probably they would come out with certain solutions.

When this youth will face the issues or when they are going to examine themselves the issues they will understand the problems and may come out with the recommendation they can work in Group activities well contribute in different minds in the same direction will result in a positive attitude.

6. Projects and exhibition

By giving the youth a free mind and giving them and open space to develop and think about how and why and what the different Ways and Means they can contribute towards sustainable development goals. Each and every initiative taken by then will help the people to come out with various brainstorming sessions they would make think effortlessly by contributing not only to their projects, but they would also come out certain solution to the problems of the near future.

7. Talk shows

Various eminent personalities and the people involved in contribution towards the sustainable developments can be called and made to speak to the youth and exchange their ideas engage them in various activities and how will they contribute or what kind of mindset they can build in this youth shall help them to reach the goals towards sustainable development.

8. Forming Committee

Different line of committees can be formed so that they can address a problem and issues. They can even pilot the highest problems, provide opportunities for leadership training and

employment in local communities and they can divide groups for various aspects of education, energy, skills economic reforms and good governance. Contributing towards this potential as an active citizen for peace and development they should empower themselves for a good leadership as well as they can set their own agendas have taken come up with encouraging more active citizenship. For this kind of activeness among the people contributes towards the achievement of sustainable development goals also which is referred to as Global goals and the agenda 2030 and activating this youth can happen in different stages.

9. Awareness Programme

A lot of public awareness program can be organised, managed, and developed by the youth itself to get the key message to be passed on to the public at large and the target audience here needs to be the youth, adult and children. We need to encourage them to act in preventing and developing and contributing towards stainable development goals. Public awareness is important to increase enthusiasm and support can turn the local knowledge and resources to begin. Event raising of funds can be organised, during these activities a lot of money can be collected for community development. These events are generally undertaken by the government organization and non-government organization, but youth must come as the helping hand and the combination of this youth communication strategies can be targeted to the audience awareness raising is often considered to be important at the stage where we are involving more of our youth here because there is more of acceptance and they are also a change mediator. Moreover, they can become self-reliance.

10. Entertainment Programme

The objective for any entertainment programs to create an obvious change in behaviour the strategy adopted by the entertainment program is primarily motivational rather than information and this can act as a catalyst in initiating interpersonal communication among the peers .Audience can become a positive factor they can initiate any kind of supporting change. Entertainment through various programs like folk dances, street plays, dramatization of any act , social cause of these kind of activities will not only help will not only contribute to the entertainment of the people certain message can be passed to the people regarding the various activities which is conducted by these youth and how the role of youth is so important for sustainable development goals even while contributing towards the social learning we are

presenting them the negative and positive aspects trying to build the present the consequences of their actions as an individual, community and society at large.

When we empower young people by giving them guidance, providing better education, valuable opportunities , giving access to the resources they can act as collaborator, change agent , critical thinker, innovator with community work to achieve sustainable development goals. Engaging young people in development programs has a very interesting impact on their personal development, their empowerment, their ability to connect with more people in their community and globally. Young people have the power to achieve the most effective transformation of the world into a better place for all with political commitment and proper resources.

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Index

6. Sustainable Technologies In Education

Mrs. Vanashree Pahak

Abstract

Internet has been an important aspect of people's lives. It has given a new change and better tools to help and facilitate learning. Use of Technology in the classroom or online means more time and work, but positive impactful learning outcomes. So here we investigate the position of Technology in education. The main aim is to find out, What is Technology? How it is useful? What resources can be used and how economic it can be Modern-day students not only have computers to help them with their schoolwork, they also use the Internet for research while teachers use technology to enhance their lessons. Technology has revolutionized the field of education. The importance of technology in schools cannot be ignored. In fact, with the onset of computers in education, it has become easier for teachers to impart knowledge and for students to acquire it. The use of technology has made the process of Teaching and learning all the more enjoyable. Therefore, educational technology is based on theoretical knowledge from different disciplines (communication, psychology, sociology, philosophy, artificial intelligence, computer science, etc.) plus experiential knowledge from educational practise.

Integration of Digital Resources in Education& its Impact

Technology can bring the class to the outside world,

instead of taking the outside world to the class.

---- David Manuel

Resources are those which are required during teaching learning process. Like Online Resources, Digital Resources, Physical Resources. Of which digital resources are media, audio-Videos, software, apps etc. But now debate is more pressing than ever, as use of technology has been integrated in large with new teaching methods. Technology allows experiment in pedagogy, democratize the classroom and better engage students.

Pros of Technology

- Active learning and complete participation of class, Technology makes learning process a fun through apps and e-textbooks eg: Byju's learning app, Cue math etc.
  This is helping in designing to support course learning objective. Educational Games In younger grades, teachers expose children to computers through educational games. Instead of playing board

games that focus on education, students can learn the basics of spelling, counting and other early educational lessons through computer games that make learning fun, which improves Knowledge retention in pupils.

- Reduces tedious tasks like assignments, worksheet preparation, papers, grading, attendance sheet record etc. Allows to experiment and get quick feedback. Technology use allows many more stud to be actively thinking about information, making choices, and executing skills than is typical in teacher-led lessons. Moreover, when technology is used as a tool to support students in performi authentic tasks, the students are in the position of defining their goals, making design decisions, evaluating their progress.
- Allows to do more work in less time because of the supports and capabilities provided by techn Technology has eliminated space and time constraints Online education and distance learning h given a new dimension to education and higher learning.
- Digital methods such as pod casts, blogs and social media encourage development of new teach methods. Many schools use software like the Encyclopedia Britannica to help students to do research.
- It prepares students for future as they would become techno savvy and familiar with using atle form of technology at an early age &eventually will develop other skills.

  Thus educational technology has given a lot to this world and continues to add more knowled It has brought nation to heights with new discoveries and inventions and will continue to imbi bulk of new knowledge and learning.

Apart from this there are some ill effects as well as the coin has two side Technology do have some disadvar

- Powerfully destructive, as millions of people were affected due to technology. Innovations may lead destructive weapons & Bombs.
- Destroys environment which has also lead to Global Warming.
- Health Issues may occur. Computers, mobile phones, T.V may be dangerous specially to kids. This to harmful effects of eyes, brain and of course whole body.
- Risk has increased and privacy is reduced due to technology hacking, where youngsters are also aff out of it.
- It not cheap. It has created an idea of profit/loss concept.

- It has reduced the habit f reading among students, Brainstorming is reduced as everything is available on Internet through Technology.
- Traditional methods of teaching has been reduced as for Teachers.
- Teachers, Scholars, & experts all agree that technology has changed the way students learn.

Conclusion:

Still can be concluded as, technology allows greater communication, resource sharing, and improved practice, so that the vision is owned by all and will help every individual to improve learning. It is a support system where teachers can share their ideas & resource Online. Its professional learning opportunities for teachers.

Hence the way of teaching needs to be altered for sustainable development. E-education has become a necessity.

Finally, Technology may Change the Relationships between schools, communities, bringing them closer together and has given a lot to this world.