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Review Article

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Ba-ZnO Nanoparticles for Photo-Catalytic Degradation of Methyl Orange

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Abstract

Chemical precipitation method was used to synthesize pure ZnO and Ba-ZnO nanoparticles. The XRD patterns and SEM topography shows that prepared nanoparticles were wurzite structure. The average particle size of 2% Ba-ZnO (25 to 40 nm) exhibited excellent achievable photo-catalytic degradation of M.O. in the acidic condition (pH 4). It was found that 2% Ba-ZnO shows the highest activity for degradation of methyl orange compare to ZnO.

Keywords: Ba-ZnO Nanoparticles; Xrd Pattern; Sem Topography ; Photo-Catalytic Degradation.

Introduction

The Cleanup of waste water and air pollution has become increasingly important in the past decades and burgeoning Populations require more and more energy and resources to sustain a comfortable standard of living. Two major types of pollution can be identified that encompass all other; technological and agricultural, Technological pollution is that produced from human sources ; industrial, military etc, Compounds with low solubility in water characterize this type of pollution. A separate layer forms on the surface that negatively affects the physical properties of water which also hampers any living thing that makes contact with the surface. The second major type of pollution is that of high concentrations of nutrients that leach in to the soil and drain in to water sources mainly from agriculture. The most notable effect of this form of pollution is overgrowth of alge and other plants in the water sources. That can't be removed by natural means, which build up in a prematurely age a water source [1].

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Many different types of chemical enter ground and surface water sources both inorganic and organic. Heavy metals, nitrates and organo metallics are the most common inorganic sources of pollution both industrially and agriculturally based some of the most common and harmful organic pollutants in waste water and other polluted sources are organic molecules including poly chlorinated biphenyl, chlorinated and brominated phenols, chlorinated hydrocarbons and a plethora of aromatics contained in pesticide run off sewage, and industrial sources [2].

Toxic and coloured effluents from industries and agriculture always been a matter of serious concern for the environment and consequently much attention has been drawn to-words the removal of these harmful contaminates from waste water [3].

These harmful contaminants of water are difficult to decompose biologically as well as chemically. Physicochemical process only transfer pollutant from one phase to another [4]. During the past decade, there has been considerable interest in the preparation of metal oxide nano particle with carefully controlled size, morphology and surface nature, because they serve as key material, in the enormous fields of catalysts and catalysts supports inorganic additives micro electronics, elect optics, photo voltics and photo catalysts [5-7].

Advanced oxidation processes are of ample

interest currently for the effective oxidation at a wide variety of organic molecules and dyes [8].

Among them top priority goes to semiconductors assisted photo catalytic degradation. Most of the photo catalytic studies use either synthetic. Or commercial TiO2 as photo catalytic [9]. However recently some studied have been carried out to evaluate the Priority of other metal oxide [10]. among the other semiconductors zinc oxide appears to be highly promising photo catalyst [11].

Thus the focus of the present work is to synthesize zinc oxide doped with metal / non metal and uses it in the photo catalytic degradation using sunlight illumination.

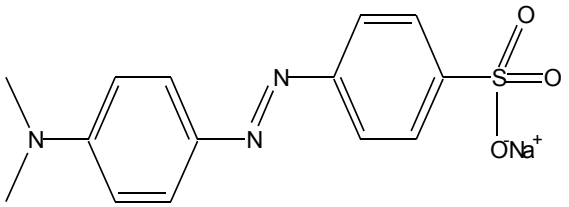


Fig. 1: Chemical Structure of Methyl Orange (M.O)

Materials and Methods

From Sigma-Aldrich (Bangalore) reagent grade Methyl orange (M.O.) were procured. M.O. is directly used without any further treatment. A known concentration of M.O. stock solution is prepared during experiment. $Zn(NO_3)_2 \cdot 6H_2O$, NaOH and $Ba(NO_3)_2$ procured from HIMEDIA. To maintain pH of the medium acetate, phosphate, and borate buffer solutions were prepared of all are analytical grade.

Instruments Used

(i) Kinetic studies carried out using CARY 50 Bio UV-Vis Spectrophotometer (Systonic) with the temperature controller and HPLC system.

(ii) Degradation studies carried out using a photo-reactor (PHILIPS, TUV 8W T5) mercury lamp with Emax =254 nm.

(iii) Newport 2936–C optical power meter was used to measure intensity of light.

(iv) To measure pH of the medium LI-120-Elico pH-meter was utilised.

(v) To identify purity and crystal size of nano particles Siemens (Cu source) X-ray Diffractometer, (AXS- D5005) was used.

(vi) The prepared nanoparticles topography of was confirmed by a SEM with model JEOL-JSM-6360.

2. Photo catalyst preparation by precipitation method

For synthesizing un-doped and Barium doped ZnO, 0.1M zinc nitrate salt was added to distteled water to prepare zinc nitrate solution. 0.1M NaOH solution is prepared separately in distilled water. NaOH solution was added drop by drop with constant stirring thoroughly to zinc nitrate solution for 3 hrs. The resultant mixture was endorsed to settle for over-night and spirant suspension was then decanted with carefully, the residual suspension was filtered and cleaned number of times with distilled water then followed with ethanol. The white residue was dehydrated in oven at 120^0C for 3 hrs. Then powdered in a mortar then ignited at 500^0C for about 1 hr by a temperature rate about 10^0C per minute within a furnace. During the drying process, complete transformation of Zn $(OH)_2$ in to ZnO takes place. The same procedure was followed for the synthesis of 2% Ba - ZnO nano sized particles. Where, the Barium concentration was maintained 2 (% mole ratio). The Barium when doped with ZnO nanoparticles it enters into the interstitial position of ZnO lattice. Similar literature was also reported earlier study [6].

3. Characterization of ZnO and 2% Ba-ZnO X-ray Diffraction Studies (XRD)

XRD spectra of un-doped & barium doped zinc oxide nano particles at 600^0C temperature as shown in following figure. The intense sharp peak suggests that the prepared samples nano particles are crystalline in nature with hexagonal -wurtzite structure. It can be confirmed by the appearance of [100] [002] [101] [102] [110] [103] [200] & [112] diffraction peaks from different lattices at angles 2ø (10-90^0). The intense peak of [101] indicates that the expansion of nano-crystal has-taken place along the easy route of crystallisation of zinc oxide [7]. No additional peaks were observed which implies that the wurzite-structure is not disrupted by Ba-doped ZnO. This indicates that prepared zinc oxide nano particles were hexagonal wurzite structure.

The mean particle sizes of synthesized nano-

particles were computed by Debye Scherrer equation (1) taking full width half-maxima of A (101) intense line.

$$D=k\lambda/\beta\cos\theta \qquad (1)$$

Where k = dimension less shape factor (0.94), Cu (Kα) = wavelength radiation of X-ray (0.154 nm). β = full width at half max. θ = 1/2 diffraction angle. The particle size of ZnO, and 2% Ba-ZnO was found to be 17.28, and 39.33 nm respectively.

XRD patterns of (a) Undoped ZnO, (b) 2% Ba-ZnO

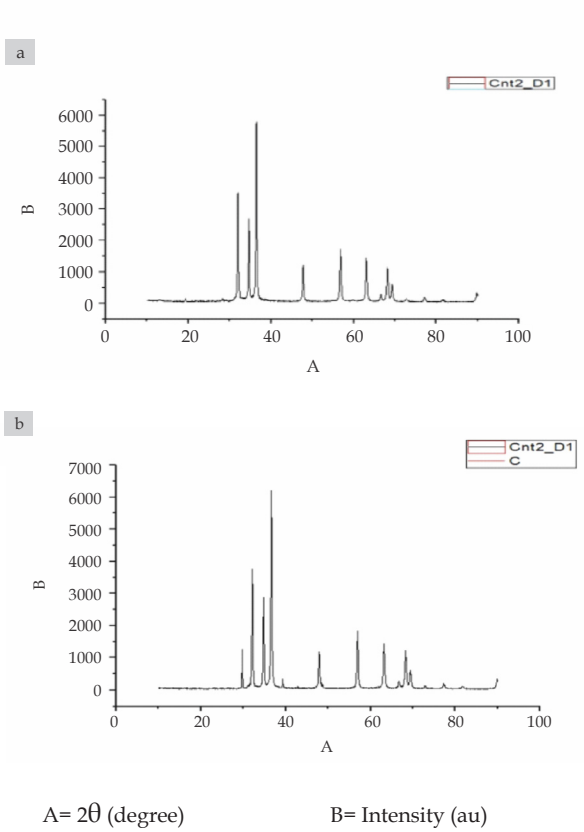
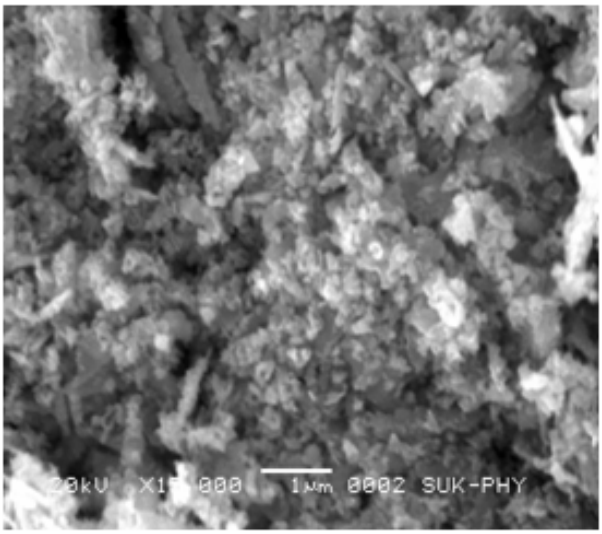


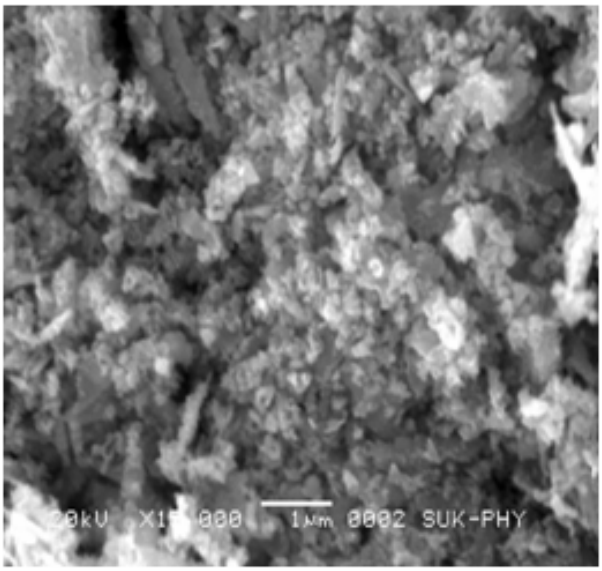
Fig. 2: XRD patterns of (a) Undoped ZnO, (b) 2% Ba-ZnO

Scanning Electron Microscope (SEM)

To investigate the topography of prepared samples, the SEM analysis of pure ZnO, and 2% Ba-ZnO nano particles are carried out at similar magnifications (15000). This image confirms the arrangement of Ba-ZnO nano particles. These images shows that the non uniform distribution of nearly egg-shaped arranged in cluster to form a pointer as shown in following diagram



(a) Undoped ZnO



(b) 2% Ba-ZnO

Fig. 3: SEM Images of (a) Undoped ZnO, and (b) 2% Ba-ZnO

The Photo-catalysis Process

To observe the photo-catalytic mineralization of M.O., a known quantity of M.O and buffer solution was kept in a beaker. A dosage 0.1 g l-1 of 2% Ba-ZnO nano powder were added. Before edify, the suspensions were allowed for 1 hr in dark to accomplish equilibrium adsorption-desorption between M.O and photo-catalyst. Then, the solution was kept beneath 8 W UV tubes having 4mW/ cm^2 intensity and 254 nm peak wavelength having photo-reactor with nonstop magnetic stirrer. For every 10 min time, the suspension was taken out

and kept in clinical centrifuge at 1500 rpm for 5 min. The centrifugate was observed @464 nano-meter (ε = 29933 l mol-1 cm-1) using UV-Vis spectro-photometer and the degree of mineralization was investigated.

Comparison of different photocatalysts.

The degree of photo-catalytic activity of M.O with UV, UV-ZnO, and UV- 2% Ba-ZnO was reported. It was seen that the mineralization activity of M.O with UV- 2% Ba-ZnO was more potential than UV and UV-ZnO as shown in following diagram.

% degradation activities of various treatment methods with time at 25^0C. [Photocatalyst] = 0.1 g l-1, [M.O]= 2.0 x 10-5 mol dm-3 at pH 4 and light intensity 4mW/cm^2.

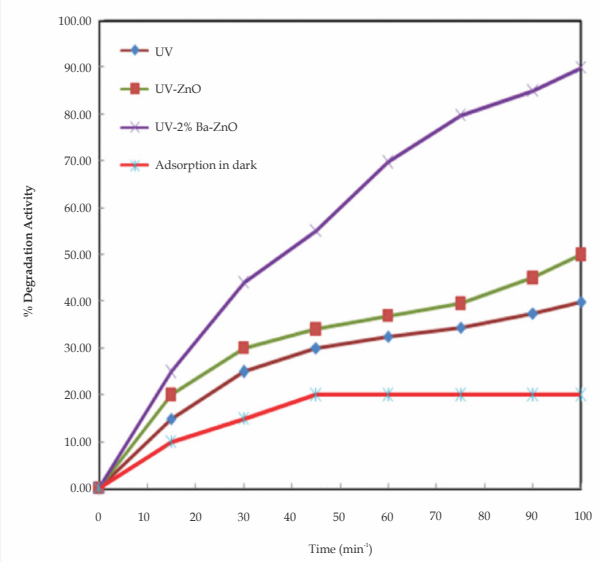


Fig. 4:

The % degradation efficacy of M.O was examined under similar environment by UV, UV-ZnO, and UV-2% Ba-ZnO and % adsorption in dark was also investigated. The % degradation activity of M.O was found to be 20%, 35%, 50%, and 89% with UV, UV-ZnO, and UV-2% Ba-ZnO respectively within 100 minute as shown in as shown in the above figure 4.

Influence of Barium doping on ZnO was examined by using 2% (mole ratio) content of Barium may favours separating charge-carriers effectively and hindered the re-combination of e- - h+ pairs. Hence, enhances the photo-catalytic activity. The photo degradation rate was maximum with 2% Ba-ZnO compared with UV and UV-ZnO hence, further studies were carried out with UV-2% Ba-ZnO.

Effect of Photo-catalyst Dosage

UV–visible spectral changes during the degradation of Methyl Orange at 25±0.2^{0}C,[M.O] = 2.0 x 10-5 mol dm-3, pH = 4, 2% Ba-ZnO = 0.1 g l-1. light intensity 4 mW/ cm^2

Time (1) 00.00 min (2) 15.00 min
(3) 30.00 min (4) 45.00 min
(5) 60.00 min (6) 75.00 min
(7) 90.00 min

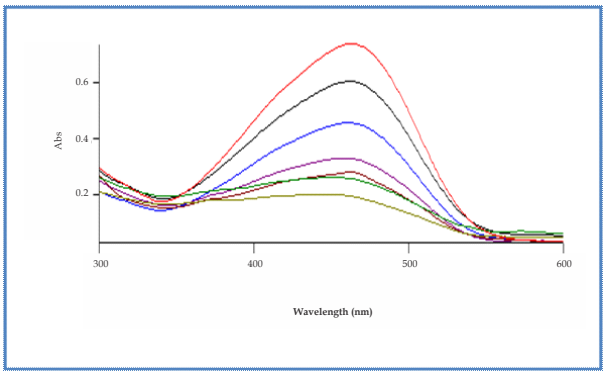


Fig. 5:

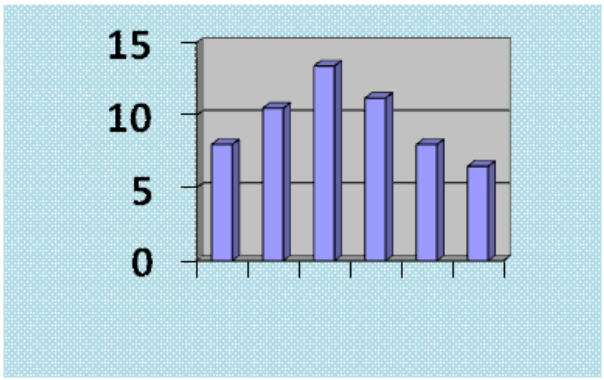
To study the influence of photo-catalyst dosage test were performed taking various amounts of 2% Ba-ZnO and keeping [M.O.] constant at 2 × 10-5 mol dm-3. It is investigated that an increase in amount of semiconductor catalyst, increases the photo-degradation as shown in below Table 1 and Figure 6. But, when the amount of semiconductor catalyst exceeds the optimum amount (0.1 g l-1) the photo-degradation activity decreases. This behaviour may be due to, an enhancement in the number of active centres on semiconductor. In turn the rate of radical formation increases. Hence, photo-catalytic rate of reaction increases initially. Whereas, at higher amount of semiconductor catalyst above 0.1 g l-1., leads to increase in turbidity of the M.O. solution, as a result the light can't reach the semiconductor surface due to masking effect. Hence, decrease in the rate of photo-degradation was observed [8].

Effect of different amounts of 2% Ba-ZnO photocatlyst on the degradation of M.O. at [M.O.] = 3 x 10-5 mol dm-3, at pH=4, light intensity = 4mW/cm²

Table 1:

Photocatalyst	Amount of Photo-catalyst (g l-1)	k obs x 103 (min-1)
2% Ba-ZnO	0.020	08.0
	0.040	10.5
	0.100	13.4
	0.120	11.2
	0.140	08.0
	0.160	06.5

Effect of different amounts of 2% Ba-ZnO photocatlyst on the degradation of M.O. at [M.O.] = 3 x 10-5 mol dm-3, at pH=4, light intensity = 4mW/cm²



X axis= Amount of Photo-catalyst (g l-1)
Y axis = k obs x 103 (min-1)

Fig. 6:

Effect of M.O

The influence of initial [M.O.] on the degradation rate was examined by altering the [M.O.] from 0.5 x 10–5 to 5.0 x 10-5 mol dm-3 & keeping photo-catalyst quantity constant (i.e. Ba-ZnO = 0.1g l-1). The degradation rate of M.O. was initially enhances with enhance in the [M.O.]. After 2 x 10-5 mol dm-3 limiting value increase in [M.O.] leads to decline in the rate constant. This depicted in following Table 2 and Figure 7.

It is due to fact that the more number of active centres on the semiconductor photo-catalyst existing initially for reaction which is incredibly vital for the degradation of M.O., but as the M.O concentration increased above 2 x 10-5 mol dm-3 the suspension became more turbid & covers the photo catalyst surface.

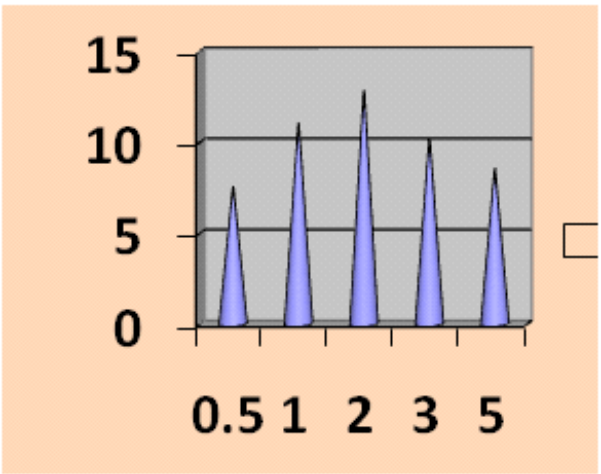
Hence, the light entering the solution decreased there by only less number of photons strikes the surface of semiconductor. Hence, the formation of OH. & O2-. radicals were limited. Even at higher [M.O.] the path length was further condensed & the photo-degradation was insignificant [9].

Effect of of [M.O.] on photocatalytic rate constants with 2% Ba-ZnO at 25⁰C [Ba-ZnO] = 0.1 g l-1, at pH=4, light intensity = 4mW/cm²

Table 2:

Photo-catalyst	[M.O] x 105 (mol dm-3)	k obs x 103 (min-1)
2% Ba-ZnO	0.50	07.50
	1.00	11.00
	2.00	12.80
	3.00	10.20
	5.00	08.50

Effect of of [M.O.] on photocatalytic rate constants with 2% Ba-ZnO at 25⁰C, [Ba-ZnO] = 0.1 g l-1, at pH=4, light intensity = 4mW/cm²



X axis = [M.O] x 105 (mol dm-3) Y axis = k obs x 103 (min-1)

Fig. 7:

Effect of pH

The M.O. photo-catalytic mineralization rate was examined by altering pH 4 to 8, by keeping other reaction conditions constant. It is observed that the rate of reaction decreases with increase in

pH of the medium as shown in following table and figure. This behaviour may be explained on the basis of surface properties of adsorbent and adsorb ate. In acid-medium the surface of a semiconductor acts as a positive surface where as dye molecule act as a negative ion, hence strong electrostatic force of attraction leads to strong adsorption and consequent degradation takes place hence the rate of photo-catalytic degradation increases.

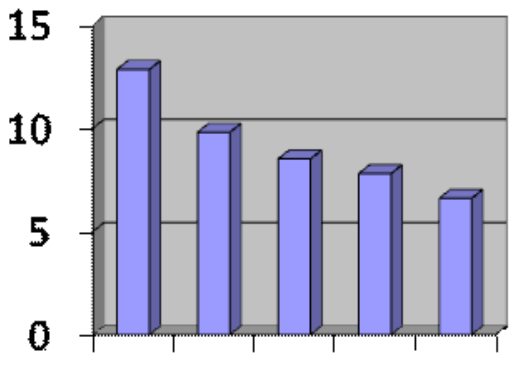
Where as in alkaline medium photo-catalyst surface acts as a negative surface and dye molecule also acts as negatively charged. Hence, the repulsion between two negatively charged species (OH– ions and M.O. dye) takes pace. Thus, the rate of mineralization of M.O decreases at higher pH value [10].

Effect of pH on the rate constant of photo catalytic degradation of M.O. with 2% Ba-ZnO at 25^{0}C, [Ba-ZnO] = 0.1 g l-1, [M.O.] = 3 x 10-5 mol dm-3, light intensity = 4mW/cm^2

Table 3:

Photo-catalyst	pH	kobs x 103 (min-1)
2% Ba-ZnO	4	12.84
	5	09.80
	6	08.51
	7	07.80
	8	06.60

Effect of pH on the rate constant of photo catalytic degradation of M.O. with 2% Ba-ZnO at 25^{0}C, [Ba-ZnO] = 0.1 g l-1, [M.O.] = 3 x 10-5 mol dm-3, light intensity = 4mW/cm^2



X-axis = PH Y-axis = kobs x 103 (min-1)

Fig. 8:

Effect of UV Lamp Distance

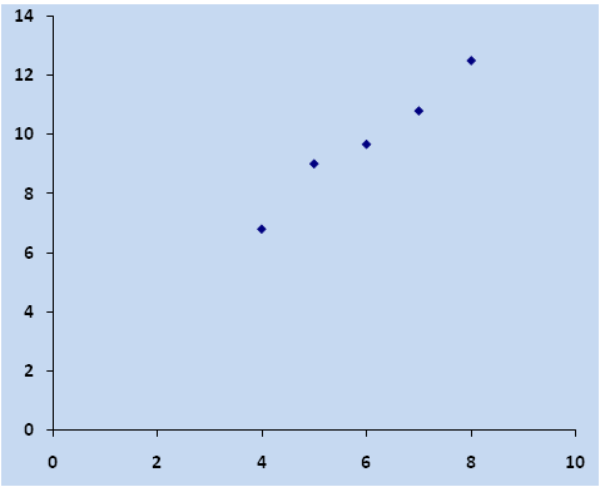
Effect of intensity of light on the mineralization of rate constant of M.O. was observed by differing UV lamp distance from the target. It is observed that, a increase in UV intensity of light increases the rate of photo catalytic degradation of M.O. as shown in following table and figure. It is due to fact that, as the UV- intensity increases; the amount of photons per-unit-area of the photo-catalyst (2% Ba-ZnO) also increases. Subsequently, plenty of e- - h+ pairs are generated; consequently the h+ mineralize the M.O. molecules adsorbed on the semiconductor surface & oxidise to water. This results in effective mineralization of MO [11].

M.O. degradation under different UV intensities M.O. with 2% Ba-ZnO at 25^{0}C, [Ba-ZnO] = 0.1 g l-1, [M.O.] = 3 x 10-5 mol dm-3, at pH = 4.

Table 4:

Photocatalyst	Light intensity (mW/cm^2)	k obs x 103 (min-1)
2% Ba-ZnO	4	06.80
	5	09.01
	6	09.67
	7	10.80
	8	12.50

M.O. degradation under different UV intensities M.O. with 2% Ba-ZnO at 25 oC, [Ba-ZnO] = 0.1 g l-1, [M.O.] = 3 x 10-5 mol dm-3, at pH = 4.



X axis= Light intensity (mw/cm2)
Y axis= Kobs X 103 (min -1)

Fig. 9:

Conclusion

Chemical precipitation method was used to synthesize pure ZnO and Ba-ZnO nanoparticles. The XRD patterns and SEM topography shows that prepared nanoparticles were wurzite structure. The average particle size of 2% Ba-ZnO (25 to 40 nm) exhibited excellent achievable photo-catalytic degradation of M.O. in the acidic condition (pH 4). It was found that 2% Ba-ZnO shows the highest activity for degradation of methyl orange compare to ZnO.

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The National Science Film Festival of India-Films on Life Sciences Is in High Demand

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Abstract

Films are the medium of choice since many years for communication of the massages. The impact of films marked on the mind and thoughts of the viewers. In the India the traditional education tolls includes books, black boards, reading, writing, reciting activities. But the scenario is shifting towards the technology intervention in education. The less numbers of teachers, difficulty in reaching to each student enhances the technology like films, video conferencing; online lectures to increase reach to each student. The film making learning is art and science collaboration. It need creative minds and scientific as well. The language of films is different than books. Films always need catchy titles, small dialogues to understand more in fewer words. This audio-visual medium connects the viewer more than text books. In Vigyan Prasar popular science film production started about two decades ago. To encourage science film making in India, the Vigyan Prasar came up with a science film festival originally titled as Rashtriya Vigyan Chalchitra Mela (RVCM) and at present National Science Film Festival (NSFF). The various films submitted by the national and international producers are categorized in various categories and screened in festival among viewers. The learning attitude enhanced by adopting the workshop along with screening of films. The event is educational, entertainer, and above that it enhances the scientific thinking among the participants. In the present study the films received during 2015 were analyzed. The comparative study is performed in between the NSFF and other Indian Science film festivals and competition. There are rising concern among the viewers about health, biology and others issues.Life science is responsible for genesis of interests and curiosity because the subject is about life.

Keywords: Education; National Science Film Festival (NSFF); Rashtriya Vigyan Chalchitra Mela (RVCM); Vigyan Prasar; India.

Introduction

The film festival phenomenon was historically originated in Europe in 1930s and spread worldwide.At present different types of film festivals operate in all countries. (Olga Bauer, 2006-07)

Science film making requires creativity and science understanding. The thrust for understanding the concepts, principles, laws in science and visualization of each and everything in new innovative way is the basics of science film making. The Vigyan Prasar developed a guideline for making science films.

Guidelines for uses of visuals/shots in science serial/ science news/documentary films

As general guidelines while producing documentary films or news program the following points need to be kept in mind.

Repeat shot: If a visual was repeated in one episode of the news program twice or visuals of one episode in another episode is termed as repeat shot.

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As a general rule shots should not get repeated. But if the need arises then repeat shots should be used prudently. It is better that in such situations proper consultation is done with the relevant persons. There may be times when repetition can't just be avoided.

Some shots are of such a nature (like a big and visually interesting event) that there repetition can enhance the impact and comprehension of a particular story in the viewers mind. In such cases also decision should be taken separately about the use of visuals.

Copyright violated shot: Shots downloaded from internet without proper permission will be treated as copyright violation and films produce will be responsible that violation.

Archival shot: Archival shots are shot from history.

Stock shots: Stock shots means shots taken by the producer which is original and made a stock of it. Necessary but should be used judiciously.

The shots of space crafts, space mission and astronomical objects and others for similar kinds will be considered in this category.

Judicious use of shots needs to take care as well as producer may incorporate graphics and animations instead of repetitions of same shots many times. Freely available shots in open source need to be explored. Shots need to be selected before story telling.

Treatment of news: Each news shall have different treatment for variety of news, for example:

News can be started from particular and end in general (P to G mode) means start with the particular case and end with possible solution by this way public will be connected with the news segment.

News can be started with sound so that will attract the viewer and increase the curiosity about news.

News can be started with the best quotes/ words/sentence by famous personalities.

Story Treatment: Science Stories should be forward looking.- Stories should try to have a human angle otherwise viewer would not feel connected to it. - Stories should cite proper examples and case studies.

P to G format: Story should start with a particular example or examples and then go on describing the new scientific innovation addressing the problem. After that its impact on the General Public can be described

PPF format: In context of a scientific phenomenon the Story describes the present situation and then deals with the past experience and then carries on to speak for the future.

Use of Ambience: Science stories often have very good natural sounds. Like the sound of a machine, of an aeroplane, of a bird etc. These sounds can be beautifully integrated in the story to make it more impact full and meaningful as they create the proper ambience.

Voice over: Use of effective voice over with pause at proper place is needed. Avoid the bytes by experts/public unless necessary.

Audio and video errors in programmes: Any content error, pronunciation error, graphical errors should strictly be banned. It gives wrong impression of the programme as well as the owner of the programme.

Use of Voice Over: Narration is very important. Bad delivery of narration can ruin a good script. So voice over should be greatly taken care of. Separate stories should have separate voices to avoid monotony. If there is a crunch of voice over artists than at least two subsequent stories should not have the same voice over. Programme should contain both male and female voice over for greater impact, variety and balance.

Sludge in news programme: It can be allowed to use but care need to be taken that sludge may not be used to fill the need of graphics and animations.

Uses of bytes in news: Care should be taken to use short bytes less than 30 seconds and may be up to 45 seconds if some eminent personality is speaking. Shorter bytes

Bytes should normally be short, of not more than 15 to 20 sec duration. Longish bytes are monotonous and boring. But if a longer byte is unavoidable (like if the speaker is very important) then proper visuals should be used over the byte. Other important parts of the byte can be incorporated in the voiceover.

Animation & Graphics: Science stories should make maximum use of animations, graphics and

diagrams. It increases the comprehension of a particular process and makes greater impact in comparison to just dull visuals.

Methodology

The films to be invited for the competition pre-categorized as detailed:

The films were categorized in various categories like Films made by government and non-government institutions/organizations-category A, Film made by independent film makers/production houses-category B,Films made by college students-category C,Films made by students studying in minutes class 6th to 12th-category D, and Films made with foreign collaborations & Films from other countries Films made by host organizations –category noncompetitive. The analysis of the films is based on the data of 1 year of time.

Table 1: Showing various categories of films received

Competitive Category	Duration
Category A	
Films made by government and non-government institutions/organizations	15-25 minutes
Category B	
Film made by independent film makers/ production houses	15-25 minutes
Category C	
Films made by college students	5 - 25 minutes
Category D	
Films made by students studying in minutes class 6th to 12th	upto 10
Category E	
Films made on spot mobile phone	upto 5 minutes
Non Competitive Category	
Films made with foreign collaborations ß Films from other countries	
Films made by host organizations	

After the receipt of the films, first classified in various categories into various categories depending on the details filled up by the applicant. A jury comprising of well known scientists and film makers watch each film and shortlist them. The films then again critically viewed by the higher jury and selected the award for the films in each category. This activity held 1-2 months prior to actual festival. The shortlisted films were then ready for screening in the festival. The film producers, directors, students all watch the films. After the film screening schedule there is workshop with nominated experts. The workshop includes lectures, critics about the films and penal discussion. The students directly interact with the film Producer/Director and solve their query related to the film making.

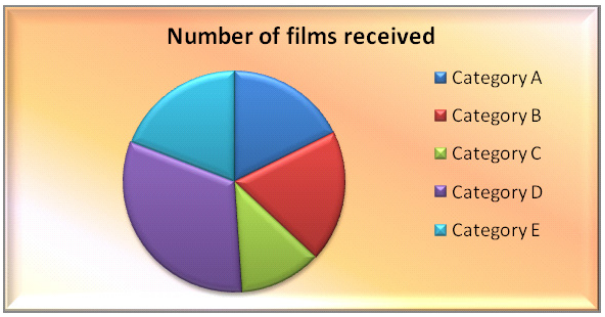

Fig. 1: Graph showing the numbers of films received category wise

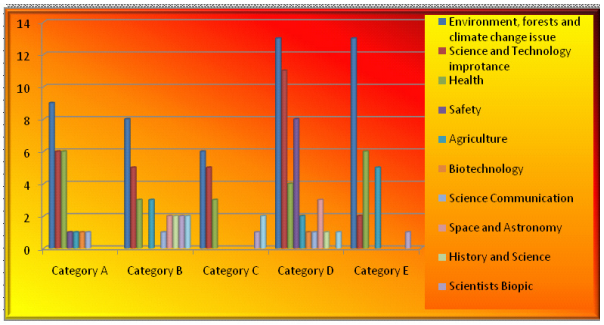

Fig. 2: Graph showing numbers of films (X-axis) and category of films (Y-Axis)

The films received in each category classified into the subject theme on which the film is based. The results observed are amazing and important.

The figure 1 revealed that the category D has highest numbers of films submitted from the film makers followed by the category B, E, and A respectively. The figure 2 results shows that there is more focus on Environment and Climate change subject among the Indian film makers followed by Health Sciences and Science and Technology importance.

Discussion

The film making in science is a challenging job which requires both skills and intellectuals. The students always learn the during film making in

science. The approach and the treatment of the films always changes with the topic of science and technology. The film on environment needs different types of planning and scripting as compared to health science or any other science subjects. The national science film festival is example for the encouragement of the science film makers. Those new in film making can obtain new platform for their creativity appreciation. In the student category the films are some time not properly edited, voice over with background noise may be the cause of the decrease in quality of films. Along with the NSFF, the India International Science Festival was also a major event which was held during the 2015 organized signifies a collective effort towards nurturing scientific temper at the global level. The aim behind organizing this festival was to provide a platform to thousands of young researchers and students across the nation and other neighboring countries for discussing scientific ideas and innovations on issues of global relevance. The event was inaugurated by Harsh Vardhan, Union Minister for Science and Technology, and Earth Sciences. The festival focused on the major scientific achievements by youth and future prospects in the scientific arena through Young Scientists' Meet (YSM), Mega Science, Technology and Industrial Expo, International Science Film Festival, Innovation Models and 'INSPIRE' presentations, IRIS National Science Fair (Initiative for Research and Innovation in Science), Scientist–Students Interaction, workshops and interactive sessions, and the largest collective science practical session 'Catalysis' with the aim to enter the Guinness World Records. More than 10,000 participants, including about 2000 students from different corners of the country as well as from foreign countries participated in this science festival. IISF 2015 had been the first science festival organized in our country to promote the 'potential benefits of science to the society', and simultaneously inculcating and nurturing the scientific caliber. (India International Science Festival 2015)

The second edition of Science Film Festival of India (SCI-FFI) was inaugurated in January 2017 at Goa. The four-day-long extravaganza had a range of blockbuster science-fiction films, interactions by experts and scientists from January 17-20 at Inox, Panaji. The festival opened with the films on mathematical extraordinaire Srinivasa Ramanujan 'The Genius of Srinivasa Ramanujan' and 'The Man Who Knew Infinity'. The films focus on the life and academic career of the pioneer Indian mathematician.

The festival will focus on four distinct themes: mathematics, genetics, futuristic and space that will enthrall the audience. Each day has been carefully crafted with films and expert interactions and that will help the festival participants explore and enhance the themes and showcase what Science can bring to them. Conceptualized by Vidnyan Parishad the event's primary objective is to popularize science among the student community andurge them to take up a career in science instead of just engineering and medicine. (http://timesofindia.indiatimes.com).

Summary and Conclusion

The science film festivals are best platform for the film makers. The films makers can meet discuss the challenges faced by them during their film production. The film makers always have ethical practice in production of films like follow guideline of film making, don't do copy paste jobs, films should not be another text book reading. The film must have ups and down, emotional balance in visual and voice. Judicious use of sound volume, different phases of sound, doesn't repeat same shots to fill the gaps. Always think from angle of viewer. In-depth research on the topic is always the main backbone of the science films. The results shows that there is many subject areas where lesser number of entries coming in festival. The regional science film festival in the regional languages like Assumes, Guajarati, Marathi, Punjabi, Urdu, Tamil, Telgu, Malayalam is the present day need of the science film making industry. The promotion of science through films is well accepted approach as films directly touches our minds, heart and thoughts. The films have capability to transform the society towards the good and keep one away from the bad. The whole focus of audience shifted more on life science films side rather on other issues. The production of films always depends on the subject area in demand.

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Revised Rates for 2018 (Institutional)

Title	Frequency	Rate (Rs): India		Rate ($):ROW	
Community and Public Health Nursing	3	5500	5000	430	391
Dermatology International	2	5500	5000	430	391
Gastroenterology International	2	6000	5500	469	430
Indian Journal of Agriculture Business	2	5500	5000	413	375
Indian Journal of Anatomy	4	8500	8000	664	625
Indian Journal of Ancient Medicine and Yoga	4	8000	7500	625	586
Indian Journal of Anesthesia and Analgesia	4	7500	7000	586	547
Indian Journal of Biology	2	5500	5000	430	391
Indian Journal of Cancer Education and Research	2	9000	8500	703	664
Indian Journal of Communicable Diseases	2	8500	8000	664	625
Indian Journal of Dental Education	4	5500	5000	430	391
Indian Journal of Forensic Medicine and Pathology	4	16000	15500	1250	1211
Indian Journal of Emergency Medicine	2	12500	12000	977	938
Indian Journal of Forensic Odontology	2	5500	5000	430	391
Indian Journal of Hospital Administration	2	7000	6500	547	508
Indian Journal of Hospital Infection	2	12500	12000	938	901
Indian Journal of Law and Human Behavior	2	6000	5500	469	430
Indian Journal of Library and Information Science	3	9500	9000	742	703
Indian Journal of Maternal-Fetal & Neonatal Medicine	2	9500	9000	742	703
Indian Journal of Medical & Health Sciences	2	7000	6500	547	508
Indian Journal of Obstetrics and Gynecology	4	9500	9000	742	703
Indian Journal of Pathology: Research and Practice	4	12000	11500	938	898
Indian Journal of Plant and Soil	2	65500	65000	5117	5078
Indian Journal of Preventive Medicine	2	7000	6500	547	508
Indian Journal of Research in Anthropology	2	12500	12000	977	938
Indian Journal of Surgical Nursing	3	5500	5000	430	391
Indian Journal of Trauma & Emergency Pediatrics	4	9500	9000	742	703
Indian Journal of Waste Management	2	9500	8500	742	664
International Journal of Food, Nutrition & Dietetics	3	5500	5000	430	391
International Journal of Neurology and Neurosurgery	2	10500	10000	820	781
International Journal of Pediatric Nursing	3	5500	5000	430	391
International Journal of Political Science	2	6000	5500	450	413
International Journal of Practical Nursing	3	5500	5000	430	391
International Physiology	2	7500	7000	586	547
Journal of Animal Feed Science and Technology	2	78500	78000	6133	6094
Journal of Cardiovascular Medicine and Surgery	2	10000	9500	781	742
Journal of Forensic Chemistry and Toxicology	2	9500	9000	742	703
Journal of Geriatric Nursing	2	5500	5000	430	391
Journal of Microbiology and Related Research	2	8500	8000	664	625
Journal of Nurse Midwifery and Maternal Health	3	5500	5000	430	391
Journal of Organ Transplantation	2	26400	25900	2063	2023
Journal of Orthopaedic Education	2	5500	5000	430	391
Journal of Pharmaceutical and Medicinal Chemistry	2	16500	16000	1289	1250
Journal of Practical Biochemistry and Biophysics	2	7000	6500	547	508
Journal of Psychiatric Nursing	3	5500	5000	430	391
Journal of Social Welfare and Management	3	7500	7000	586	547
New Indian Journal of Surgery	4	8000	7500	625	586
Ophthalmology and Allied Sciences	2	6000	5500	469	430
Otolaryngology International	2	5500	5000	430	391
Pediatric Education and Research	3	7500	7000	586	547
Physiotherapy and Occupational Therapy Journal	4	9000	8500	703	664
Psychiatry and Mental Health	2	8000	7500	625	586
Urology, Nephrology and Andrology International	2	7500	7000	586	547

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Review Article

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Importance of Palliative Care in Cancer: Indian Scenario

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Abstract

The cancer treatment is at present based on chemotherapy and radiotherapy. Both these treatments have lots of side effects including severe pain to the patients. Thus, importance of palliative care to the cancer patients is more needed for management of cancer. As per the World Health Organization definition the Palliative care is an approach that improves the quality of life of patients and their families facing the problem associated with life-threatening illness, through the prevention and relief of suffering by means of early identification, assessment and treatment of pain and other problems, physical, psychosocial and spiritual. Some of the objectives of Palliative care are provides relief from pain and other distressing symptoms; affirms life and regards dying as a normal process; intends neither to hasten or postpone death; integrates the psychological and spiritual aspects of patient care; offers a support system to help patients live as actively as possible until death; help the family cope during the patient's illness and in their own betterment. The review study reveals that there is need for increase of palliative care in India. The palliative care at present is about 1-2% of total patients suffering from cancer which need to be increased to maximum patients. A case study did by Ankit Chandra (2016) stated that the palliative care can be increased by awareness among the public. Here role of Institution engaged in Science Communication and Healthcare like ICMR, Vigyan Prasar, NISCAIR-CSIR become more important for carrying out mass awareness towards this social issue of palliative care.

Keywords: Palliative Care; Treatment; Cancer; India.

Introduction

In the past few decades, there is a slow and constant increase in numbers of cancer patients observed in India. The cancer term is not new in society and defined as the abnormal growth of cells with or without spreading capacity to other parts of the body. The increase in numbers of cancer in India mainly depends on the use of chemicals in the fields during sowing of various crops. This can be ascertained that there is a rise in numbers of patients in Punjab state which is famous for the production of wheat and related crops. Recently published news in down to earth magazine regarding survey done by the Punjab Government indicates that there are at least 90 cancer patients for every 100,000 population in Punjab. This is also observed that the incidence of cancer in Punjab is higher than the national average of 80 per 100,000 populations. The study was performed by door-to-door survey1. Every state and thus the whole country facing a slow rise in cancer patients. The cancer treatment is at present based on chemotherapy and radiotherapy. Both these treatments have lots of side effects including severe pain to the patients. The cancer patients thus need palliative care. As per the World Health Organization definition the Palliative care is an approach that improves the quality of life of patients and their families facing the problem associated with

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life-threatening illness, through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of pain and other problems, physical, psychosocial and spiritual.

Some of the objectives of Palliative care are

To provides relief from pain and other distressing symptoms;

To affirms life and regards dying as a normal process;

To intends neither to hasten nor postpone death;

To integrates the psychological and spiritual aspects of patient care;

To offers a support system to help patients live as actively as possible until death;

To help the family cope during the patient's illness and in their bereavement [2].

The government of India role

The Government of India through Directorate General of Health Services started a centrally sponsored scheme the funding pattern for the palliative care. In the said scheme 40% share will be shared by states except for North-Eastern states of India. For which 10% in case of NE and Hill states [3].

Palliative care is also known as supportive care which is required in the terminal cases of Cancer, AIDS etc. and can be provided relatively simply and inexpensively. Effective palliative care requires a broad multi-corrective approach that includes the family and makes use of available community resources. It can be provided in tertiary care facilities, in community health centres and even in patients' homes. The Ministry of Health & Family Welfare, Government of India, constituted an expert group on Palliative care which submitted its report 'Proposal of Strategies for Palliative Care in India' in November 2012. No separate budget is allocated for the implementation of the National Palliative Care Program. However, the Palliative Care is part of the 'Mission Flexipool' under National Health Mission (NHM).

A model PIP, a framework of operational and financial guidelines, for the states has been designed. By a model PIP, the states/UTs may prepare their proposals related with Palliative Care and incorporate them in their respective PIPs to seek financial support under NHM.

A process to avail

By a model PIP (Guidelines), the states/UTs may prepare their proposals related with Palliative Care and incorporate them in their respective PIPs to seek financial support under NHM.

Goal: Availability and accessibility of rational, quality pain relief and palliative care to the needy, as an integral part of Health Care at all levels, in alignment with the community requirements.

Objectives

1. Improve the capacity to provide palliative care service delivery within government health programs such as the National Program for Prevention and Control of Cancer, Cardiovascular Disease, Diabetes, and Stroke; National Program for Health Care of the Elderly; the National AIDS Control Program; and the National Rural Health Mission.

2. Refine the legal and regulatory systems and support implementation to ensure access and availability of Opioids for medical and scientific use while maintaining measure for preventing diversion and misuse

3. Encourage attitudinal shifts amongst healthcare professionals by strengthening and incorporating principles of long term care and palliative care into the educational curricula (of medical, nursing, pharmacy and social work courses).

4. Promote behaviour change in the community through increasing public awareness and improved skills and knowledge regarding pain relief and palliative care leading to community-owned initiatives supporting health care system.

5. Develop national standards for palliative care services and continuously evolve the design and implementation of the National program to ensure progress towards the vision of the program.

Implementation mechanism

It is envisaged that activities would be initiated through the National Program for prevention and control of cancer, CVD, Diabetes & Stroke. The

integration of national programs is being attempted under the common umbrella for synergistic activities.

Thus, strategies proposed will provide essential funding to build capacity within the key health programs for non-communicable disease, including cancer, HIV/AIDS, and efforts targeting elderly populations. Working across ministries of health and finance, the program will also ensure that the national law and regulations allow for access to the medical and scientific use of Opioids.

The regulatory aspects, as mentioned in the Program, for increasing Morphine availability would be addressed by the Department of Revenue in coordination with the Central Drug Standards Control Organization. Cooperation of international and national agencies in the field of palliative care would be taken for successful implementation of the program.

The major strategies proposed are the provision of funds for establishing state palliative care cell and palliative care services at the district hospital.

Non-Government Organizations engaged in palliative care:

The large NGO in the Palliative care working in India is Pallium India. Pallium India is a charitable trust registered under the Societies Registration Act (no. 693/2003/IV). Pallium India is authorized by Government of India to receive Foreign Donations under the Foreign Contribution Regulation Act. (FCRA). It is a national registered charitable trust formed in 2003 with the following vision and mission: An India in which palliative care is integrated into all health care so that every person has access to effective pain relief and quality palliative care along with disease-specific treatment and across the continuum of care. To catalyze the development of effective pain relief and quality palliative care services and their integration in health care across India through delivery of services, education, building capacities, policy, research, advocacy and information.

Current scenario of Palliative care in India:

With reference to the review by Rajagopal (2015), there is less than 1% of India's population has access to palliative care. The efforts by various organizations engaged in palliative care over the last quarter of a century have resulted in progress. In Kerala, this has 3% of India's population but has maximum percentage of palliative care to the patients. The credit for this work is to NGO's charitable activity.

The year 2014 saw the landmark action by the Indian Parliament, amended India's infamous Narcotic Drugs and Psychotropic Substances Act, thus overcoming many of the legal barriers to opioid access. Education of professionals and public awareness are now seen to be the most significant needs for improving access to palliative care in India [4].

Ayushman Bharat – Pradhan Mantri Jan Arogya Yojana (PM-JAY) was launched by Hon'ble Prime Minister on September 23, 2018. PM-JAY will provide a cover of up to Rs.5 lakh per family per year for health care- secondary and tertiary care hospitalization. The scheme will be benefits to over 10.74 crore vulnerable families. The scheme will be available in cashless and paperless manner at both public and empanelled private hospitals. It is the World's largest healthcare scheme and critically dependent on effective communication that should reach the last mile beneficiary. It is not only important to communicate the features of the scheme to the beneficiaries, but it is also important to keep them updated on the processes involved in availing the benefits. A strong community outreach at State level is key for ensuring effective implementation of PM-JAY. In this journey towards achieving universal health coverage, it is important to keep the general audience continuously updated about various milestones of PM-JAY. The role of communication is also to alert people of misleading information about the scheme and communicate correct information effectively [5].

International Scenario of Palliative care

During a meeting held in Liverpool, UK, November 2013, for the care for the dying. The representatives engaged in care works the from 12 countries participated. The group had been working together for a number of years with a shared focus on the Liverpool Care Pathway for the Dying Patient (LCP) International Continuous Quality Improvement Programme [6].

Conclusion

Palliative care is new in Healthcare. Availability of palliative care to more numbers of Indian Patients with a terminal disease like cancer is the current societal need. Since life with dignity is the fundamental right of every Human Being the palliative care if available to larger masses will ensure this right in its fullest way. Currently, the situation of last stage cancer patients became worse due to both pressure financial and side effects of medications. Many families left their near and dear ones to the Hospital with ignorance due to last stage cancer. Thus they need the support of society and palliative care. Life never to be ended without hope and palliative care is bringing hope in patients. The work of Non-Government Organizations is evident in this area but need more agencies to participate in palliative care. The awareness among the public towards palliative care is the most critical aspect and need to be taken up at the forefront by science communication agencies like Vigyan Prasar, NISCAIR. The role of healthcare agencies for proper registration of patients, making them the availability of information of palliative care by Government and other agencies. The review article study concluded that the Palliative Care to be included by the Government in the planning of various plans for Healthcare. The palliative care for different disease needs different pieces of training and support which need to be included by the Educational Institutions in their curriculum. The goal of availability of palliative care to every needy will not possible when public and other agencies join hand to hand and work in a connected way.

Recommendations

The topic of palliative care is sensitive and emotional topic for care of a human being with terminal disease. In the last stage of life when family members of patients became depressed due to continuous care of patients suffering with cancer, AIDS, Tuberculosis etc. The Government and public participation is the urgent need to come up for the palliative care in interests of public. The states have to mobilize funds to the scheme initiated by central government of India. This will reduce financial burden on family members of patients. Recently Government of India announced Ayushyman Bharat or PM-Jay scheme for providing the health care to needy patients5. In India having many different cultures, terrains, languages etc there is big challenge to implement the PM-Jay efficiently. Participation of public, medical healthcare professionals with full support of Government is the current need for healthy and happy India.

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6. Shuster E. Fifty years later: the significance of the Nuremberg Code. N Engl J Med. 1997;337:1436-40.

Guidelines for Authors

Manuscripts must be prepared in accordance with "Uniform requirements for Manuscripts submitted to Biomedical Journal" developed by international committee of medical Journal Editors

Types of Manuscripts and Limits

Original articles: Up to 3000 words excluding references and abstract and up to 10 references.

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The second page should carry the full title of the manuscript and an abstract (of no more than 150 words for case reports, brief reports and 250 words for original articles). The abstract should be structured and state the Context (Background), Aims, Settings and Design, Methods and Materials, Statistical analysis used, Results and Conclusions. Below the abstract should provide 3 to 10 keywords.

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List references in alphabetical order. Each listed reference should be cited in text (not in alphabetic order), and each text citation should be listed in the References section. Identify references in text, tables, and legends by Arabic numerals in square bracket (e.g. [10]). Please refer to ICMJE Guidelines (http://www.nlm.nih.gov/bsd/uniform_ requirements.html) for more examples.

Standard journal article

[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. J Oral Pathol Med 2006; 35: 540-7.

[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. Acta Odontol Scand 2003; 61: 347-55.

Article in supplement or special issue

[3] Fleischer W, Reimer K. Povidone iodine antisepsis. State of the art. Dermatology 1997; 195 Suppl 2: 3-9.

Corporate (collective) author

[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. J Periodontol 2000; 71: 1792-801.

Unpublished article

[5] Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. Dent Mater 2006.

Personal author(s)

[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

Chapter in book

[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion and composition of saliva. In: Fejerskov O,

Kidd EAM, editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. p. 7-27.

No author given

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

Reference from electronic media

[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979-2001. www.statistics.gov.uk/downloads/theme_health/HSQ20.pdf (accessed Jan 24, 2005): 7-18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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- Conflicts of interest disclosed

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