



## Response of *Rhodococcus* sp. to Various Concentrations of Chlorpyrifos in Chemically Defined Media

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### ABSTRACT

The presence of xenobiotic chemicals in the environment has a significant negative impact on human health. Soil is the primary source of xenobiotics when compared to other environmental components. Bioremediation is a method that uses microbes to change pollutants while they go about their daily lives. These microorganisms are common in nature, with higher numbers and biomass than other species on the planet, greater diversity and capability in their catalytic systems, and the ability to function in the absence of oxygen and other harsh conditions. Present study evaluates the pesticide resistant potential of *Rhodococcus* sp. against an organophosphorous pesticide, chlorpyrifos. Our results clearly indicate the growth of chlorpyrifos resistant species of *Rhodococcus* and the colonies were found to be growing at 0.5%, 1.5% and 2.5%. Our research throws some light on the potential use of *Rhodococcus* species as biofertilizers in chlorpyrifos contaminated soils.

### 1 INTRODUCTION

The natural environment that surrounds us is the most crucial aspect of our existence on our planet. The survival of life on Earth requires a safe and healthy environment. However, in this age of advanced industrialization and modernization, human activities are to blame for the introduction and build up of harmful and dangerous contaminants such as environmental xenobiotics (Mishra, Lin & Bhatt 2021). Pesticides, antibiotics, synthetic steroids, and biological waste chemicals are all examples of xenobiotics, which are laboratory-made molecules. These compounds are alien substances to human and animal cells (Bhatt, Gangola & Chaudhary 2019). Due to their toughness, they might create a number of issues. This may be seen in humans and other living species. The tenacious character of these compounds aids their resistance to degradation. These toxic chemicals may be metabolised by microbes, providing carbon and nitrogen to the bacteria as well as nourishment (Sharma & Bhatt, 2016)

Bacterial species like *Pseudomonas*, *Escherichia*, *Sphingobium*, *Pandora*, *Rhodococcus*, *Gordonia*, *Bacillus*, *Moraxella*, *Micrococcus* (aerobic bacteria), *Pelotomaculum*, *Desulfotomaculum*, *Syntrophobacter*, *Syntrophus*, *Desulphovibrio*, *Methanospirillum*, *Methanoseta* (anaerobic bacteria) and fungal species like *Phanerochaete chrysosporium*, *Aspergillus niger*, *Aspergillus ochraceus*, *Penicillium chrysogenum*, *Fusarium* sp., *Cladosporium* sp., *Candida tropicalis* SK21 (aerobic),

*Neocallimastix*, *Piromyces*, *Ontomyces*, *Buwchfawomyces*, *Anaeromyces*, *Orpinomyces*, *Cyllumyces*, *Caecomycetes* (Anaerobic), etc. have been isolated from soil and characterized for their biodegradation potential of xenobiotic compounds (DDT, lindane, PCBs, TNT, and crystal violet) (Ellouze & Sayadi, 2016; Leis, Dresch, & Peintner, 2014; Liggenstoffer, Youssef, Couger, & Elshahed, 2010).

Microorganisms break down substances into simpler forms through biochemical change. One of the most often used pesticides is organic phosphorus pesticides (OPPs), sometimes known as organophosphorous pesticides. They have a high level of environmental resistance and are harmful to biotic components (Dahmardeh and Esmaili).

In the days after application, chlorpyrifos adsorbs more strongly to soil and penetrates deeper into the soil matrix, making it less useful for volatilization and necessitating the use of alternative degrading processes. An organophosphorous insecticide, chlorpyrifos, is widely used in agriculture to control pests. (Bisht, Harsh, Palni 2019). Bacteria and fungi, of all microorganisms, have the highest ability for development on chlorpyrifos (substrate), which is why degradation tests were done on them. Synthetic compounds may be degraded by soil microorganisms and used as a single source of carbon and energy. (

Singh, Walker, & Morgan 2004) (Yang, Zhao, & Zhang 2005) (Yang, Liu & Guo 2006) (Ghanem, Orfi & Sharma 2007) (Awad, Sabit & Abo-Aba 2011) *Rhodococcus* is a Gram-positive bacterium that is acid-fast, catalase-positive, non-motile, and non-endospore. The genus *Rhodococcus* was initially described by Zopf. This bacterium can be isolated from a wide range of environments and thrives in non-selective medium. A wide range of phenotypic characterizations are used to compare different geological species.

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## 2 Material and Methods

### 2.1. Sample Collection

The soil samples were taken from the Life Science Departmental Garden at the Institute of Applied Medicines And Research. Rhizosphere soil was collected in polybags from two independent Sugar Apple and Java Plum trees and transferred to the laboratory, where the soils were mixed and pebbles were removed to determine microbial degradation. In nature, the soils are loam, sandy loam, alkaline, and saline. With low to medium organic carbon, accessible phosphorus, and medium to high potassium availability, the soil texture ranges from light to heavy. Soil samples were taken at random from locations that had never been exposed to chlorpyrifos. Soil samples were transported to the laboratory and kept refrigerated (at 40°C) until analysis. The pH of the soil is 7.64.

### 2.2. Isolation and Characterization of *Rhodococcus* sp.

To isolate soil microorganisms, the serial dilution approach on trypticase soya agar and MHA (muller hinton media) was used. Soil sample was weighed (1 g) and serially diluted at  $10^{-1}$ ,  $10^{-2}$ ,  $10^{-3}$ ,  $10^{-4}$ ,  $10^{-5}$ ,  $10^{-6}$ ,  $10^{-7}$ ,  $10^{-8}$ , and  $10^{-9}$  dilutions. The serial dilutions of the sample soil were spread evenly on the media plates. The plates were paraffin-sealed and kept at a temperature of 28°C to 30°C in an incubator. (Murugalatha, Sonam & Anoop 2018)

### 2.3. Identification and Biochemical Characterization of *Rhodococcus* sp.

Small, discrete, smooth and mucoid colonies were observed on the agar plates. Further characterization of *Rhodococcus* was done by Gram staining and a number of biochemical tests like urease, catalase, and oxidase were performed. (Javed, Taku & Sharma 2017)

### 2.4. Survival Studies in Chlorpyrifos Amended Sterile & Non Sterile Soil

The chlorpyrifos concentrations employed were 0.25, 0.5, 0.75, 1, 1.25, 1.5, 1.75, 2, 2.25, 2.75, 3 percent, respectively. The chlorpyrifos dilutions were made in distilled water. The control was maintained. The experiment was conducted in triplicates.

In thermacoal glasses, the experiment was carried out in sterile and non-sterile field soil. Both sets of sterile and non-sterile soil were amended with 0.25, 0.5, 0.75, 1, 1.25, 1.5, 1.75, 2, 2.25, 2.75, 3 % for *Rhodococcus* spp. The chlorpyrifos was completely mixed, and each set of *Rhodococcus* cells was infected with the best chlorpyrifos strain. Field moisture conditions of 50-55 percent were maintained using distilled sterilised water, and the experiment was conducted at 30°C. There were three copies of each set of glasses. After every 5, 10, 15, 20, 25, and 30 days of inoculation, a 1g sample was taken from each glass. The appropriate dilution was placed (in triplicate) on corresponding media containing the same concentration of chlorpyrifos after serial dilution in 0.6 percent saline solution. The amount of bacteria was counted and compared to a control group that had not been inoculated with chlorpyrifos.

### 2.5. Isolation of Resistant Strains:

The dextrose content of the medium is reduced when making trypticase soya agar and the chlorpyrifos concentration is increased to the necessary level. The sterile and non-sterile soils are serially diluted at a concentration of 0.5, 1.5, and 2.5 using 1gm soil each. Inoculation was conducted on hardened TSA plates with dilutions of  $10^{-1}$ ,  $10^{-2}$ ,  $10^{-3}$ , and  $10^{-4}$ . The plates were then incubated at a temperature of 28°C to 30°C and were observed for the growth of colonies.

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## 3 Results and Discussion

In nature, the soils are loam, sandy loam, alkaline, and saline. The soil texture varies from light to heavy, with a low to medium moisture content. The pH of the soil is 7.64.

### 3.1. Colony Count of *Rhodococcus*

Colony count on (MHA) medium revealed mucoid and creamy colonies with a lower count in  $10^{-4}$  means when the dilution was raised. On  $10^{-4}$  dilution, colony count on (TSA) selective media revealed pigmented creamy and orange coloured colonies, with less number.

Dilutions	Colony count on MHA	Colony count on TSA
$10^{-1}$	52	36
$10^{-2}$	34	24
$10^{-3}$	26	19
$10^{-4}$	21	10

Table 1 - Colony count on MHA and TSA on different dilutions

### 3.2. Biochemical Characterization of *Rhodococcus*:

*Rhodococcus* was shown to be Gram-positive as a consequence of gram staining. They are encapsulated intracellular bacillus with a variety of shapes ranging from coccoid to lengthy and club-shaped. On normal media, they start off as little white mucoid colonies that grow into big salmon-coloured colonies. The colour of urease test tube has changed from yellow to pink, indicating that the bacteria are urease positive. Bacterial colonies isolated gave a positive catalase test when colonies were smeared over the hydrogen peroxide it gives quick effervescence of  $O_2$ . Test for oxidase gives negative result as there is no colour change in the oxidase disc.

### 3.3 *Rhodococcus* Survival Studies in Different Chlorpyrifos Concentrations

To control bacterial development, a low dosage of chlorpyrifos was initially utilised. As can be seen in the table, the growth of bacteria in  $10^{-3}$  and  $10^{-4}$  dilutions in both sterile and non-sterile soil decreased as the concentration of chlorpyrifos was raised. *Rhodococcus* grew well at 0.5 percent and 1.5 percent and 2.5 percent chlorpyrifos concentrations, indicating that it can use chlorpyrifos as a carbon source. The clones  $63 \times 10^{-3}$  and  $77 \times 10^{-3}$  were found in 0.5 % ,  $44 \times 10^{-3}$  and  $66 \times 10^{-3}$  were found in 1.5 % and  $28 \times 10^{-3}$  and  $36 \times 10^{-3}$  were found in 2.5 % of the chlorpyrifos samples. At  $59 \times 10^{-4}$ ,  $77 \times 10^{-4}$ ;  $37 \times 10^{-4}$ ,  $56 \times 10^{-4}$ ;  $24 \times 10^{-4}$  and  $35 \times 10^{-4}$  clones were counted in the 0.5, 1.5 and 2.5% of chlorpyrifos in sterile and non sterile soil respectively.

Table – 2 Colony count on  $10^{-3}$  and  $10^{-4}$  dilutions with different chlorpyrifos concentrations with respect to sterile and non sterile soil

Chlorpyrifos concentrations	Rhodococcus in $10^{-3}$ dilution		Rhodococcus in $10^{-4}$ dilution	
	Sterile	Non sterile	Sterile	Non sterile
Control	85	150	79	143
0.25%	78	86	63	79
0.5%	63	77	59	77
0.75%	60	71	52	75
1%	52	68	43	67
1.25%	48	70	42	60
1.5%	44	66	37	56
1.75%	30	56	29	53
2%	33	51	25	50
2.25%	30	49	27	43
2.5%	28	36	24	35
2.75%	19	26	14	23
3%	10	14	8	11



Figure – 1 Plates A and B showing colonies of non sterile and sterile at 0.5% chlorpyrifos concentration with  $10^{-2}$  dilution.

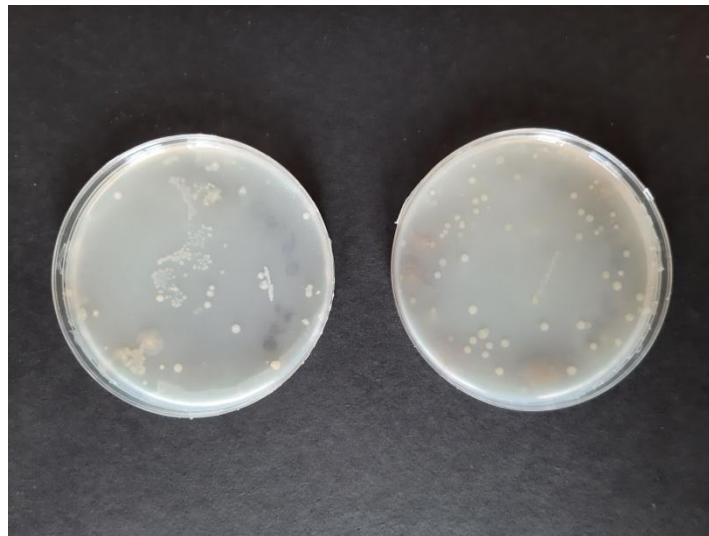


Figure – 2 Plates A and B showing colonies of non sterile and sterile at 2.5% chlorpyrifos concentration with  $10^{-4}$  dilution.

In survival trials, *Rhodococcus* showed good survival (pesticide user) even after the 25th day of inoculation, i.e. the count was lower in 0.5 % chlorpyrifos concentration, indicating its ability to degrade the pesticide.

#### 4 CONCLUSION

In the current study, chlorpyrifos was employed to see if it could be used as a carbon source by *Rhodococcus* sp. Traditional carbon sources were excluded from the medium, and a lower concentration (0.25 percent) was employed as a carbon source at first. Gradually, the concentration was raised to 0.5 percent, 0.75 percent, and one percent. The results of this investigation show that *Rhodococcus* sp. can use low amounts of chlorpyrifos as a carbon source.

Finally, agricultural soil was used to identify a new chlorpyrifos-degrading *Rhodococcus* bacterium. Chlorpyrifos might be used as a carbon source by the bacterial species. The use of Xenobiotic chemicals by microbes is a critical process for removing these substances from the environment and therefore reducing pollution. The findings show that the isolated *Rhodococcus* sp. can grow in the presence of additional chlorpyrifos (0.25, 0.5, 0.75, 1, 1.25, 1.75, 2, 2.25, 2.5, 2.75, 3 percent) in the medium, and hence might be utilised for bioremediation of chlorpyrifos-contaminated soils.

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Look back in the human history; the history of human communication began with the oral or spoken tradition of communication. One step back, the history of human communication started from human signals, natures' signals to express the feeling of human mind with other humans and then the creation of paintings became a powerful medium of communication between the primordial humans while dwelling in the forests and caves. With the passage of time and human history, the dissemination of messages developed from simply the oral tradition to painting to script, print, wired electronics, wireless electronics

and finally digital communication ushered in human civilization.<sup>1</sup> The greatest quantum jump in message dissemination in recent history occurred with the invention and introduction of computers by Charles Babbage between 1833 and 1871, and the Internet in the early 1990s. Since then, this big change and transformation of communication medium has significantly affected humans' perception, thoughts, thinking way of the media, the usage of time and space, and the reach ability and control of the media.

Now in the present age of digital communication or new media age, time has been tighten and flatted by scaling down<sup>2</sup> the distance between different points in space, and the sense of space has led people to feel that local, national, and global space becomes against time.<sup>2</sup> In addition, the reach ability of new media or digital media can now extend to all people equally across the world even in the whole cosmos and no boundary confined to all as well, instead of a limited audience as there is huge crowds in both space and electronic waves of signals and flood of messages and interaction of the masses in no time. This is significant because without the confinement of time and space, the control of message production and dissemination is no longer a privilege possessed only by any monarch, dictators, church, gods in the temples, local kings, State, and government, but instead, equally shared by all individuals across the world as if all are the individuals of the same family. Under this course, new media have influenced the relations of worldly humans and various counterfeits, blemish incurred among the masses socially, economically, politically, and culturally and changing life style as well and conflicts also occurred at large as human nature sometimes go to the roads not taken to mass development if he have such easy tool of new media to sharing, interacting with each other across the world for sending and receiving their notions, ideas, thoughts, happiness, sorrows and way of successful life to lead.

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## 2 RESEARCH PROBLEM

There are various problems in communication studies as well even in the age of information revolution and digital era of communication, however, cultural/media studies, and globalization studies in scholarly researches have been gradually mollified in recent years, but more studies in this direction are still required. The present research study integrates these concepts through the examination, analyzation, and observation of the relationship between new media and intercultural communication. In order to explore how new media influences the process of intercultural communication, the discussion in this paper but there are several areas where are limitations that a researcher cannot reach to the final research as cultural diversification is much even in the same countries, and also there is digital divide among the developed and developing countries as there is no much exposure to the cultural values of the developing countries under the dominance of developed countries' intercultural entity.

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## 3 OBJECTIVES OF THE STUDY

The basic objectives of the present research study are to examine and analyze the impact of new media on intercultural communication in global context.

- To examine and analyze impact of new media on intercultural communication and perceptions of the people of the world on intercultural communication, sharing and receiving thoughts on different cultures.
- To study the views of the people on new media and leveraging from it to interact with the people of diversified cultural backgrounds and understand one another's cultures.
- To examine the cultural conflicts among the nations and media divide or digital divide between developed and developing countries, and dominance of developed countries in both media exposure and intercultural communication.

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## 4 REVIEW OF LITERATURE

All types of innovations in media from traditional media to print media, electronic media and digital media or new media have changed and continue to change the way we think, act, and live. The digitalization of media, as a hybridization of print and electronic media in a binary code, converts analog to digital that requires a completely different mode of production and distribution which modern humans or new modern generation is sharing their hands in new media through smart mobile phones, smart TV channels, smart Radio channels and smart audio-video tools everywhere and every second and every minutes across the world to interact for their good purposes and bad purposes as well. Now language is also no bar to interact and understand the people of different nations, society and culture as new media has bridged this bar of language because new media is itself a global language works to translate the languages of different cultures digitally in their languages and dialect across the curtain of the world.

In 2007, As Chen, the new media scholar, indicated the impact of digital or new media on human society is demonstrated in the aspects of cognition, social effect, and a new form of aesthetics. Chen depicted cognitively, new media demands a non- linear nature and the creation of expectations for

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<sup>1</sup> *Digital communication is the physical transfer of data over point-to-point or point-to-multi-point communication channels through internet signal as it transfers discrete messages and can be done over large distances through internet and other things easily.*

<sup>2</sup> *The Information Age also known as the Computer Age, Digital Age or New Media Age is a historical period that began in the mid-20<sup>th</sup> century, characterized by a rapid epochal shift from the traditional industry established by the Industrial Revolution to an economy primarily based upon information technology.*

content, which directly influences the way people use media. It means new media and its digital contents impact on masses to use media in digital way and teach them to use of new media or digital media for immediate response and delivering messages, sharing and receiving messages in written, in the forms of visuals and in audio-video messages. That is why new media or digital media attracts much to kids to the elders to enjoy the benefits of new media and fast leverages of communication. According to Olason and Pollard in 2004, socially, the most manifested impact of new media is the effect of demassification or mass communication explosives at world level, which denotes that the traditional design of media for a large, homogeneous or one class audience or limited to audiences/masses is disappearing and being replaced by a specific and individual appeal, allowing the audience to access and create the message they wish to produce at their own level, here, we meant to each individual or each audience has his/her own views, own channels and own contents to share and receive that is why we call it dimassification of mass communication, while in the time of traditional media, print media and common electronic media, we the audiences and message senders had no ours own choices to sharing and receiving messages and thoughts.<sup>3</sup> Furthermore, visually, new media brings a unusual digital aesthetical thoughts and views, which refer to, for example, interactivity, manipulation, the repurposing and repurposing or stability of message content across media, deliberate creation of virtual experience, and sampling as a means of generating new immediate content in the minds of sender and receiver of the messages or informations.

No doubt, new media/digital media is also the main force accelerating the trend of globalization in human society and it has also a capacity to bring the different cultures and civilizations in the same platform to sharing with all equally that is the globalization trend has led to the transformation of almost all aspects of human society smoothly in the same platform of digital mode of media. To Chen and Zhang in 2010, for example, socially, economically, politically, culturally and habitually, globalization has changed the perception of what a human community is, redefined the meaning of cultural identity and civic society, and demanded a new way of intercultural interaction as cultures and customs of different communities are influencing one another's cultures and adaptation of cultural thoughts. This is new media which economically intensified global competition enormously in business, profession, industry, agriculture, production, trade and corporate affairs. Communication research scholars Gupta and Govindarajan interpreted in their research studies in 2007, in order to, for example, succeed in global business, a company or a business firm is required to not only understand the local markets in order to meet their global clients' needs, but they must also seek out open markets globally for strong business and leverages from the business, and expanding effective management in global business transactions for company's benefits, for the sake of employees and clients as well. In 2009, communication research scholar Steger says in his study that by virtue of the thrust of new media or digital media, the global trend creates new human social networks and other activities, redefines political, cultural, economic, geographical and other boundaries of human society, expands and stretches social relations, intensifies and accelerates social exchanges, and involves both the micro-structures of personhood and macro-structures of community but he could not define the laws of the different nations on digital or new media as none cannot use digital media beyond the boundary of nations' law and order to maintain healthy human interaction and personal affairs when interacting with different people through new media tools. According to communication research scholar Rantanen in 2006, he says in his studies that from the scholarly thoughts and ideas, traditional studies seldom connected well or integrated the two concepts- "media" and "globalization".<sup>4</sup> Here, his perceptions are right to some extent but the two concepts "media" and "Globalization" cannot be integrated in one way by traditional studies of media because traditional media has no capacity to reach or access the masses globally but new media has this capacity to integrate all types of media concepts to interlink the global masses. New media has motivated to study on three established academic fields on the study of the concepts include communication studies, media studies and cultural studies, and globalization studies because people of the world are not involved in all types of communication studies, here mass media invoke all audiences in its way of thinking and serving the contents of media or media agenda before the masses of the world as masses have their own perceptions on the messages of media studies, communication studies and cultural communication studies where new media provides all types of media studies and contents to the audiences and audiences give their own notions, feedback to that media messages as per the choice of the audiences. New media provides a multi- choice platform or multi-network to the message senders, message receivers and audiences of different users of media. But this is not same among the masses of the world as in developing countries masses are still not fully trained and literate in new media or digital media as they are far away from other countries but visual communication is helping to know the others well because visual digital communication itself makes a network of different people of the different countries to share and receive cultures and other required thoughts to follow. After world war second, communication studies started and become an academic field during the 1950s in the United States for the first time. In this context, beginning with early studies of communication focusing on international communication, speech communication, communication theories, and continuing on to recently expanded intercultural communication tools of new media, communication studies as an academic field tends to ignore the relationship between people and media as communication studies is limited to theories of communication in academics because it does not teach how people use media in different cultural contexts, and how they closely relates to the globalization of human society but smart media or new media/digital media teaches

<sup>3</sup> *Traditional media represents a form of communication employing vocal, verbal, musical and visual folk art forms transmit to a society or group of people. Now the old media like Radio, plays, folklores, village level communication means, etc. are being considered traditional media as their use is not at large level even in the village level after the advent of TV, digital media- newspapers, magazines and now information revolution in communication has changed the scenario of mass communication through internet, computers, digitalization of data and interaction everywhere through smart media tools like smart phones, smart TV, e-newspapers, etc.*

<sup>4</sup> *Globalization "refers to the expansion and intensification of social relations and consciousness across world-time and world-space. In other words, globalization is "social processes in which the constraints of geography on social and cultural arrangements recede and people become increasingly aware that they are receding. It involves the expansion, stretching, intensification, and acceleration of social activities in both objective/material and subjective human consciousness levels, or different levels of human society, including the entire world, a specific nation, a specific industry or organization, and an individual.*

automatically to use of media for personal sake and close to globalization of human society. In this direction, digital media is influencing better to use of media better at all level of intercultural communication and at other level of human affairs.

One step more, the communication research scholars Sparks in 1988 and Thussu in 2000 say in their studies that the field of media and cultural studies emerged in the 1970s in Britain on the basis of defying the preeminent of communication studies in the United States (USA), which was more oriented towards the empirical or discovery paradigm. Yet, most British media studies focus on the role of media institutions that media institutions play greater role in the process of globalization. Many scholars in this area tend to take globalization for granted, by not making an effort to theorize the concept. In the context of media studies and cultural studies which originated from the Frankfurt School of communication studies in Germany interprets that field of media and cultural studies suffer from the lack of concern about the impact of media on masses. Servaes in 2008 says that these problems that exist in media studies and cultural studies are like those that appear between the studies of international communication and intercultural communication.<sup>5</sup> It means problems are there in common media, international communication and intercultural communication and it is with digital media also. Servaes says that cultural studies in European countries and in the United States chiefly pay heed and attention to cultural issues instead of media issues. This notion of the European nation in favors of raising cultural issues more than to media issue show their dominance in culture to subdue others culture and impose on under-developed and developing countries as it used to imperial period of the British in India and in other British imperial nations of South Africa and many more nation. Now in the era of new media or digital media, European nations try to influence and dominant the cultures of the developing countries by their media infrastructure being provided to these developing nation in which various media programs are made with the intention of European and Western cultural contents to influence the people of the developing nations to adapt it, in such programs only subjects or characters are locals but hidden content in the story is European and Western. And, this influence is much on developing countries' masses after the advent of new media or digital media.

Communication research scholars Giddens in 1990, Pieterse in 2009, Robertson in 1992 and Waters in 1995 revealed in their studies that the study of globalization began in the early 1990s, a time when the trend of globalization significantly increased its impact on human society in terms of scope and scale. Nevertheless, although scholars from different disciplines are involved in the study of globalization and most agreed that without media and communication globalization will not emerge as such a great impellent of the transformation of human society, the role of media and communication in the theorization of the concept of globalization still remains unclear and less specified on the ground reality. Another scholar Rantanen in 2006 says that the contribution of media and communication scholars to globalization theories is far less than scholars from other disciplines such as anthropology and sociology. There is required need to work honestly on communication studies and globalization studies like other genres of literatures, history, sociology, political science, anthropology and other humanity courses.

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## 5 RESEARCH METHODOLOGY:

### *(a) Research Design:*

For present research design, international media coverage, media programs, editorials, articles, news data of famous international TV channels, newspapers, magazines, social media posts, books on intercultural communication and news on intercultural have been consulted and data have been collected to prove the impact of new media/digital media on intercultural communication in global context. For this study, fifty percent social media users from different culture from different countries have been observed and analyzed in social media about their views intercultural aspects and cultures of their countries, and fifty people from different culture have been interviewed.

### *(b) Population and Sample:*

For population and research sampling, four countries from the Western world, Africans, European and countries from the pocket of Asian world have been inducted in the present research study on the basis of different cultural aspects and cultural communication. The Quota Sampling is applied to conduct the research study to cover equally the views of hundred people of different culture background from these regions in international university where male-female students of twenty nine countries study in APG Shimla University.

### *(c) Tools and Techniques:*

For present research study, international media coverage, media programs, editorials, articles, news data of famous international TV channels, newspapers, magazines, social media posts, books on intercultural communication have been used as tools and techniques of research collecting data and interviewed online fifty people from different countries and fifty people from different countries interviewed offline to collect their views on impact of new media on intercultural communication in global context, and observational, experimental, simulation and derived or compiled data collection techniques have been applied.

### *d) Primary Research and Secondary Data:*

For Primary Research data collection regarding the present research study, interview, online survey of fifty people, observation, and for Secondary Research

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<sup>5</sup> *International communication is any symbolic interaction between masses of the world or different nations, while intercultural communication is between masses of different cultures in which cultural values are an obvious factor in the nature of the interaction and, or determining the outcome of the interaction.*



data collection, data available on the internet, news, articles on cultures in the newspapers, magazines, TV, social media tools, public libraries, government and non-government agencies, educational institutions and human development reports by different media coverage have been applied to conduct the present research study.

**e) Analysis of Data:**

After collecting research data, the comparative analysis has been inducted to prove the impact of new media on intercultural communication in global context.

**f) Testing of Variables:**

For testing and analysis the research collected data, independent variables and dependent variables have been tested which prove the impact of new media/digital media on intercultural communication in global context. Through research variables' study proved that new media influences intercultural communications breeds the gap of international communication and intercultural communication as well. The variables explicate that independent variables, dependent variables and external variables also influence the effects of new media/digital media on the masses of the globe.

**(g) Validity:**

The new format of information technology is changing day by day as it is advancing to make the globe a global village as it has brought the masses of the globe on the single platform of communication to share, send messages and receive messages every time, everywhere in the world any time in all conditions of human communication due to its powerful influence and fastest receiving and sending messages. The new media has excelled all types of media platforms in the field of communication. So its validity is unending as newer to newer experiments are being conducted to add the world on a single platform of communication.

**(h) Reliability:**

After testing the research data and re-test data, it is found that new media effects intercultural communication at a large scale of the people of the world as it impacts people perceptions, ideas, psychology and sharing and receiving their notions, adapting and learn the different cultures but new media also brings cultural conflicts when misconceptions enter among the masses.

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## 6 RESULTS OF THE STUDY

The research study has adopted the qualitative approach is exploring, analyzing and examining the relevance the impact of new media or digital media on intercultural communication in the claim of globalization through new media and advancement in information technology. Under the following areas, the impact of new media on intercultural communication found after analyzing the whole research study in global context as follows:

**(a) New Media and Globalization**

During the last few decades, the rapid growth of new media is influencing the surge of globalization in human society. The present study observed that new media/digital media has interconnected world human society at highly level of interaction, sharing and receiving informations and messages. The convergence of new media has enhanced the level of globalization and transforming human society into a human society of global village.<sup>6</sup> The study found that new media is considered 'New' not only for its capacity of integration of messages, informations, datum, online working and traditional interpersonal communication and whole mass media but it enables all the masses of the world to control messages in media. This is the new media/digital media which allows masses to interact with multiple individuals in fastest way of electronic signal waves everywhere in the world.

The study found that new media has five distinctive characteristics such as digitalism, convergence, interactivity, hyper-textuality, and virtuality.<sup>7</sup> Digitalization is the most powerful feature of this new media or in other way we can say new media is digital media text to convert into data from analog into digital mode and allows all kinds of mathematical operations and makes all types of data available to all equally every time.

Not only has it, new media converse the forms and functions of information, media, electronic communication, and electronic computing. The convergence power of new media can be easily and cogently demonstrated by the emergence of the Internet in terms of its powerful function enrooted in computer information technologies and broadband communication networks. This also leads to the industry convergence displays by the constant merger of big media

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<sup>6</sup> *Media convergence means interconnections of information and communications technology through computer networks, smart phones, Laptop, smart TV and media content through internet signal across the globe, while Global Village means all parts of the globe/world is being brought together by the internet and other electronic communications interconnections- smart phones, e-media or digital media, e-newspapers, smart TV, etc. The term 'Global Village' is coined by Herbert Marshall McLuhan, the Canadian communications theorist and thinker in 1964 to describe the phenomena of the world's culture shrinking and expanding at the same time on account to pervasive technological advances that allow for instantaneous sharing and receiving of culture aspects of different nations.*

<sup>7</sup> *Hypertext is simply a non-linear way of presenting informations, messages rather than reading or learning things in the order, while virtuality is the quality of having the attributes of something without sharing its real or imagined in physical form which we also call online way of sharing and receiving data and things, etc.*

companies and the product and service convergence evidences by the successful connection and combination of media's material, product, and service in the media industry.

The study observed and found that the interactive function of new media between users and the system regarding the use of information resources provides users a great freedom in producing and reproducing the message content and form of the information during the interaction. The study found the interactivity of new media makes the interaction among different networks and the disseminating of information through different operational systems, both available and facilitation. This new media imparts controlling power to messages, informations in the field of communication as well.

Its hypertextuality brings forth a global network center of communication in which information can be freely move around the world and automatically interconnect. The study found that this global network phenomenon of new media has begun to shape a new human life experiences for human beings in communication arena, which in turn leads the transformation of economic, social, political, cultural activities, cultural patterns, literatures, folklores, languages, living standards, interactional styles, and other aspects of human society.

The study observed that the cyberspace webbed by new media allows masses to generate virtual experience and reality. Not only it, the invisible cyberspace not only induces a gap between reality and virtuality, but also effectuates the free flipside of one's gender, personality, appearance, and occupation, etc. The formation of virtual community that crosses all the boundaries of human society is also fatal to disturb the cult of human minds towards the negativity through the use of different ways of information technology for the purpose of ill-will and plunder one's things, property and attack on one's privacy.

The study observed that 'Globalization' is a greater phenomenon in the human history.

The study analyzed globalization ushered by the advent of new media as globalization is a dialectically dynamic process, which is caused by the pushing and pulling between the two forces of cultural identity and cultural diversity, or between localization and universalization as Globalization is universally inescapable. Globalization moves like air penetrating into every aspect of human society and influences the way the people live, think, and behave. The study observed that globalization is holistically interconnected as it builds a huge matrix in which all components are interconnected with networks. The study found that globalization represents a culturally hybridized State, which permits cultural or intercultural communication transmission via new media to take place at a very rapid rate by permeating and dissolving human boundaries as globalization increases individual power in the new media society, which pluralizes the world by recognizing the ability and importance of individual components.

The present study observed that new media and globalization are working forces to influence intercultural communication the relationship among the masses of different cultural background across the world.

#### ***(b) The Impact of New Media on Intercultural Communication***

The present research study found that new media not only influences the form and content of information/messages, but it also affects how people understand each other in the process of human communication, especially for those from different cultural or ethnic groups.

The study found that new media/digital media also breeds communication gaps between different cultural and ethnic groups as the shard nature of new media has switched traditional cultural grammar, cultural themes, or cultural maps to a new pattern, resulting in the loss of traditional cultural logic. The restructuring of cultural patterns, or worldview, demands that members of a culture revamp their communication behaviors within their own community, and to learn a new way of interaction with people from differing cultures. The study found that new media cultivates a new culture in human society, in which the degree of arcane and uncertainty has been diversified and has reached its highest point, especially in the process of intercultural communication.

#### ***(c) National/Ethnic Culture and New Media***

In the context of national/ethnic culture and new media/digital media, the study found that that high- context, collectivistic cultures in the process of new media/digital media interaction, people in low-context, individualistic cultures tend to emphasize individual achievements and self-promotion to extend their social relations network across the world, though the orientation may share privacy or personal views in the network.

#### ***(d) New Media and Cultural Identity***

The study found that convergence of new media and globalization bring about at least six new experiences for human beings, including new textual experiences, new ways of representing the world, new relationships between users and new media technologies, new conceptions of the biological body's relationship to technological media, and new patterns of organization and production. The study observed that these experiences are also inevitably challenge the traditional formation and re-define of social or cultural identity.

#### ***(e) New Media and Intercultural Interaction***

The impact of new media on different aspects of intercultural interaction is clear and reveals the influence of new media on three common aspects of intercultural interaction in the global context as study reflects:- ***intercultural relationship, intercultural adaptation, and intercultural conflict.***

### **1. Intercultural relationships**

New media, especially social media such as Facebook, blogs, MySpace, YouTube, Twitter, and the iPhone, have enabled people from every corner of

the world to represent themselves in a particular way and stay connected in cyberspace. It is obvious that the flexibility of information presented and shared in the new media will directly affect, either positively or negatively, the development of intercultural relationships in the virtual community through the creation of a network of personal connection.

## 2. Intercultural adaptation

W. Chen also found that the use of new media shows a significant impact on the process of immigrants' intercultural adaptation. In other words, the social interaction conducted through new media by immigrants proves to be a critical element that can determine whether they can successfully adjust to the host country.

## 3. Intercultural conflict

The present research study analyzed that present world is characterized by a growing number of contacts resulting in communication between masses with different languages and cultural background and the contacts with persons from other cultures and languages is often frustrating and full of misunderstanding. Culture is not a fixed identity but a discursive space that always on the move and in a personal relationship, someone who feels there is superior and tries to enforce to enforce his/her culture, then it happens to intercultural conflicts and destroys the relationships or creates a situation in which their counterparts is forced to ignore their own culture and adapt to another, which undoubtedly cause resentment and upset. The research study found such cultural conflicts among the people of different cultures and developed and developing nations.

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## 7 CONCLUSION:

To sum up above research study that new media/digital media not only provides a space in which people of different cultures can freely express their opinions and establish relationships, but may also challenge the existence of human communication in intra-cultural communication and intercultural contexts because of new media's specific characteristics that are significantly unlike to traditional media. The focus of new media is mainly on human interaction of the whole world dwelling in different land of the cosmos with their different cultures and languages through the language of communication technology which is new media or digital media. It impacts on the masses of the world but also creates cultural conflicts when the ego of cultural values enters into the cultural communication. The study also explicates the impact of cultural values on new media, the impact of new media on cultural identity, and the impact of new media on three aspects of intercultural interaction, namely, intercultural relationships, intercultural dialogue, and intercultural conflict.

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