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Academic Dishonesty: A Kenyan Medical School Experience

By Dr. Pius Musau & Dr. Franklin O. Boibanda
Moi University

Abstract- *Background:* Academic dishonesty, or cheating as commonly expressed, is an age-old practice that is widespread across the whole world. The Kenyan experience is anecdotal with limited studies, especially in medical schools. This study shares the experience of medical students about this challenging vice.

Objective: To determine the level and forms of academic dishonesty in Moi University, School of Medicine.

Design: Cross-sectional study using self-administered questionnaire.

Setting: The School of Medicine, Moi University, Eldoret-Kenya.

Subjects: One hundred and fifty-six students in the clinical (4^{th}, 5^{th}, and 6^{th}) years of study.

Results: Eighty percent of the students were aware of academic dishonesty, 75% had witnessed it in progress while 60.9% confessed to participating in it. The proportion of dishonest students varied with year of study and those previously exposed to academic dishonesty in secondary school and males were more likely to be involved. A majority (72.6%) of those engaged in academic dishonesty believed that their classmates were also doing it.

The leading forms of academic dishonesty were signing nominal rolls for absent friends and cheating in examinations using illegal notes and electronic access to information.

Conclusion: Academic dishonesty is prevalent with the majority of those involved believing that their classmates are also into the practice.

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Conclusion: Academic dishonesty is prevalent with the majority of those involved believing that their classmates are also into the practice. The leading forms of academic dishonesty include both traditional analog and modern digital methods.

I. Introduction

Kenya, a worthy member of the global village, had its national attention drawn to academic dishonesty for the first time in 1969 when the then minister for Education annulled the results of what was considered a stolen national examination (1). The Kenya Certificate of Secondary Education (KCSE) in 2015 was so blatantly stolen that there was a national outcry. Empirical studies on the extent of this vice in the country are, however, limited.

This paper examines the level and forms of academic dishonesty in a Kenyan medical school with the hope that it will inform us on a pestering challenge that has existed for long.

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II. Material and Methods

Medical students in the clinical (4th, 5th, and 6th) years of study filled a 20-item self-administered questionnaire without disclosing their identities. The sought information was demographic data and the views of the students on various aspects of academic dishonesty ranked in a Likert scale of six levels based on degree of agreement or disagreement with stem statements.

Collected data was transcribed into a sheet and entered for analysis using Statistical Package for Social Sciences (SPSS) version 21. Subjective data was presented in frequencies while discrete data was analyzed using measures of dispersion and central tendencies with statistical significance at ⩽ 0.05. The results appear in tabulated figures, ratios and percentages.

III. Results

One hundred and fifty-six students responded to the self-administered questionnaire, giving a return rate of 91.2%. Their demographics are as shown in table 1 below:

Table 1: Demographic Features of Respondents

	Year of Study			
Age	4th	5th	6th	Total
21-25	42	62	31	135
26-30	0	4	15	19
31-35	0	1	1	2
Total	42	67	47	156
Gender				
Male	23	36	28	87
Female	19	31	19	69
Total	42	67	47	156

There was a male to female ratio of 1.3:1. The age ranged from 21 to 34 years with a mean± standard deviation of 24.1±1.8 years. Given the definition of academic dishonesty as any form of misconduct that gives an undeserved advantage to the concerned student in any academic exercise, 98.7% agreed with no statistically significant difference between the genders.

A total of 27 students (17.3%) had participated in academic dishonesty in their secondary schools. These were 26.2% of the 4th, 11.9% of the 5th and 17.0% of the 6th year students. Males were 3.2 times likely to have been exposed to academic dishonesty as compared to the females (p=0.002).

Eighty percent of those who responded were aware of academic dishonesty in the medical school. There were no statistically significant differences between them regarding gender, age or year of study.

The top three forms of dishonesty were signing for an absent friend, use of illegal notes and access to information using electronic gadgets during examinations. The least prevalent were paying to have work done by others, collusion with lecturers and fabrication of data. Twenty-one students (13.5%) claimed not only to be unaware of academic dishonesty but also to have no idea of any form that may be in practice as seen in Table 2 below:

Table 2: Forms of Academic Dishonesty in the Medical School

Forms of Dishonesty	Number	%	Valid %	Cumulative %
Signing for Absent Friend	85	54.5	54.5	54.5
Illegal Notes	18	11.5	11.5	66.0
Electronic Gadgets	10	6.4	6.4	72.4
Copying	4	2.6	2.6	75.0
Plagiarism	7	4.5	4.5	79.5
Fabrication	7	4.5	4.5	84.0
Lecturer Collusion	3	1.9	1.9	85.9
Paying	1	.6	.6	86.5
Not Applicable	21	13.5	13.5	100.0
Total	156	100.0	100.0	

Seventy-five point six percent of the students had witnessed some academic dishonesty in progress while 60.9% confessed to having participated at least once. Majority of those involved were males (55%). The percentages of students who participated in academic dishonesty varied between the years of study with 70.1% of the 5th, 61.9% of the 4th and 46.8% of the 6th years confessing to the vice (p=0.042). Those exposed to dishonesty in secondary school were more likely to cheat, but the difference was not statistically significant, just as was the case with gender. A majority of those who took part in academic dishonesty (72.6%) believed that their classmates too were involved in the activity.

The top three reasons why the students were academically dishonest were the desire to assist a comrade (43.5%), the belief that everybody does it (37%) and inadequate preparations for examinations (12%). Those who did not participate said it is because their conscience would not allow (60.9%), that they desired true marks (29.7%) or feared the consequences if caught (4.7%).

IV. Discussion

There is consensus that academic dishonesty is any form of activity that leads to an undue advantage in the form of falsified presence in monitored sessions, undeserved grades, unearned qualifications or impersonated profession (2). An impressive 98.7% of the students could identify with this definition and suggests a uniformity of perspective among the medical students on this whole topic. It is an age-old problem that is widespread across the world and has been shown to occur in every type of educational setting from elementary to graduate schools (3). In the late 19th and early 20th centuries, cheating was widespread at college campuses in the United States of America, and was not considered dishonorable among students (4). It has been thought that, like in the rest of the world, this is a widespread practice and a matter of conscientious concern in Kenya especially with the recent cheating in primary and secondary school examinations.

Eighty percent of the students were aware of academic dishonesty. It compares favorably with similar findings in two different studies by Baird and Jendreck giving rates between 75% and 87% (5, 6). These percentages may point to the said universality of academic dishonesty irrespective of geographical regions. In this study, those with prior exposure to the vice in secondary school were more likely to cheat, just as Davis and Ludvigson found that the individuals who cheat during their university-level studies are likely to have also cheated earlier in their studies and mature into other forms of dishonesty in life (7).

We established that academic dishonesty takes many forms and may even involve collusion with lecturers as also found in studies by both Akaranga (1) and Gudo (8). While our study showed this to be among those with least prevalence and did not establish the kind, these other studies unearthed a form of cooperation not readily found in Western literature: the sex for marks scandals in Kenyan Universities in which female students are awarded marks in exchange for sex with their lecturers. Academic dishonesty is understood to be morphing into sophisticated forms with

advancement in technology (9) as seen in our study where among the leading methods is the use of electronic gadgets to cheat in examinations.

Our finding on the top three reasons why students engage in academic dishonesty seems to mirror similar ones by Davis and colleagues who asserted that academic dishonesty has over the years become a way of life in colleges with students feeling need to cheat because "everybody does it" (10). As pointed out by Bernardi et al. (11), this study found that those engaged in dishonesty neutralize it by, among other things, appealing to a sense of goodness like claiming to assist a comrade or thinking that nobody is worse off for the action. Those not involved in academic dishonesty seemingly have a spiritual (their conscience not allowing it) or moral (desire for true marks or fear of repercussions) basis for not doing it.

V. Conclusion

Academic dishonesty is prevalent with three-quarters of the students having witnessed it in progress, varies between years of study and a majority of those involved believe that their classmates are also into the practice. The leading forms of academic dishonesty are signing a roll for absent classmates and cheating in examinations using crib notes and digital access to information.

Recommendation

Mechanisms should be put in place at varying levels of management to contain or make it difficult for students to engage in whatever form of academic dishonesty.

Acknowledgment

We wish to acknowledge the bold move by the students involved in the study to offer an insight into an area that many others prefer to hush it with the implicit and tacit support of institutions of higher learning.

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The Prominent Characteristics of Austroasiatic Traditional Folk Doctors in the Lower Kong River Ethnography

By Dr. Thittayawadee Intarangkul

Abstract- The purpose of this Ethnographic study is to study the characteristics of Austroasiatic traditional folk doctors of the Kha Ethnography in The People's Republic of Laos. The target study group consists of Austroasiatic traditional folk doctors in the lower Kong River Ethnography (Kha Tribe) in The People's Republic of Laos. This study utilizes Qualitative Research and relies on In-depth Interview. Thorough interviewing with Folk doctors, their family, relatives and neighbours about their birth until present. Including topics about way of life, economy, religion, changes and globalization to deduct information of the prominent characteristics of Kha tribe group. Precise study group purpose sampling, 10 traditional Kha doctors that live in Champasak Province, the People's Republic of Laos.

The results of the study indicates that the prominent characteristics of the traditional folk doctors in The People's Republic of Laos still utilize local knowledge continuously while curing the people in the community and have 13 good prominent characteristics that are fit to be traditional doctors that people respect;1. Merciful, 2. Sacrificing, involved in 3. Constant learning, 4. Securing (defending) community forest, 5. Upholding rituals, possessing 6. Psychic powers, 7. Transmitting herbal remedy knowledge, 8. Have influence within the community, through achieving the 9. Respect and admiration of the people, 10. Self preservation through example, 11. Uphold the 5 Precepts of Buddhism.

Keywords: *characteristics, traditional folk doctors, austro-asiatic ethnic group.*

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Suggestions. The traditional folk doctors in The People's Republic of Laos should promote the knowledge and characteristics of traditional folk doctors from the community area to the regional level in the lower Kong River countries to firmly develop and sustain the traditional folk doctors knowledge for future generations.

Keywords: characteristics, traditional folk doctors, austro-asiatic ethnic group.

I. Introduction

Health issues and sickness from transmitted chronic diseases in the Austroasiatic ethnic group in the lower Kong river have a rising tendency every year and affecting the costs of health services to rise accordingly. Using traditional medicine and herbs developed in accordance to managing the health of the Austroasiatic ethnic group importantly appropriate to the way of life, culture, traditions and beliefs. Traditional medicine is considered a tradition of looking after health and sickness of the people in the Austroasiatic ethnic group. By using knowledge of healing by experience and exercise from traditional doctors that have expertise important from life and culture (SaowaneeKhulasomboon and co., 2007 : 11) Traditional folk Doctor is folk wisdom that has been with the Thai community for a long period of time. Traditional folk Doctor is collective knowledge from direct sources and formulas and is important for traditional medicine practice. Traditional folk doctors have various methods in practice such as Tree 1.root medicine doctors practice using herbal remedies. 2. Blowing Doctors use various blowing rituals. The more common ingredients are chewing lime and blowing, chewing garlic and blowing, chewing various leaves and blowing.

Blessed water Doctors use holy water to sprinkle over the areas that are unwell. 3.Tendon Doctors practice by using their thumb and index finger to press the sprained tendons or adjusting dislocated joints. 4. Monk Doctors are monks who have the ability to heal patients by sprinkling holy water and teaching chants before night sleep. Dance Worshipping the Spirits Doctor are mostly female practitioners who heal by performing ritual dancing accompanied by Lao reed mouthorgan. 5. Evil Doctor are sometimes called witch doctors from curing illness caused by ghosts and spirits. They are also called Blessing Doctors, Brahmin Doctors. 6. Midwife Doctor is responsible for overseeing childbirth and cleaning the infant.

Traditional folk doctors of the Austro-asiatic ethnic group in the lower Kong river are people who follow folk wisdom. They have suitable knowledge to care for health of their community and nearby regions. They emphasize traditional philosophy, knowledge, practices to maintain the health, cure diseases and sickness in accordance to traditions, culture and ways of life. Practices include usage of herbs, Thai spa massage , traditional cure for bones. Usage of Buddhist beliefs and rituals to maintain both personal body and mental health. Usage of Natural therapy obtained from collective, transmitted knowledge. Having observation, maintaining journals and study that has been passed on from one generation to the next. Extensive knowledge of thorough therapy is knowing the cause of the disease,

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knowledge of the disease, symptoms. Knowledge of medicine used to cure, their properties, methods to prepare them for use to determine the appropriate treatment for each disease.

The phenomenon that confirms the practice of traditional folk doctors is depicted on wall carvings in Bayon Sanctuary (1113 A.D - 1150 A.D.) world heritage NakhonWat, Siem Reap, Cambodia. It is a depiction of the practice by traditional folk doctors of the Austroasiatic ethnic group (Kha Tribe) in the lower Mae Klong Basin as in Picture 1.

Source: (Thittayawadee Intarangkul, Photograph, 2014, May 17)

Picture 1: Ancient traditional folk doctors with attendants and patients which show respect and faith in the traditional folk doctors of NakhonWat Temple, Siem Reap Province, Cambodia.

From Picture 1, shows traditional medical practice by traditional folk doctors. It is widely popular in both royal and common households. It has been passed on as a resource and folk wisdom by curing with philosophy, knowledge, and traditional practices that maintain care for health and cure diseases accordingly to traditions, rituals and way of life. The practices include the use of herbs, Thai spa massage, as well as for traditional cure for bones. Usage of Buddhism and rituals to maintain body health and mental health. Usage of Natural therapy obtained from collective, passed on knowledge.

In The People's Republic of Laos there is a Lao Theung Ethnic group in southern Laos such as KhaOi and KhaTu dwelling in large numbers in the Xe River basin and Bolaven Plateau in Pakse and Paksong, Champasak Province. The characteristics of Kha Tribe still strongly preserve beliefs, customs in way of life, culture and traditions. Especially the traditional folk doctors who have influence over mentality and how the family and community lead their life. Whether it may be beliefs towards a higher power, natural defining powers, rituals according to beliefs to create peace in their group, or looking after the health of the community such as taking care, cure of sickness of the people in the community. Traditional folk doctors are responsible for treating the sick even though we have made progress in medicine, have hospitals, clinical facilities that provide convenience more than before (ever). Traditional folk doctors are still many peoples choice of treatment. We might have heard the phrase *"I went to see the doctor but never got any better but then I went to see a Traditional folk doctor and was cured immediately."* The experience and practice of medicine of traditional folk doctors is a treasure of wisdom that has high value in studying.

II. The Purpose of this Study

To study the characteristics of traditional folk doctors of Kha tribe in The People's Republic of Laos.

III. The Results

The results find that the characteristics of traditional folk doctors of Kha tribe in The People's Republic of Laos still use the knowledge passed on from their ancestors. They help in curing people in the community since the past until the present time. The traditional folk doctors of the Kha tribe are respected in (by) the community. A Traditional folk doctor has to have strong characteristics that are appropriate such as merciful, sacrifice, continuous learning, protecting community forest, uphold rituals, have psychic powers, pass down herbal folk knowledge, have influence over people in the community, are respected and revered, self preserve, uphold the 5 precepts and have mystical healing powers. Additionally good characteristics include leadership in community, set the example of self health preservation (look after oneself), Conserve traditional medical folk wisdom and care for community health as follows.

a) The Kindness

The Kindness of Traditional folk doctor is a characteristic that should set an example for the villagers of persons concerned in caring for patients. They are friendly, wish well for others. Merciful without

particularity. Mercifulness comes from cultivating oneself in everyday life or being kind towards the next person and expanding to others in a wider range. As the saying "*Curing someone is like making good merits. Receive happiness from curing someone because they trust and revere in me*" (Sang Chanpeng, 2013, September 7). The of Traditional folk doctor should be merciful. Make patients revere and respect. In accord with Doctor PhaiKhumathong says with a happy expression "*People who come were troubled. After helping them I felt proud.*" (PhaiKhumathong. 2013 September 21).

b) Sacrifice

Sacrifice is standard virtue of the of Traditional folk doctor. Sacrifice personal happiness for the community. In according to an interview "*Be able to help them from distress is satisfying enough. I don't think about the money*" (BieawKhumdeewai. 2013, June 22). Traditional folk doctors see that public benefits are important. Influencing the community to be happy, generous towards one another.

c) Constant Learning

Constant Learning is essential for traditional folk doctors. To search for new knowledge, constantly keeping up to date with the advancement of society and treatment of diseases. It is training oneself to always be skillful. Learning skills come from observation. Observing the surroundings or object of study. The duties of traditional folk doctors is up to the beliefs about health and affect health altering behaviour in preventing, curing, nursing and restoring health of the villagers. *"Nowadays people in the community have increased interest in massage. They organize association (clubs) and have doctor Chatwan come teach without any expenses"* (NoiThanepoon. 2012, May 26).

d) Protect Community Forest

To preserve and protect them for the next generation to insure long lasting benefits. Traditional folk doctors can find medical herbs from within the community forest. *"I am a Traditional folk Doctor (Massage Doctor). I also have a rice field. People come to me for massage almost every day. Every day after I bathe and have breakfast if I don't go to my rice field I go to the community Thai massage club. I make massage cream (medicine) and compress herbal ball."* (NoiThanepoon. 2012, May 26).

e) Rituals

Performing rituals or attending rituals is training people to know order, train discipline. Will lead people to uphold precepts. Rituals will better help the results of healing of traditional folk doctors. *"Broken bones, sprains, Hemorrhoids, Septicemia, Colon cancer, asthma, diabetes, healing broken bones we blow, use sesame oil and reattach the bones with magic. Check symptoms to choose the most suitable medicine for the bone."* (Ken Thongsai. 2013 September 25). Traditional folk doctors use rituals in addition when curing patients to help increase the rate of success. But rituals are based on supernatural superstition than can cure depending on beliefs and faith of people in the community.

f) Psychic Powers

Have Psychic powers by strengthening the soul and Calm the soul to be tranquil state. Calmly analyze one's emotions without being immersed in the effects of the emotion. Traditional folk doctors prefer to use rituals and psychic powers to cure patients accompanying in tandem with the use of medicine and herbs."*I am happy to learn this practice. it is far to go see a doctor. they come to me instead. When i see them smile after they are healed, I am happy.*" (NattakitSawadtong. 2013 September 25) and *"Broken bones, sprains, Hemorrhoids, Septicemia, Colon cancer, asthma, diabetes, healing broken bones which we have blown on, use sesame oil and reattach the bones with magic. Check symptoms to choose the most suitable medicine for the bone."* (Ken Thongsai. 2013 September 25) traditional folk doctors that utilize psychic powers accompanying with medical treatment are usually those who are pure. They constantly strengthen their soul and psychic powers to positively increase the success of healing. This is in according to the beliefs and faith of people in the community. These rely on contact with supernatural powers such as powerful ghosts, holy entities etc.

g) Relaying knowledge of medical herbs

Passing down folk knowledge of traditional folk doctors is the passing on of collected knowledge from ancestors to their successors or people who were chosen through extensive selection to become the bearer of folk medical knowledge. To preserve folk knowledge of family and community onwards.

h) Influence over community behaviour

This is a main element of the traditional folk doctors towards activities continuously, by being example in life. To promote good health in body, soul, emotion and in community. Having proper behavior and setting a good example and having good results in healing others. traditional folk doctors are important in creating trust and reverence of the people in the community. Whatever the traditional folk Doctor does or invite the people to do, people will join. Traditional folk doctors have influence over the behaviour of the community whatever the activity would be. Should support the traditional folk doctors to be leaders in healthcare such as bringing traditional folk doctors to disseminate information and knowledge to leaders of the village to take care of their own health needs.

i) Respect and Faith

Respect and Faith is a factor that the villagers have towards traditional folk doctors. Setting a good

example, having moral standards, Being a leader in creating benefits for the community especially regarding health. Traditional folk doctors show the capability in health care in realization. They need time to receive acceptance from the community.

j) Self Preservation

Self Preservation is preparing oneself for taking care of oneself health. Preparation of medical instruments and the correct medicine. Including skills and basic knowledge in diagnosing their own sickness. Usually this preservation includes rituals and beliefs, traditional Thai medicine, passed on medicine remedies. The strong beliefs and trust in traditional medical doctors is a main factor in deciding behaviour of the people.

k) The Five Precepts

Traditional folk doctors will strictly uphold the five precepts in order to show respect to the teachers and to help in successfully curing the patients. Upholding the five precepts is part of maintaining spirit (soul heart). To be traditional folk doctor that is leader of community, he has to encourage the community to uphold the five precepts for everyone to have basic care of their own health.

l) Alms and Pray

Traditional folk doctors should strictly uphold Alms, Precepts and Pray. They make the Traditional folk Doctor have pure souls. Makes them think only positively. Refrain from being greedy. Makes those staying in the community demonstrate generosity towards one another. Makes taking care of health of people in community with generosity such as Traditional folk Doctor Don't emphasise on accumulating profits from healing. Even if they get nothing in return, they will still help willingly.

m) Supernatural Power in Healing

Supernatural power in healing is the belief and trust that the patients exhibit towards traditional folk doctors. Similar to treatment of that one would exhibit towards a relative. Some of the physical sickness can be cured by changing one's mindset. A lot of knowledge of Traditional folk Doctor is intangible. While they are curing patients, they continue to chant incantations. Authentic traditional folk doctors will focus on training their soul, upholding Buddhist precepts, Maintain a strict routine. A lot of these doctors chant while collecting herbs. When going into the forest to look for medical herbs they have to choose the timing, have special chants while they do so. When they pick herbs, they pray to their teachers to help ensure the herbs will help in the healing of patients. Traditional folk doctors utilize rituals to help heal and also make the patients have faith and be encouraged during the treatment which stimulates faster healing.

The characteristics of traditional folk doctors of Kha tribe in The People's Republic of Laos show that the traditional folk doctors still use folk knowledge in continuous treatment of the Health in the community. Traditional folk doctors will uphold in righteousness. They are respected and revered. They will be depended upon in every aspect in the community. They will have roles in the society as leaders of village traditions, conserve resources. Example of self-reliance in the community. Set an example in developing one's own health, such as maintaining proper eating habits, exercising, promotion of healthy behaviour etc. Other than setting a good example for the community, traditional folk doctors have a role in preserving medical folk wisdom and knowledge to continuously pass on from one generation to the next. To maintain medical folk knowledge to continue to play an important role in overseeing health of the community. Even though in this present day the villagers have increased options in maintaining their health, traditional folk doctors still play an important role in overseeing health of community.

IV. Conclusion

The traditional folk doctors of the Kha tribe is an ethnic group that maintains good traditions since age-old times. It is an ethnic group that is peace-loving and friendly. They have customs and traditions that are unique to themselves. The Kha tribe traditional folk doctors also have medical folk knowledge in curing patients which combine beliefs and faith in supernatural powers to encourage miraculous healing of sicknesses. Additionally medical folk knowledge regarding curing can also act as a bridge connecting relationships of people in the community to tighten and strengthen the structure of the community tribe and can withstand the impact from the outside. The Kha ethnic group still upholds and strongly believes in the traditions and customs of their tribe. They cooperate together in community activities. They demonstrate unity within the group. They help one another, share with others, are harmonious and respect each other. The children respect and look up to their elders. They maintain relationships in families and especially medical folk knowledge. They pass on the teachings so that traditional folk doctors can acquire the methods and medicine recipes that have been passed down by their ancestors and teachers. We can still see traditional folk Medical Doctors use folk medical knowledge in curing patients in their community today. The traditional folk doctors have ideas and beliefs concerning the source of the sickness and diseases and the method of curing the sick within the community that are seeking help. The Traditional folk doctor's way of life strictly upholds the teachings of their mentor teachers and ancestors. They adhere to the teachings of righteousness. They are examples that the people look

up to and respect as philosophers of the community. They are those who villagers rely on.

There are thirteen outstanding characteristics of the traditional folk doctors of the Kha ethnic group in The People's Republic of Laos. They are merciful, willing to sacrifice, constantly learning, protecting and maintaining the community forest, upholding rituals, exhibiting psychic powers, inheriting herbal folk wisdom, having influence in the community, respected and revered, believers in self-preservation, upholders of the five Buddhist precepts, those who practice giving alms and praying and have supernatural powers in healing. Overall there are five distinct groups: 1) Other than the characterics of being merciful, sacrificing, setting proper examples, constantly learning about the use of herbs and medicine and assuring that the community forest is protected. 2) Traditional folk doctors like to use rituals and psychic powers along with medicine or herbs in curing patients and passing down folk knowledge. 3) The respect and reverence towards traditional folk doctors is basic behaviour towards promoting health and helps the participants to learn self-medication. 4) Self-preservation along with traditional folk practices such as the five precepts, and uphold the use of alms giving, upholding precepts and prayer are the main important basic characteristics utilized for healing patients. 5) Using knowledge in the basic level and deeper levels. Also the traditional folk Doctor heals by utilizing rituals or magic.

Additionally traditional folk doctors maintain their roles in society as leaders of community traditions and customs, conserving resources. Promoting self reliance within the community. Setting an example in developing self reliance in promoting healthy choices such as choice of proper foods, of maintaining regular exercise or other health promoting efforts etc. Other than setting an example for the community, traditional folk doctors have a duty to preserve medical folk knowledge from generation to generation. Maintaining the medical folk knowledge of the traditional doctors will continue to remain important in curing sickness of people in the community even though in the present day the villagers have many different options available in choosing health care. The traditional folk doctors still have to have an important role in promoting communities health efforts.

Suggestions

1. The study of the prominent characteristics of the traditional folk doctors in The People's Republic of Laos is a study based on the Kha ethnic tribe only. There should be additional studies conducted on other ethnic groups in the sub-districts of the Kong river basin.
2. The study cannot factually explain the mystical powers that heal the patients. There should be new studies conducted in various fields for it to become acceptable as a means of new age medical practice.

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6. Nattakit Sawadtong, 72 Years Old village 8 Kam District Jompra Prefecture Surin Province, Interviewees.
7. Phai Khumathong. 69 Years Old village 8 Kam District Jompra Prefecture Surin Province, Interviewees.
8. Sang Chanpeng, 76 Years Old village 8 Kam District Jompra Prefecture Surin Province, Interviewees.

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Global Trends and Changes in Alcohol-Fuelled Facial Fractures: A Review Article

By Dr. Roshan Cherian Paramesh, Dr. Anjaleena Elizabeth Mathew,
Dr. Rashmi Cherian Paramesh & Anita Mathew

Abstract- Alcohol consumption is a common way to socialize in many cultural settings. However, excessive intake can impair personal judgement and can result in injury to self or others. Maxillofacial injury as a result of alcohol overindulgence is not only of medical concern but is also an alarming social issue. Throughout the world, over the past 2 to 3 decades there has been an increase in incidence of facial fractures due to alcohol-induced Interpersonal violence (IPV) and a decrease in the proportion of fractures resulting from drunk driving. Constant epidemiological assessments are imperative to identify aetiology, new trends and governing factors to strategize preventive steps and administer effective treatment for these injuries.

Keywords: *alcohol, maxillofacial trauma, fracture, injury, inter personal violence (IPV), assault, road traffic accidents (RTA), audit.*

GJMR-K Classification: *NLMC Code: WU 610*

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Global Trends and Changes in Alcohol-Fuelled Facial Fractures: A Review Article

Dr. Roshan Cherian Paramesh [α], Dr. Anjaleena Elizabeth Mathew [σ], Dr. Rashmi Cherian Paramesh [ρ] & Anita Mathew [ω]

Abstract- **Alcohol consumption is a common way to socialize in many cultural settings. However, excessive intake can impair personal judgement and can result in injury to self or others. Maxillofacial injury as a result of alcohol overindulgence is not only of medical concern but is also an alarming social issue. Throughout the world, over the past 2 to 3 decades there has been an increase in incidence of facial fractures due to alcohol-induced Interpersonal violence (IPV) and a decrease in the proportion of fractures resulting from drunk driving. Constant epidemiological assessments are imperative to identify aetiology, new trends and governing factors to strategize preventive steps and administer effective treatment for these injuries.**

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I. Introduction

Half of all alcohol-related deaths globally are the result of an injury. [(1)]Injuries can be categorised into Unintentional Injuries including Road Traffic Accidents (RTA); and Intentional which is caused by deliberate acts of Inter Personal Violence (IPV). The face being the most revealing and exposed part of the body, it is also the most unprotected. [(2)]This accounts for the high incidence of maxillofacial injuries following a trauma.

RTA today is the leading cause of death for those aged between 15-29 globally. [(3)]Males are at higher risk due to an active social life, their indulgence in sports like boxing, football, motor racing. Nowadays an increasing proportion of women are also reported to suffer from maxillofacial trauma. This can be attributed to their evolving social life and their increasing participation in all sports activities.[(4)]RTA is one of the main etiologic factors in maxillofacial injuries.[(5-10)]

This is especially true in developing countries where road conditions and traffic orchestration such as traffic lights at crossroads are inadequate. This problem is further amplified by factors such as public's poor road safety awareness and non-compliance to the use of safety devices like helmets and seatbelts.[(11)]Driving Under Influence (DUI) further increases the likelihood of Road Traffic Accidents (RTA) due to diminished reflexes, over speeding and disregard for safety measures.[(4)]

In developed countries, Interpersonal Violence has replaced Road Traffic Accidents as chief causative factor in alcohol induced trauma.[(12-14)]This escalation of violence in today's society and the resultant increase in alcohol-related IPV seems to be a result of several social factors and economic strain like poverty, unemployment and low personal income.[(2)]Alcohol-induced IPV primarily results in trauma to the face. It has also been suggested that the chief motive of the attacker in injuring the face is to cause a blow to the victim's confidence and self-esteem.[(2)]All over the world, alcohol related IPV has widespread ramifications. It affects the physical, social and psychological health of the victims, damages their relationship with friends and family and increases level of fear and uneasiness within the community. The burden of alcohol related violence on health services and the government is also immense.

The aim of this study is to evaluate the changing trend in alcohol induced trauma, its significance in maxillofacial surgery and improvisation in its management. Periodic review of such data can further heighten public awareness of the ill-effects of alcohol abuse and also help develop effective strategies to put a check on its progression.

II. Discussion

Various studies show that interpersonal violence, falls and Road Traffic Accidents are the most common causes of maxillofacial fractures in adults.[(15)]

Buffano et al., in 2015 conducted a multicentre prospective study in collaboration with several Maxillofacial centres throughout Europe. They found that IPV is the most common cause of maxillofacial trauma (39%) with incidence values ranging from 15.4% to 60.8% at various centres across Europe. They also concluded that alcohol plays a crucial role in IPV-related facial fractures.[(2)]

Alcohol intoxication is a major contributing factor in Interpersonal violence, as it is a central nervous system depressant. This results in decreased inhibition, poor judgement, lack of reasoning and ultimately renders the person aggressive. On the other hand, consumption of alcohol increases the susceptibility of the person to become a victim of interpersonal violence by decreasing motor reflexes and coordination,

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reducing the ability to think rationally and thus decreasing one's physical ability to defend oneself or escape.[2, 4, 16]

Shapiro et al., in 2000 found that patients who sustain facial fractures as a result of IPV are twice likely to be intoxicated as compared to RTA patients. The increasing trend of alcohol related IPV is inversely proportional to RTA caused by alcohol consumption. This can be a result of better road conditions, improvised safety measures like incorporation of airbags for driver and passenger side seats, and installation of stricter legislation prohibiting drunk driving, mandatory use of seat belts and strictly enforced speed limits.[2, 15, 17, 18]

Laverick et al., in 2008 reported the highest published correlation (72%) between alcohol use and interpersonal violence.[12] In spite of this rising trend in alcohol related IPV, many IPV related facial fractures are going unreported due to its association with unlawful activities like alcohol or drug use, acts of violence and possession of firearms. Data on alcohol abuse is very often inaccurate and extremely difficult to obtain as the patient is not necessarily the intoxicated one.

Lee at al., in 2008 conducted a retrospective study of alcohol-related maxillofacial trauma. They documented 'alcohol abuse' when the patient was reported to have consumed 2 units of alcohol within an hour of the incident. It was inferred that the quantity of alcohol consumption is more predictive in injury than the frequency of alcohol intake. A distinct change in the aetiology of alcohol induced trauma was noted between the 2 halves of the study period. Alcohol related IPV was found to be on the rise in the latter half as compared to alcohol-induced RTA in the former half. It was noted that isolated zygoma fracture was the common pattern of fracture seen after IPV. This could be attributed to the prominent position of the cheek within the facial skeleton and the tendency of the attacker to target prominent and accessible areas.[19, 20]

Shapiro et al., in 2000 found a clear association between alcohol use and compliance with use of protective headgear.[21]It was found that non-helmeted motorcyclists with facial fractures were 40 times more likely to be intoxicated as compared to helmeted motorcyclists. This large variance in their study could be due to the smaller sample size for helmeted motorcyclists. This evidence is also supported by another study by Nelson et al., in 1992 who reported that non-helmet users are 4 times more likely to be intoxicated at the time of injury. These studies show the vital role that alcohol plays in compliance with the use of protective headgears.[22]

As compared to IPV caused facial fractures, the severity of facial trauma is much more in RTA related facial fractures.[7] IPV most frequently result in isolated facial fractures. The most common mechanism of facial fracture is by the direct contact of the fist of the attacker to the victim's face. This results in fracture of prominent facial parts, most frequently the zygoma. The presence of the mandibular 3rd molars, curvature of trajectories in the angle region and thinner cross-sectional area relative to the adjacent segments also renders the angle region susceptible to fractures.[2]

Victims of alcohol induced physical aggression usually present with isolated maxillofacial fractures thus making maxillofacial surgeons the primary health care providers to attend to such patients.[2, 23] Hence, the knowledge of aetiology and pattern of IPV related maxillofacial fractures is crucial for diagnosis, treatment and prevention of the same. This knowledge can contribute towards creation of effective policies, evaluation of current health care services and development of preventive programs to reduce and eventually eliminate alcohol induced trauma.

III. Prevention Strategies

The Alcohol Use Disorders Identification Test (AUDIT) is a sensitive test which can be used to identify persons with hazardous patterns of alcohol overindulgence.[12] The AUDIT was developed by WHO as a screening tool to assess excessive drinking and alcohol dependence. It focuses on the patient's recent alcohol consumption and provides a foundation for intervention to help overindulgent drinkers reduce or stop alcohol use and hence, avoid the sequence of alcohol related injury. The use of AUDIT and its effectiveness has been demonstrated and proven within the speciality of maxillofacial surgery. It is a brief questionnaire with 10 questions, each question having a set of gradated response. A brief intervention is offered by the maxillofacial surgeon based on the score obtained. Score less than 8 did not require intervention. A patient who scored between 8 and 15 was offered simple advice on the hazards of drinking and its effects. A patient scoring between 16 to 20 was provided brief counselling and continuously monitored over a period of time. A score of beyond 20 required referrals to specialist for diagnostic evaluation and treatment. The treatment of alcohol-related trauma and violence begins with the health care providers. Steps should be taken at the time of its presentation at health centres to curb its progression.[24]

Most alcohol related assaults take place in and around drinking establishments like pubs and nightclubs.[13, 25] With an objective to decrease alcohol-fuelled violence the Government of Newcastle, a city in Australia; introduced the "Sydney Lockout Laws" in 2014. The law required 1.30 am lockouts and 3 am last drinks; wherein the bars in the city would not permit any new customers after 1.30am and would not serve drinks past 3 am. Hoffman et al., in 2017 found that the rate of maxillofacial assaults decreased drastically at the rate of 21% every year after the introduction of this legislation.[26]Provision of easily accessible late-night transport,

improved street lighting and installation of CCTV cameras near drinking venues can further safeguard against violence breaking out near such establishments. All national governments should take appropriate steps like increasing taxation on alcohol, strict enforcement of minimum legal age for purchase of alcohol and levying heavy fines for alcohol related disorderly conduct in public places to further reduce the occurrence of alcohol-fuelled Interpersonal Violence.

Instilling values at an early age can help children grow into responsible adults. The British Association of Oral and Maxillofacial Surgeons in 1998 conducted an educational program aptly called "Save your Face" targeting 13 to 14-year-old high school students. 200 Maxillofacial Surgeons visited schools to educate the targeted age group on the ill effects of alcohol overindulgence and resulting maxillofacial injuries.[13]Continued education of the society on the importance of preventive strategies is the cheapest and the only long-term solution to reduce economic, physical, psychological and social burden of alcohol induced trauma.

IV. Conclusion

Trauma and Violence are amongst the arresting social issues in the world today. As well as causing millions of fatalities throughout the world annually, non-fatal injuries leave hundreds of millions incapacitated physically and psychologically. The association of maxillofacial trauma and alcohol consumption is undisputable. Some countries around the world have recognised that, alcohol-related trauma and violence are preventable public health issues and have advocated preventive strategies to decrease morbidity caused by it. Unfortunately, in many countries, especially developing countries, the gravity of the situation has not been understood. Steps must be taken now to alter this situation; and the international community, national governing bodies, health institutions and society in general must work conjointly to create a global environment that is safe from the risk of alcohol related trauma.

Conflict of Interest

The authors have no conflict of interest to disclose

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Emphysematous Cholecystitis: A Case Successfully Treated with Percutaneous Cholecystostomy

By Abbas AR Mohamed, Turki Atia Al Quarshi & Tarig Abbas Mohamed
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Abstract- Emphysematous cholecystitis is a relatively rare life-threatening form of acute cholecystitis caused by gas producing organisms. We report a case of emphysematous cholecystitis that was successfully treated with percutaneous cholecystostomy.

Keywords: *emphysematous cholecystitis, percutaneous cholecystostomy.*

GJMR-K Classification: *NLMC Code: WF 648*

Emphysematous Cholecystitis: A Case Successfully Treated with Percutaneous Cholecystostomy

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Abstract- **Emphysematous cholecystitis is a relatively rare life-threatening form of acute cholecystitis caused by gas producing organisms. We report a case of emphysematous cholecystitis that was successfully treated with percutaneous cholecystostomy.**

Keywords: emphysematous cholecystitis, percutaneous cholecystostomy.

I. Introduction

Emphysematous cholecystitis is a severe form of acute cholecystitis characterized by gas production in and around the gallbladder wall caused by gas-forming organisms. It is associated with increased morbidity and mortality. We report a case of emphysematous cholecystitis in 84 years old diabetic man who was successfully treated with percutaneous cholecystostomy. We also review the literature for the role of percutaneous cholecystostomy in the management of the condition.

II. Case Report

84-year-old male presented to our emergency department with right upper quadrant abdominal pain of two days duration. He had history of chronic dyspepsia, fat intolerance and recurrent mild right upper quadrant abdominal pain for few years before his presentation. He was known diabetic and hypertensive on medical treatment. He had CAPAG 6 month before admission and he was on regular dose of anticoagulants.

On examination he was febrile with temperature of 38.8c. His blood pressure was (80/40 mmHg), pulse was 120 and respiratory rate was 28/min. His abdomen was slightly distended with remarkable tenderness and rigidity over the right hypochondrium. Murphy's sign was positive. His ECG was normal and his blood gas analysis showed slight metabolic acidosis. His hemoglobin was (13 g/dl). Urea and electrolytes, liver function test and serum amylase were within normal values. His erect chest X Ray excluded free air under the diaphragm (Figure 1). After initial fluid resuscitation he had abdominal CT scan (Figure 2A & B) which showed a distended thickened wall gallbladder containing air within its wall and lumen with air-fluid level. There was also a curvilinear hyper density in relation to the gallbladder wall, with gallbladder wall calcification and pericholecystic fat stranding extending to the region of the hepatic flexure. There was no obvious evidence of gallstones seen and no evidence of intra-or extrahepatic biliary dilatation. The CT scan findings were consistent with non-calculus emphysematous cholecystitis.

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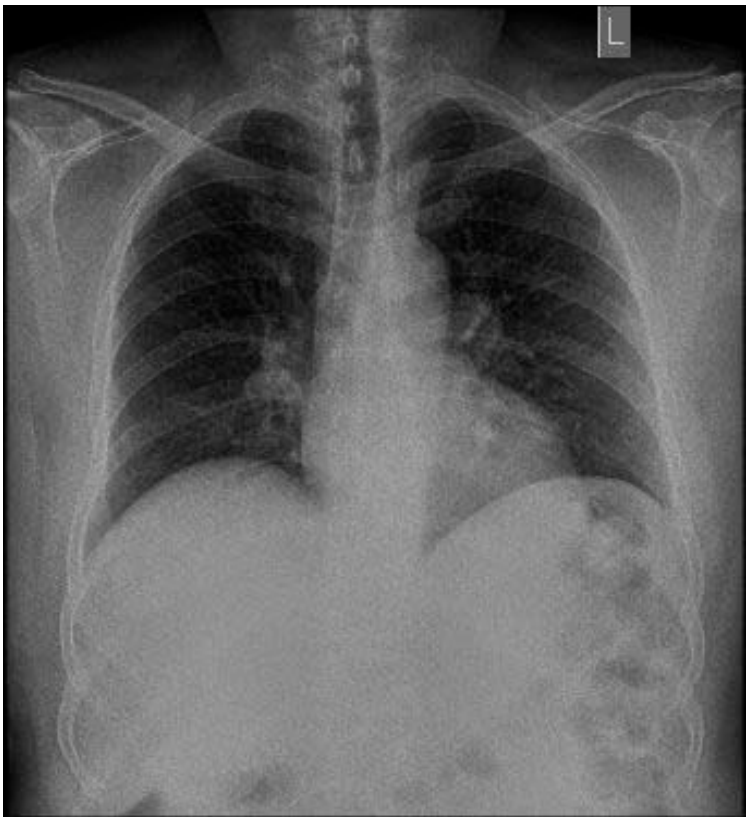

Figure 1: Chest X-Ray showing no air under the diaphragm

Figure 2A: The CT scan showing a distended thickened wall gallbladder containing air within its wall and lumen, with no obvious evidence of gallstones or biliary dilatation

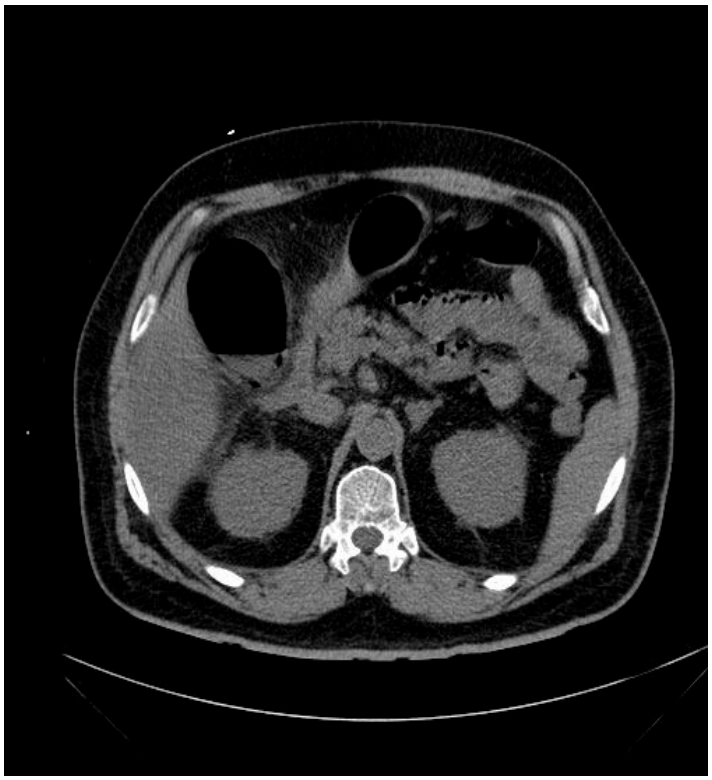

Figure 2B: The CT scan showing same finding of figuer 2A together with clear air fluid level within the gallbladder

Due to the patient multiple co morbiditities including old age, diabetes millutes, hypertension, poor cardiac function with ejection fraction of 25%, recent coronary surgery and anticoagulant therapy which constitues very high risk for surgery we opted to treat him with percutanous cholecystestomy and intravenous antibiotics. Percutanous ultrasound gauided cholecyststomy was done at bed side under local anaesthesia (Figure 3).

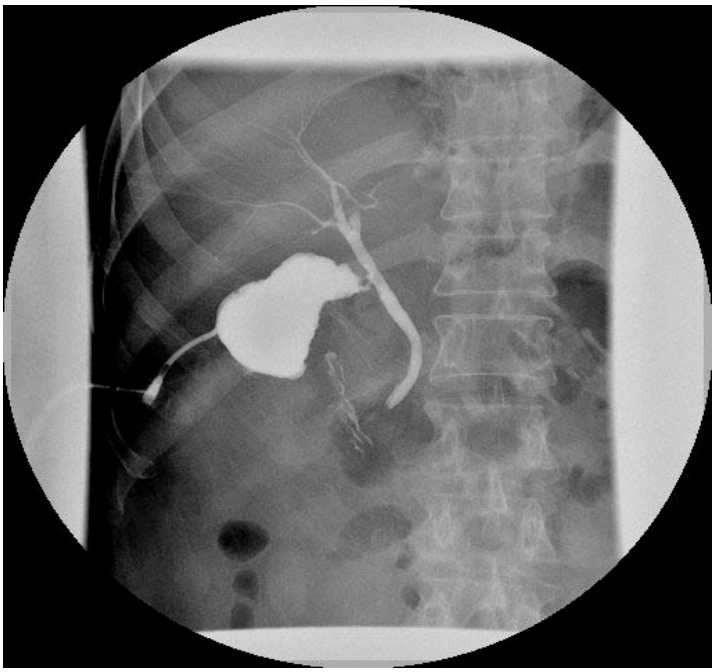

Figure 3: Cholangiogram done immediately after the insertion of percutaneous cholecystostomy tube, showing the tube in situ with no evidence of gallbladder stone or extrahepatic biliary dilatation

The patient did well and discharged on the 7th post cholecystostomy day. The cholecystostomy tube was removed after 6 weeks and he remained symptoms free on follow up for more than a year.

III. Discussion

Emphysematous cholecystitis also known as acute gaseous cholecystitis, aerocholecystitis, pneumocholecystitis, and gas gangrene of the gallbladder, is a severe variant of acute cholecystitis characterized by gas production in and around the gallbladder wall or in the pericholecystic space. (1) The disease was first described by Stolz1 who reported three cases discovered accidentally at autopsy 1901. (2-3) Pende was the first to record a description of the findings at surgery in 1907. (4) Lobingier reported the first case in the English literature in 1908 (5) and Hegner was the first to make preoperative radiologic diagnosis in 1931. (6)

This disease is considered interesting and merits the report of a single case because of its relative rarity, its unusual radiologic and clinicopathologic characteristics and its increased incidence among male diabetics. (7)

The disease is relatively rare compared with non-emphysematous cholecystitis. It is common in males with male: female ratio is 7:3. (8) It is also more common in older patients with diabetes mellitus than in the general population. (1)

Although emphysematous cholecystitis develops in approximately 1% of all cases of acute cholecystitis, this entity is potentially more severe than acute non-emphysematous cholecystitis because in emphysematous cholecystitis gallbladder gangrene is 30 times higher and perforation occurs 5 times more frequently than in acute non-emphysematous cholecystitis (9) together with significantly increased rates of mortality (15-25%). (10)

The assumptive pathology of the condition is cystic artery occlusion secondary to inflammation from acute cholecystitis or small vessel atherosclerosis leads to gallbladder wall ischemia and overgrowth of gas-producing bacteria. The bacteria most frequently isolated in these instances include Clostridial species, with Clostridia welchii being the most common. E. coli is isolated with the second most frequency. (10 and 11)

Clinical presentation of the condition is similar to acute non-emphysematous cholecystitis, with right upper quadrant pain, low-grade fever, nausea and vomiting. Peritoneal signs include tenderness in the right hypochondrium and positive murphy's sign may be present. A mass in the right upper quadrant may be palpated in half of the patients. (12)

Diagnosis depends on the characteristic radiological appearance. On imaging, the condition is diagnosed when there is radiographic demonstration of air in the gallbladder wall in the absence of an abnormal communication with the gastrointestinal tract. (13)

Bloom RA, et al described the ultrasound spectrum of emphysematous cholecystitis classifying them into 3 stages; in the first stage Gas is present in the gallbladder lumen. There is a dense band of hyperreflective echoes with distal reverberations when the gallbladder is full of gas or a band of reverberations in the gas-filled portion of the gallbladder with the usual signs of cholecystitis in the bile-filled portion when the gallbladder is partially full of gas. In the second stage the gas is present in the gallbladder wall in absence of an area of high reflectivity in the gallbladder wall with reverberations that may change position with patient movements or a bright hyper reflective ring emanating from the entire gallbladder circumference. In the third stage the gas is present in the pericholecystic tissue and is seen inside the gallbladder, within its wall and outside the gallbladder in the surrounding tissues, indicating gangrene and perforation. (14) In some cases, there may be multiple tiny echogenic foci in the gallbladder lumen, arising from the dependent part of the gallbladder and "floating" to the nondependent wall, reminiscent of bubbles rising in a glass of champagne (15, 16, 17).

Abdominal CT scan is now considered the primary imaging modality to confirm acute emphysematous cholecystitis, as it is the most sensitive and specific imaging modality for identifying gas in the gallbladder lumen or wall. (18, 19) CT scan demonstrates emphysematous changes in the gallbladder wall that are diagnostic of this condition and is highly sensitive for tiny bubbles of air which may not be seen on ultrasonography. It can also provide precise information regarding the location and extent of air and fluid collections, such as extension into the pericholecystic tissues and the hepatic ducts. Gas in the peritoneum indicates perforation. (20)

Magnetic resonance imaging (MRI) can provide extensive information on intramural necrosis as well as intraluminal gas. Gas in the gallbladder lumen and wall appear as signal void areas. (21) Characteristic MRI findings of emphysematous cholecystitis are numerous floating signal void bubbles in the upper dependent portions of the gallbladder (22).

The traditional management of emphysematous cholecystitis is urgent surgery after fluid resuscitation because of the risk of gangrene and perforation with overall, surgical mortality rates vary from 15% to 25%. (10), However due to recent advances in imaging and interventional radiology percutaneous cholecystostomy is now considered as one of the options of management of the condition especially in high risk patients.

The role of cholecystostomy in the era of laparoscopic surgery is well established for high risk and debilitated patients with an obstructed gallbladder, in whom open operation or laparoscopic interventions associated with high morbidity and mortality. (23)

At present, many authors consider percutaneous cholecystostomy is a cost-effective, easy and reliable procedure with low complications and high success rates for high-risk patients with acute calculous

cholecystitis, and definitive treatment in patients with acalculous cholecystitis (24-29).

Although many papers were published in the role of percutaneous cholecystostomy in management of acute non-Emphysematous cholecystitis in seriously ill patients, unfortunately till present, there is no published large-scale studies about the role of percutaneous cholecystostomy in management of condition in seriously ill patients. This most probably due to the rarity of the condition and its sporadic presentations. Most of the published literatures about the condition are occasion case reports.

Slot WB et al (30) reported a case similar to our case reporting successful percutaneous drainage of gallbladder in a male diabetic patient with emphysematous cholecystitis in whom surgery was considered contraindicated because of his poor cardiac status. On the other hand, Safioleas M et al (31) reported 5 cases of Emphysematous cholecystitis, three of them were treated with open cholecystectomy without complication. The remaining two were treated with percutaneous drainage; both of them developed septic musculoskeletal complications. They recommend that surgeons must be aware of musculoskeletal complications of percutaneous trans gallbladder drainage in patients with emphysematous cholecystitis.

IV. Summary

Emphysematous cholecystitis is relatively rare life-threatening form of acute cholecystitis caused by gas producing organisms. The clinical picture is similar to that of acute non-emphysematous cholecystitis with early signs of sepsis and rapid progress to gangrene and perforation. Demonstration of air in the gallbladder wall in the absence of an abnormal communication with the gastrointestinal tract in plain abdominal x ray and CT scan is diagnostic. The traditional management of emphysematous cholecystitis is urgent surgery after fluid resuscitation because of the risk of gangrene and perforation; however with the recent advances in the field of intervention radiology, percutaneous cholecystectomy may provide an alternative noninvasive option of treatment especially in high risk patients. With the anticipated difficulty of publication of large scale studies due to rarity of the condition we encourage publication of each single case treated with percutaneous drainage.

Conflict of Interest: None Declared

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Biological Control of Narrow Brown Leaf Spot and Leaf Smut Disease in Paddy Crops by Some Antagonistic Fungi

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Abstract- Rice is one of the most important crops worldwide. Fungal diseases in rice plants are raising concerns both in the field of research and production. Therefore, there is a definite requirement to find their control measures. In this study, an attempt was made to address the raised concerns by biologically controlling two of the least discussed diseases of the rice plants. An experiment to test potential of soil fungi as antagonists after treatment against the isolated fungal pathogens, Cercospora janseana and Entyloma oryzae was performed. In the present study, isolation of fungal plant pathogens were done from the infected plant collected from the rice field in Cauvery-Delta zone. The infected leaves were surface sterilized. Next, the efficiency of fungal isolates (ten) against Cercospora janseana and Entyloma oryzae were tested using dual culture method under in-vitro conditions. The culture filtrate test was performed to observe the maximum zone of inhibition at a particular concentration by the ten antagonistic fungi. Chemical fungicides like Carbendazim and Mancozeb were also tested using disc diffusion method. This test helped in comparison of the effects of biological control agents (antagonistic fungi) and chemical control agents (chemical fungicides). Results revealed that Trichoderma viride was found to be most effective as a biological control agent in all the tests when compared to other fungal species.

Keywords: *Cercospora janseana, Entyloma oryzae, Trichoderma viride, Biological control, Carbendazim, Mancozeb, rice.*

GJMR-K Classification: *NLMC Code: QW 4*

Strictly as per the compliance and regulations of:

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Basobi Mukherjee [α] & N. Uma Maheswari [σ]

Abstract- Rice is one of the most important crops worldwide. Fungal diseases in rice plants are raising concerns both in the field of research and production. Therefore, there is a definite requirement to find their control measures. In this study, an attempt was made to address the raised concerns by biologically controlling two of the least discussed diseases of the rice plants. An experiment to test potential of soil fungi as antagonists after treatment against the isolated fungal pathogens, *Cercospora janseana* and *Entyloma oryzae* was performed. In the present study, isolation of fungal plant pathogens were done from the infected plant collected from the rice field in Cauvery-Delta zone. The infected leaves were surface sterilized. Next, the efficiency of fungal isolates (ten) against *Cercospora janseana* and *Entyloma oryzae* were tested using dual culture method under *in-vitro* conditions. The culture filtrate test was performed to observe the maximum zone of inhibition at a particular concentration by the ten antagonistic fungi. Chemical fungicides like Carbendazim and Mancozeb were also tested using disc diffusion method. This test helped in comparison of the effects of biological control agents (antagonistic fungi) and chemical control agents (chemical fungicides). Results revealed that *Trichoderma viride* was found to be most effective as a biological control agent in all the tests when compared to other fungal species. All the test antagonists grew faster than the pathogens and produced inhibition zones which limited the growth of the fungal pathogens, *Cercospora janseana* and *Entyloma oryzae*. *Gliocladium virens* and *Trichoderma harzianum* also contributed in showing their antagonistic activity after *Trichoderma viride.* In conclusion, the three antagonistic fungi that were found to be highly efficient might be exploited commercially to biocontrol the narrow brown leaf spot and leaf smut disease. Further studies needs to be continued in this area of research.

Keywords: *Cercospora janseana, Entyloma oryzae, Trichoderma viride, Biological control, Carbendazim, Mancozeb, rice.*

I. Introduction

Many types of crops get exposed to different species of pests, but only a few are taken into account (Pimentel *et al.*, 1997). Plant pathogens, pest insects, and weed cause most reduction in world's food production, without application of pesticides.

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Before harvest, losses due to pests are approximately 15% for pest insects, 13% for diseases, and 12% for weeds. Post-harvest, also a loss of food occurs due to other types of pests (Pimentel *et al.*, 1997). Diseases in plants can be caused by a variety of fungi that result in significant losses on crops. Different types of fungi harm almost every tree, and each one attacks various kinds of plants. Approximately, more than 10,000 different species of fungi may cause diseases in plant varieties (Agrios, 2005).

Diseases caused by fungi can be reduced by the usage of inoculums and inhibition of its virulence mechanisms thereby, promoting genetic diversity in the crops (Strange *et al.*, 2005). Mostly, fungicides cause acute toxicity, whereas, few cause chronic toxicity as well (Goldman, 2008). Chemical pesticides usage leads to various environmental and health problems. International Labour Organization (ILO) has recorded that 14 % of occupational injuries occurs as a result of exposure to pesticides and other agrochemical constituents (ILO, 1996). World Health Organization (WHO) and United Nations Environment Programme surveyed that each year, up to three million workers in agriculture experience severe poisoning due to pesticides, of which about 18,000 die (Miller, 2004). Suitable improvement in technology results in productive use of natural resources, which is essential for agricultural development. Amongst all, one is the use of microbial antagonists.

According to previous reports, many microbial antagonists possess antagonistic activities against plant fungal pathogens, for example, *Pseudomonas fluorescens*, *Agrobacterium radiobacter*, *Bacillus subtilis, B.cereus*, *B. amyloliquefaciens*, *Trichoderma viride*, *Burkholderia cepacia*, *Saccharomyces* sp, *Gliocadium* sp.

A possible way of controlling plant diseases is the application of biological control which decreases the excessive use of agrochemicals and its health hazards effect. Many naturally occurring soil microbes aggressively attack plant pathogens and provide benefit to the plants by suppression of the disease and hence referred to as biocontrol agents. In addition to this, biological control agents also help to control insect, pests, and weeds.

Among several types of biological control agents available to be used in plants, screening of the appropriate biocontrol agent is necessary to be developed and commercialized further. Biocontrol agents possess multiple beneficial characters such as competence in the rhizosphere, antagonistic potential, and ability to produce antibiotics, lytic enzymes, and toxins.

II. Materials and Methods

a) Study Area

The study was mainly focussed and conducted in the Cauvery-Delta Zone to isolate the available plant pathogens from the infected paddy leaves grown in this region and find the antagonistic effect of different fungi on the isolated plant pathogens.

b) Sample collection of infected paddy plants

A survey was conducted in the above said areas during the crop season. Collection of diseased plants showing narrow brown leaf spot and leaf smut symptoms, from the Vadakovanur village in the Cauvery-Delta zone, Thiruvarur district, Tamil Nadu, India. A clean polythene bag stored the samples, and each sample was marked clearly to show details of the location and variety. In the laboratory, the samples got used for microscopic examination, isolation, purification and pathogenicity test.

c) Collection of soil sample

In paddy, collection of the rhizospheric soil sample, from Thirukkanurpatti, Thanjavur district, Cauvery-Delta zone to isolate *Trichoderma, Aspergillus, Penicillium, Rhizopus, Fusarium, Gliocladium* species. After sample collection, samples were brought to the laboratory and stored in the refrigerator for further biological analysis.

d) Isolation of Fungal Pathogens (Waksman, 1922)

Surface sterilization of the infected paddy leaves was done using 0.1% mercuric chloride solution, 1% sodium hypochlorite solution (1 min) and 70% ethanol wash (1 min). Potato Dextrose Agar medium was prepared and poured into the Petri plates. Surface sterilized sample was dried after placing between two sterile filter papers. Then inoculated or impressed (Impression method) in sterile Potato Dextrose Agar medium (PDA) and incubated at 27±2^{0}C for 72 hours. To avoid bacterial contamination Streptomycin @ 100 ppm was added in the medium.

e) Isolation of native antagonistic mycoflora from rhizosphere of paddy

i. *Serial Dilution Technique (Aneja, 2002)*

The collected soil sample was serially diluted to isolate the fungal population. The soil sample was diluted in a conical flask containing 90 ml of sterile distilled water and mixed thoroughly to make 1:10 dilution (10^{-1}). Then 10 ml of diluted sample was transferred to the next flask and serially diluted into the series of conical flasks having 90 ml of sterile distilled water with sterile pipettes, up to 10^{-6}. Consider 10^{-4} to 10^{-6} dilutions for the fungal isolation. The soil sample was taken from a container and subjected to serial dilution followed by pour plate method.

ii. *Pour Plate Method (Johnson et al., 2001)*

Pour plate technique provides the maximum probability of recovering all bacteria present in a given sample. The process includes the addition of molten agar to the inoculums in a Petri plate, mixing it by rotating the plate and then allowing solidification of the medium with the inoculums. Since the lowest area of the agar contains a lesser quantity of oxygen, even anaerobic organisms can be effectually enumerated. Potato dextrose agar medium was used in pour plate method. In sterilized petri plates, 1 ml of sample was transferred from 10^{-1} to 10^{-6} dilution. Finally, the cooled medium was poured into the sample containing plates and incubated at 27±2^{0}C for 72 hours.

The composition of Potato Dextrose Agar medium (pH – 5.6):

Potato (Peeled) – 200g

Dextrose – 20g

Agar – 15g

Distilled water – 1000 ml

iii. *Preparation of PDA (Potato Dextrose Agar Medium) (Aneja, 2002)*

200g of potatoes were made into thin slices and boiled with 1000 ml distilled water for extraction; 15g of agar was mixed in 200 ml distilled water, and melted. In potato extract, this melted agar solution was mixed; to this mixture, 20g of dextrose was also added. On addition of distilled water, the final volume of medium was made up to 1000 ml. The pH (medium) was maintained as 5.6. The medium was sterilized in an autoclave at 121^{0}C for 15 minutes. Addition of a pinch of Streptomycin just before pouring the medium into Petri plates is necessary to prevent the bacterial growth.

iv. *Identification of Fungi*

a. *Lactophenol Cotton Blue Technique*

- On top of the glass slide, a drop of lactophenol cotton blue was placed. A small tuft of the fungus probably with spores and spore-bearing structures was transferred into the globule using an inoculation needle.
- The material was teased using the two inoculation needles. Fungal material was then flooded with stain.
- The fungal preparation was mounted with coverslip, taking care to avoid trapping air bubbles in the stain. It was then examined under the microscope.

b. *Identification Manual*

Identification of individual fungi are done on the basis of spore morphology, cultural characteristics and also using standard manuals like The Manual of Soil Fungi (Gilman, 1957), Microscopy and Photomicrography: a working manual (Smith, 1994), Ainsworth and Bisby's Dictionary of the Fungi (Hawksworth *et al.,* 1995), Practical Mycology: manual for identification of fungi (Funder *et al.,* 1968), Dictionary of the Fungi (Kirk *et al.,* 1983), Biology of Conidial Fungi (Cole *et al.,* 1981) and Laboratory Manual for Identification of Pathogenic fungi (Hazen *et al.,* 1972).

v. *Pathogenicity Test (Sakthivel et al., 1987)*

a. *Inoculum Preparation*

The healthy paddy plants were planted in pots filled with a sterile potting mixture containing soil, sand and farmyard manure in the ratio of 1:1:1 and grown under greenhouse conditions. *Cercospora janseana* and *Entyloma oryzae* were cultured in Potato Dextrose broth in Roux bottles using mycelial plugs (3 mm) taken from the advancing margin of 7 days old culture of the isolate. The isolates were allowed to grow at $25^0C \pm 2^0C$ for 14 days and the mycelial mats were used for pathogenicity tests. The mycelial mats were harvested, weighed and homogenized in a mixer blender and made into a suspension. Inoculation of suspension of 5 ml containing 1g ml/l over the soil surface around one-month-old healthy paddy plants was performed. The ones without inoculums served as control. Evaluation of the plants was done by recording the development of black powdery spores on leaves and subsequent spotting and yellowing of the leaves. Observation of symptoms of the narrow brown leaf spot and leaf smut and recording of results was done at regular intervals.

b. *Reisolation of the pathogen*

The plants which got infected by the fungi and showed symptoms of narrow brown leaf spot and leaf smut after 14 days (International Rice Research Institute, Philippines, 1988) were collected and used for the reisolation of the pathogens to prove the pathogenicity. The infected sample portions (infected paddy leaves) gathered in the laboratory were used for isolation. These were washed thoroughly with tap water to remove the impurities present on the leaves. Small pieces excised from the diseased portions along with some healthy parts were surface sterilized with 0.01% mercuric chloride or with 75% ethanol for 1-3 minutes, then washed for three times in sterile distilled water and transferred on to PDA Petri plates (90 mm diameter).

vi. *Dual Culture Test (Dennis et al., 1971)*

This test was used to study the reduction in the growth of pathogens and inhibition zone formed due to the antagonistic activity of the biocontrol agents. The biocontrol agents *Trichoderma viride, Trichoderma harzianum, Aspergillus niger, Aspergillus flavus, Aspergillus terreus, Penicillium notatum, Penicillium chrysogenum, Rhizopus sp., Fusarium sp.,* and *Gliocladium virens* were selected to study the antagonistic activity against *Cercospora janseana* and *Entyloma oryzae* isolated from the infected paddy leaves. The Potato dextrose agar medium was prepared and poured into the Petri plates. After solidification, 6 mm diameters of the pure culture of each biocontrol agents were placed on the PDA medium in opposite direction against pathogenic fungi. The plates were incubated at 27 ± 2^0C for 15 days, and the results were noted at every 72 hours on 3, 6, 9, 12 and 15th days respectively. In the control experiment, the test antagonists got replaced with sterile agar plugs. The growth of the pathogens was recorded in both the test and control experiments. Colony interaction was determined using dual culture method. The growth inhibition was calculated of the colony of the test pathogens and antagonistic fungi:

$$\text{Percentage inhibition of growth} = \frac{r - r^1}{r} \times 100$$

r=Measurement of growth of the pathogenic fungi from the center of the colony up to the core of the plate in the absence of antagonistic fungi.

r^1=Measurement of growth of the pathogenic fungi from the middle of the colony towards the antagonistic fungi.

The colony interaction assessment between test pathogens and soil fungi done following the model proposed by Porter (1924). Five types of interactions grade as proposed by Skidmore *et al.,* 1976 have been used.

They are as follows:

1. Mutual intermingling growth without any macroscopic sights of interaction – Grade 1
2. Mutual intermingling growth in which the growth of the fungus is inhibited, and overgrowth of the opposed fungus takes place – Grade 2
3. Intermingling growth where the fungus under observation is germinating into the opposed fungi either above (or) below – Grade 3
4. Sight inhibition of both the interacting fungi with narrow demarcation line - Grade 4
5. Mutual inhibition of growth at a distance of >2 mm – Grade 5

vii. *Culture Filtrate Method (Narasimha Rao et al., 2001)*

The biocontrol agents were inoculated into the potato dextrose broth at 27^0C with intermittent shaking at 150 rpm. The metabolites were collected from 12 days and filtered. The sterilized filtrates were amended in PDA to make 5%, 10%, and 15% concentration in Petri plates. The solidified agar plates were inoculated at the center with 6mm diameter mycelia disc of the pathogen and incubated at 27^0C for seven days. The Petri plates without filtrate served as control. The colony diameter

was measured, and calculation of percentage inhibition of radial growth was done.

The percent inhibition of growth can be calculated as:

$$\% \text{ of inhibition of growth} = \frac{\text{Growth in control} - \text{Growth in treatment}}{\text{Growth in control}} \times 100$$

viii. *Disc Preparation (Kirby Bauer et al., 1966)*

The Whatman No.1 filter paper, used for the disc preparation; the disc size was 6mm. The commercially available chemical fungicides namely, Carbendazim (50% wp) and Mancozeb (75% wp) were used. 0.3 gm of fungicides were diluted with 10 ml of sterile distilled water and added into the discs, and the discs were maintained in a hot air oven at 45^{0}C till it reached required concentration.

ix. *Disc Diffusion Method*

The PDA medium was prepared and sterilized at 121^{0}C for 15 minutes and allowed to cool to approximately 50^{0}C. Next, the medium was poured into the sterile Petri plates. After solidification, the isolated pathogens were swabbed on the agar plate with the help of sterile cotton buds. After disc preparation, the discs were placed on the PDA medium. Control plates containing only the isolated pathogens, without the introduction of chemical fungicides were also maintained. The Petri plates were stored in an incubator at 27±2^{0}C for 7 days. After the incubation period, the results were recorded. The efficacy of fungicides was expressed as percent of radial growth over control, which was calculated by using the formula (Vincent *et al.,* 1947):

$$I = (C-T/C) \times 100$$

Where,

I = Percent inhibition over control

C = Radial growth in control

T = Radial growth in treatments

x. *Statistical Data Study*

The entire test and all the data of the parameters were statistically analyzed using random sampling and expressed as Mean ± S.D. (Gupta *et al.,* 1971).

$$\text{Mean} = \bar{x} = \frac{x = \sum x}{N}$$

Where,

$\sum$ = Sum total of all the values of variable

N = Total no. of observations

$$\text{Standard Deviation} = \frac{\sqrt{\sum(x-\bar{x})2}}{N}$$

Where,

$\sum(x-\bar{x})2$ = Sum of the square of the deviation of each value from the mean.

N = Number of observations

Duncan Multiple Range Test (DMRT) is a test used to evaluate the significant differences between treatments (P≤0.05). ANOVA analysis is performed with the SPSS statistics software.

III. Results

a) Sample Collection

The present study was carried out to isolate the fungal species of pathogens from narrow brown leaf spot disease and leaf smut disease occurring in the infected paddy crop field located at Vadakovanur village in the Cauvery-Delta Zone, Thiruvarur district, Tamil Nadu, India. The physicochemical parameters of the soil sample collected from the same place were analyzed, and the morphological analysis was done to identify the fungal species present in the soil.

Table 1: Physico-chemical properties of paddy field soil

SL. No.	Soil Characteristics	Amount
1.	Colour	Pale Brown
2.	Texture	Clay Particles
3.	Temperature	47^{0}C
4.	pH	7.31
5.	Moisture	40.03%
6.	Organic Carbon	0.30%
7.	Organic Matter	0.420%
8.	Organic Nitrogen	0.080%

Table 2: Isolation and Identification of antagonistic fungi from rhizospheric soil sample

SL. No.	Name of the organisms
1.	Trichoderma viride
2.	Gliocladium virens
3.	Trichoderma harzianum
4.	Aspergillus niger
5.	Aspergillus flavus
6.	Aspergillus terreus
7.	Penicillium notatum
8.	Penicillium chrysogenum
9.	Rhizopus stolonifer
10.	Fusarium oxysporum

Table 3: Isolation and Identification of pathogenic fungi from infected leaf sample

SL. No.	Name of the organisms
1.	Cercospora janseana
2.	Entyloma oryzae

Table 4: Colony interaction between Cercospora janseana and antagonistic fungi in dual culture experiment

Sl. No.	Growth response of the antagonist and the test fungus	Antagonistic fungi tested (mm)				
		T.viride	G.virens	T.harzianum	A.niger	A.flavus
1.	Colony growth of the pathogen towards antagonist (mm)	8	9	10	12	16
2.	Colony growth of the pathogenic fungi growing away from the antagonistic fungi (mm)	20	10	15	13	25
3.	% growth inhibition of the pathogenic fungi near the zone of interaction (mm)	75.0	73.8	72.3	57.1	35.7
4.	Colony growth of the antagonist in Control, i.e. Growth towards the center of the plate in the absence of the pathogen (mm)	30	28	24	35	33
5.	Colony growth of the antagonist towards the pathogen (mm)	20	18	16	15	10
6.	Colony growth of the antagonist away from the pathogen (mm)	40	42	34	23	27
7.	% growth inhibition in the zone of interaction	24.6	27.8	28.8	46.4	60.7

T.viride: Trichoderma viride, G.virens: Gliocladium virens, T.harzianum: Trichoderma harzianum, A.niger: Aspergillus niger, A.flavus: Aspergillus flavus.

Table 5: Colony interaction between Cercospora janseana and antagonistic fungi in dual culture experiment

Sl. No.	Growth response of the antagonist and the test fungus	Antagonistic fungi tested (mm)				
		A.terreus	P.notatum	P.chrysogenum	R.stolonifer	F.oxysporum
1.	Colony growth of the pathogen towards antagonist (mm)	15	11	10	18	16
2.	Colony growth of the pathogenic fungi growing away from the antagonistic fungi (mm)	24	15	14	27	25
3.	% growth inhibition of the pathogenic fungi near the zone of interaction (mm)	42.9	64.2	69.2	32.8	30.4
4.	Colony growth of the antagonist in Control, i.e. Growth towards the center of the plate in the absence of the pathogen (mm)	28	30	25	32	33
5.	Colony growth of the antagonist towards the pathogen (mm)	12	12	16	11	10
6.	Colony growth of the antagonist away from the pathogen (mm)	19	25	34	20	21
7.	% growth inhibition in the zone of interaction	64.3	42.9	37.8	63.7	69.7

The growth of Cercospora janseana towards the center of the plates in the absence of any antagonistic fungus (control) was 26 mm, measurement was taken within 72 hours.
A.terreus: Aspergillus terreus, P.notatum: Penicillium notatum, P.chrysogenum: Penicillium chrysogenum, R.stolonifer: Rhizopus stolonifer, F.oxysporum: Fusarium oxysporum.

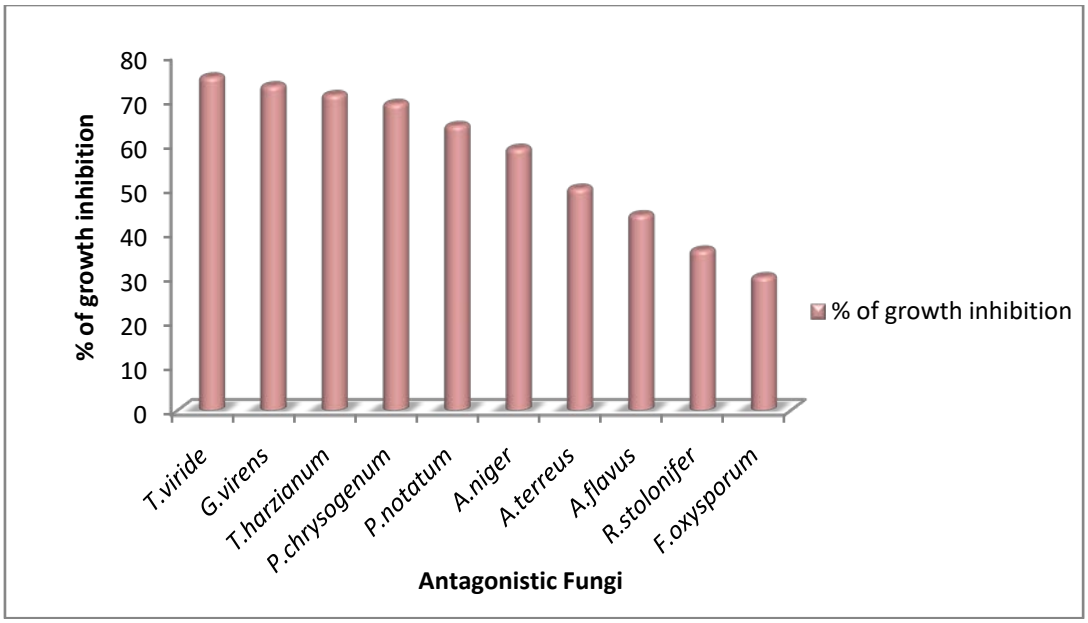

Fig. 1: Antagonistic fungi inhibition of Cercospora janseana by dual culture method

Table 6: Colony interaction between Entyloma oryzae and antagonistic fungi in dual culture experiment

Sl. No.	Growth response of the antagonist and the test fungus	Antagonistic fungi tested (mm)				
		T.viride	G.virens	T.harzianum	A.niger	A.flavus
1.	Colony growth of the pathogen towards antagonist (mm)	8	9	10	12	16
2.	Colony growth of the pathogenic fungi growing away from the antagonistic fungi (mm)	20	10	15	13	25
3.	% growth inhibition of the pathogenic fungi near the zone of interaction (mm)	75.2	73.7	72.4	57.8	35.9
4.	Colony growth of the antagonist in Control, i.e. Growth towards the center of the plate in the absence of the pathogen (mm)	30	28	24	35	33
5.	Colony growth of the antagonist towards the pathogen (mm)	20	18	16	15	10
6.	Colony growth of the antagonist away from the pathogen (mm)	40	42	34	23	27
7.	% growth inhibition in the zone of interaction	24.6	27.8	28.8	46.4	60.7

T.viride: Trichoderma viride, G.virens: Gliocladium virens, T.harzianum: Trichoderma harzianum, A.niger: Aspergillus niger, A.flavus: Aspergillus flavus.

Table 7: Colony interaction between Entyloma oryzae and antagonistic fungi in dual culture experiment

Sl. No.	Growth response of the antagonist and the test fungus	Antagonistic fungi tested (mm)				
		A.terreus	P.notatum	P.chrysogenum	R.stolonifer	F.oxysporum
1.	Colony growth of the pathogen towards antagonist (mm)	15	11	10	18	16
2.	Colony growth of the pathogenic fungi growing away from the antagonistic fungi (mm)	24	15	14	27	25
3.	% growth inhibition of the pathogenic fungi near the zone of interaction (mm)	43.0	64.6	69.9	32.4	23.1
4.	Colony growth of the antagonist in Control, i.e. Growth towards the center of the plate in the absence of the pathogen (mm)	28	30	25	32	33

5.	Colony growth of the antagonist towards the pathogen (mm)	12	12	16	11	10
6.	Colony growth of the antagonist away from the pathogen (mm)	19	25	34	20	21
7.	% growth inhibition in the zone of interaction	64.3	42.9	37.8	63.7	69.7

The growth of Entyloma oryzae towards the center of the plates in the absence of any antagonistic fungus (control) was 28 mm, measurement taken within 72 hours.

A.terreus: Aspergillus terreus, P.notatum: Penicillium notatum, P.chrysogenum: Penicillium chrysogenum, R.stolonifer: Rhizopus stolonifer, F.oxysporum: Fusarium oxysporum.

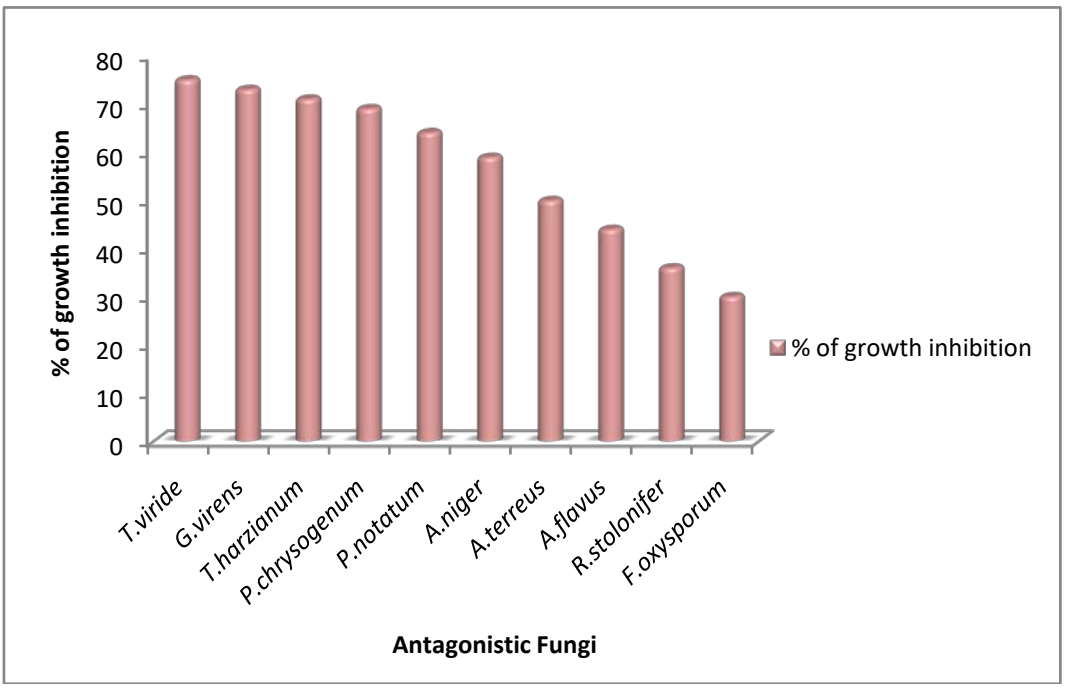

Fig. 2: Antagonistic fungi inhibition of Entyloma oryzae by dual culture method

Table 8: Effect of culture filtrate of antagonist on mycelial growth and sporulation of Cercospora *janseana* on PDA medium

Sl. No.	Name of the Antagonist	Radial average growth of C.janseana (mm) at different concentration (%)		
		5	10	15
1.	Trichoderma viride	10.4	7.6	4.2
2.	Gliocladium virens	12.8	10.4	3.0
3.	Trichoderma harzianum	14.2	12.4	10.9
4.	Penicillium chrysogenum	12.8	11.6	10.3
5.	Penicillium notatum	16.3	14.2	12.3
6.	Aspergillus niger	19.3	16.5	10.3
7.	Aspergillus terreus	18.4	15.4	14.2
8.	Aspergillus flavus	23.6	20.4	18.6
9.	Rhizopus stolonifer	10.0	12.0	10.2
10.	Fusarium oxysporum	30.2	28.3	22.4

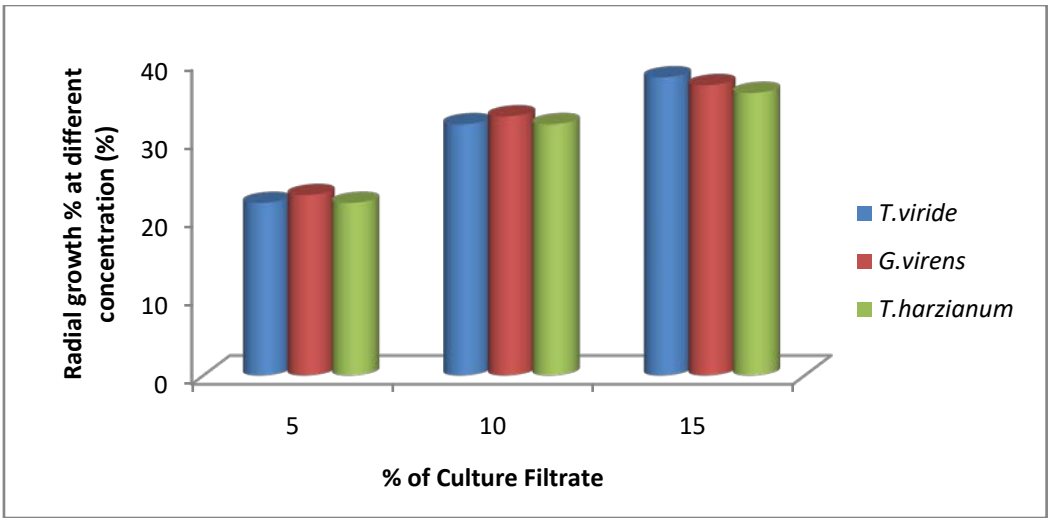

Fig. 3: Measurement of percentage of growth inhibition of pathogen Cercospora janseana by culture filtrate test

Table 9: Effect of culture filtrate of antagonist on mycelial growth and sporulation of Entyloma oryzae on PDA medium

Sl. No.	Name of the Antagonist	Radial average growth of E.oryzae (mm) at different concentration (%)		
		5	10	15
1.	Trichoderma viride	10.4	7.6	3.8
2.	Gliocladium virens	12.8	10.4	6.4
3.	Trichoderma harzianum	14.2	12.4	8.2
4.	Penicillium chrysogenum	12.8	11.6	10.1
5.	Penicillium notatum	16.3	14.2	7.6
6.	Aspergillus niger	19.3	16.5	9.8
7.	Aspergillus terreus	18.4	15.4	14.3
8.	Aspergillus flavus	23.6	20.4	15.3
9.	Rhizopus stolonifer	10.0	12.0	6.8
10.	Fusarium oxysporum	30.2	28.3	20.0

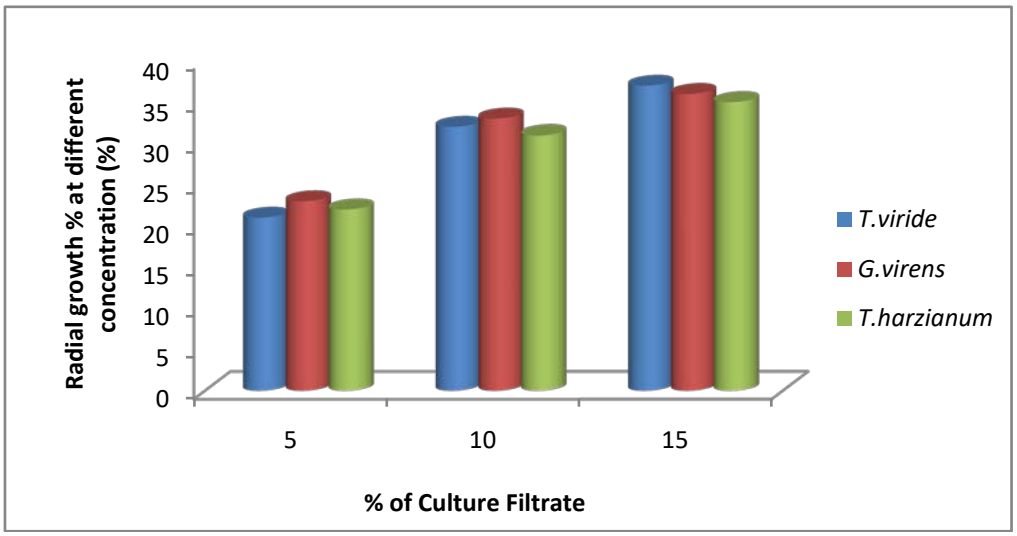

Fig. 4: Measurement of percentage of growth inhibition of pathogen Entyloma oryzae by culture filtrate test

Table 10: Antifungal activity of chemical fungicides against Cercospora janseana

Sl. No.	Hours	Zone of Inhibition of Carbendazim (mm)	Zone of Inhibition of Mancozeb (mm)
1.	72	34 ± 0.1	24 ± 0.3
2.	120	27 ± 0.2	20 ± 0.2
3.	168	20 ± 0.8	18 ± 0.5
4.	216	18 ± 0.9	15 ± 0.7

Values are expressed as Mean ± Standard Deviation

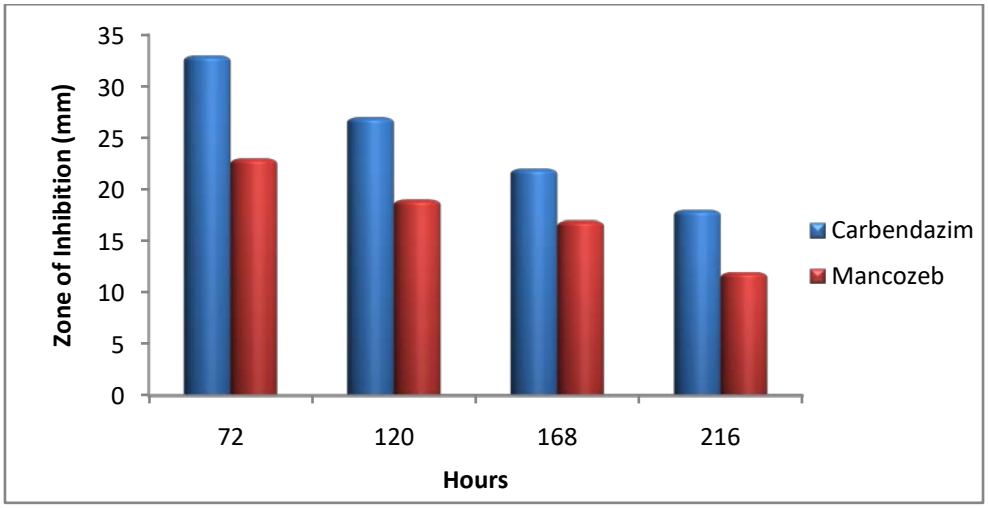

Fig. 5: Percentage of efficacy of chemical fungicides on the colony growth of Cercospora janseana

Table 11: Antifungal activity of chemical fungicides against Entyloma oryzae

Sl. No.	Hours	Zone of Inhibition of Carbendazim (mm)	Zone of Inhibition of Mancozeb (mm)
1.	72	32 ± 0.1	22 ± 0.1
2.	120	26 ± 0.2	16 ± 0.2
3.	168	19 ± 0.8	12 ± 0.8
4.	216	17 ± 0.9	10 ± 0.9

Values are expressed as Mean ± Standard Deviation

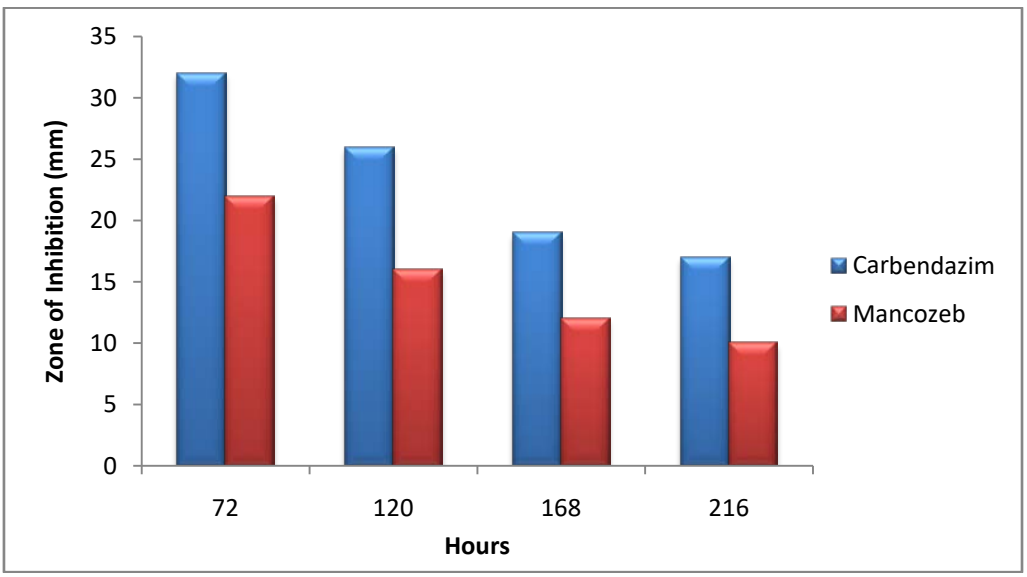

Fig. 6: Percentage of efficacy of chemical fungicides on the colony growth of Entyloma oryzae

HPLC ANALYSIS RESULT – Peak Table

Peak#	Ret. Time	Area	Height	Area%	Height%
1	3.116	1815055	270073	31.754	47.834
2	3.262	3897232	294400	68.181	52.143
3	4.757	3700	130	0.065	0.023
Total		5715987	564603	100.000	100.000

IV. Discussion

Our study indicated that the antagonistic effect of *T.viride* was better than other species of isolated antagonistic fungi for the inhibition of the fungal pathogens, *Cercospora janseana* and *Entyloma oryzae,* causing narrow brown leaf spot and leaf smut diseases in paddy leaves. A high amount of moisture content, organic matter, and temperature, along with neutral pH was recorded while measuring the physicochemical parameters of the soil. In dual culture test, *T.viride* showed maximum % of inhibition (75%) against the tested pathogens, *C.janseana* and *E.oryzae* in comparison to other antagonistic fungi. Compared to other soil fungi in the Culture filtrate test, *T.viride* exhibited maximum control effect at 15% concentration rather than 5% and 10% concentration on the tested fungal pathogens, *C.janseana* and *E.oryzae*. From the commercial fungicides aspect, Carbendazim showed the maximum zone of inhibition compared to Mancozeb for the tested fungal pathogens, *C.janseana* and *E.oryzae*. Besides *Trichoderma viride, Gliocladium virens* and *Trichoderma harzianum* can also be used for controlling of the plant pathogens. Thus, the control of leaf borne paddy crop plant disease is possible through the use of antagonistic microorganisms as well as with the use of fungicides in the form of soil drenches.

V. Conclusion

In our research findings, we concluded that fungal antagonists like *Trichoderma* and *Gliocladium* are potential biocontrol agents that can be explored to provide productive and safe means to manage paddy crop diseases. The present study showed that three species of fungi, i.e. *Trichoderma viride, Gliocladium virens* and *Trichoderma harzianum* suppressed the growth of *Cercospora janseana* and *Entyloma oryzae*, the cause of narrow brown leaf spot and leaf smut disease in paddy crops. Rice (*Oryza sativa L.)* being a main cereal crop with high demand worldwide should be prevented from disease-causing plant pathogens as it results in increased yield losses of paddy crops.

In definite areas, farmers still rely on the use of synthetic fungicides to control plant diseases. However, the misuse of these chemicals may cause serious environmental and health problems. Therefore, these chemical fungicides must be replaced with biocontrol agents for the prevention of plant diseases. Thus, it can be concluded that fungal biocontrol agents being harmless to the animals and human beings (no side effects), cheaper than chemicals and highly potent will hold significant value in the field of agriculture.

This research work can be extended or studied further shortly by understanding the antagonistic mechanism in depth, improvement of strains and development of additional products of fungi biocontrol agents for the control of plant pathogens. Measures can also be taken for improving the potential of these agents by continual improvement in isolation, formulation and application methods, particularly in the field of crops.

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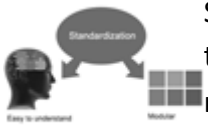

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The MARSM member can apply for approval, grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A.

Once you are designated as MARSM, you may send us a scanned copy of all of your credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria.

It is mandatory to read all terms and conditions carefully.

AUXILIARY MEMBERSHIPS

Institutional Fellow of Open Association of Research Society (USA) - OARS (USA)

Global Journals Incorporation (USA) is accredited by Open Association of Research Society, U.S.A (OARS) and in turn, affiliates research institutions as "Institutional Fellow of Open Association of Research Society" (IFOARS).

The "FARSC" is a dignified title which is accorded to a person's name viz. Dr. John E. Hall, Ph.D., FARSC or William Walldroff, M.S., FARSC.

The IFOARS institution is entitled to form a Board comprised of one Chairperson and three to five board members preferably from different streams. The Board will be recognized as "Institutional Board of Open Association of Research Society"-(IBOARS).

The Institute will be entitled to following benefits:

The IBOARS can initially review research papers of their institute and recommend them to publish with respective journal of Global Journals. It can also review the papers of other institutions after obtaining our consent. The second review will be done by peer reviewer of Global Journals Incorporation (USA) The Board is at liberty to appoint a peer reviewer with the approval of chairperson after consulting us.

The author fees of such paper may be waived off up to 40%.

The Global Journals Incorporation (USA) at its discretion can also refer double blind peer reviewed paper at their end to the board for the verification and to get recommendation for final stage of acceptance of publication.

The IBOARS can organize symposium/seminar/conference in their country on behalf of Global Journals Incorporation (USA)-OARS (USA). The terms and conditions can be discussed separately.

The Board can also play vital role by exploring and giving valuable suggestions regarding the Standards of "Open Association of Research Society, U.S.A (OARS)" so that proper amendment can take place for the benefit of entire research community. We shall provide details of particular standard only on receipt of request from the Board.

The board members can also join us as Individual Fellow with 40% discount on total fees applicable to Individual Fellow. They will be entitled to avail all the benefits as declared. Please visit Individual Fellow-sub menu of GlobalJournals.org to have more relevant details.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

After nomination of your institution as "Institutional Fellow" and constantly functioning successfully for one year, we can consider giving recognition to your institute to function as Regional/Zonal office on our behalf.
The board can also take up the additional allied activities for betterment after our consultation.

The following entitlements are applicable to individual Fellows:

Open Association of Research Society, U.S.A (OARS) By-laws states that an individual Fellow may use the designations as applicable, or the corresponding initials. The Credentials of individual Fellow and Associate designations signify that the individual has gained knowledge of the fundamental concepts. One is magnanimous and proficient in an expertise course covering the professional code of conduct, and follows recognized standards of practice.

Open Association of Research Society (US)/ Global Journals Incorporation (USA), as described in Corporate Statements, are educational, research publishing and professional membership organizations. Achieving our individual Fellow or Associate status is based mainly on meeting stated educational research requirements.

Disbursement of 40% Royalty earned through Global Journals : Researcher = 50%, Peer Reviewer = 37.50%, Institution = 12.50% E.g. Out of 40%, the 20% benefit should be passed on to researcher, 15 % benefit towards remuneration should be given to a reviewer and remaining 5% is to be retained by the institution.

We shall provide print version of 12 issues of any three journals [as per your requirement] out of our 38 journals worth $ 2376 USD.

Other:

The individual Fellow and Associate designations accredited by Open Association of Research Society (US) credentials signify guarantees following achievements:

- The professional accredited with Fellow honor, is entitled to various benefits viz. name, fame, honor, regular flow of income, secured bright future, social status etc.

- In addition to above, if one is single author, then entitled to 40% discount on publishing research paper and can get 10%discount if one is co-author or main author among group of authors.
- The Fellow can organize symposium/seminar/conference on behalf of Global Journals Incorporation (USA) and he/she can also attend the same organized by other institutes on behalf of Global Journals.
- The Fellow can become member of Editorial Board Member after completing 3yrs.
- The Fellow can earn 60% of sales proceeds from the sale of reference/review books/literature/publishing of research paper.
- Fellow can also join as paid peer reviewer and earn 15% remuneration of author charges and can also get an opportunity to join as member of the Editorial Board of Global Journals Incorporation (USA)
- • This individual has learned the basic methods of applying those concepts and techniques to common challenging situations. This individual has further demonstrated an in–depth understanding of the application of suitable techniques to a particular area of research practice.

Note :

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- In future, if the board feels the necessity to change any board member, the same can be done with the consent of the chairperson along with anyone board member without our approval.
- In case, the chairperson needs to be replaced then consent of 2/3rd board members are required and they are also required to jointly pass the resolution copy of which should be sent to us. In such case, it will be compulsory to obtain our approval before replacement.
- In case of "Difference of Opinion [if any]" among the Board members, our decision will be final and binding to everyone.

"

Preferred Author Guidelines

We accept the manuscript submissions in any standard (generic) format.

We typeset manuscripts using advanced typesetting tools like Adobe In Design, CorelDraw, TeXnicCenter, and TeXStudio. We usually recommend authors submit their research using any standard format they are comfortable with, and let Global Journals do the rest.

Alternatively, you can download our basic template from https://globaljournals.org/Template

Authors should submit their complete paper/article, including text illustrations, graphics, conclusions, artwork, and tables. Authors who are not able to submit manuscript using the form above can email the manuscript department at submit@globaljournals.org or get in touch with chiefeditor@globaljournals.org if they wish to send the abstract before submission.

Before and during Submission

Authors must ensure the information provided during the submission of a paper is authentic. Please go through the following checklist before submitting:

1. Authors must go through the complete author guideline and understand and *agree to Global Journals' ethics and code of conduct,* along with author responsibilities.
2. Authors must accept the privacy policy, terms, and conditions of Global Journals.
3. Ensure corresponding author's email address and postal address are accurate and reachable.
4. Manuscript to be submitted must include keywords, an abstract, a paper title, co-author(s') names and details (email address, name, phone number, and institution), figures and illustrations in vector format including appropriate captions, tables, including titles and footnotes, a conclusion, results, acknowledgments and references.
5. Authors should submit paper in a ZIP archive if any supplementary files are required along with the paper.
6. Proper permissions must be acquired for the use of any copyrighted material.
7. Manuscript submitted *must not have been submitted or published elsewhere* and all authors must be aware of the submission.

Declaration of Conflicts of Interest

It is required for authors to declare all financial, institutional, and personal relationships with other individuals and organizations that could influence (bias) their research.

Policy on Plagiarism

Plagiarism is not acceptable in Global Journals submissions at all.

Plagiarized content will not be considered for publication. We reserve the right to inform authors' institutions about plagiarism detected either before or after publication. If plagiarism is identified, we will follow COPE guidelines:

Authors are solely responsible for all the plagiarism that is found. The author must not fabricate, falsify or plagiarize existing research data. The following, if copied, will be considered plagiarism:

- Words (language)
- Ideas
- Findings
- Writings
- Diagrams
- Graphs
- Illustrations
- Lectures

- Printed material
- Graphic representations
- Computer programs
- Electronic material
- Any other original work

Authorship Policies

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1. Substantial contributions to the conception and acquisition of data, analysis, and interpretation of findings.
2. Drafting the paper and revising it critically regarding important academic content.
3. Final approval of the version of the paper to be published.

Changes in Authorship

The corresponding author should mention the name and complete details of all co-authors during submission and in manuscript. We support addition, rearrangement, manipulation, and deletions in authors list till the early view publication of the journal. We expect that corresponding author will notify all co-authors of submission. We follow COPE guidelines for changes in authorship.

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Appealing Decisions

Unless specified in the notification, the Editorial Board's decision on publication of the paper is final and cannot be appealed before making the major change in the manuscript.

Acknowledgments

Contributors to the research other than authors credited should be mentioned in Acknowledgments. The source of funding for the research can be included. Suppliers of resources may be mentioned along with their addresses.

Declaration of funding sources

Global Journals is in partnership with various universities, laboratories, and other institutions worldwide in the research domain. Authors are requested to disclose their source of funding during every stage of their research, such as making analysis, performing laboratory operations, computing data, and using institutional resources, from writing an article to its submission. This will also help authors to get reimbursements by requesting an open access publication letter from Global Journals and submitting to the respective funding source.

Preparing your Manuscript

Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.

Format Structure

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, “What words would a source have to include to be truly valuable in a research paper?” Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

Preparation of Eletronic Figures for Publication

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

Tips for writing a good quality Medical Research Paper

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of medical research then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.

6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

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	A-B	**C-D**	**E-F**
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Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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