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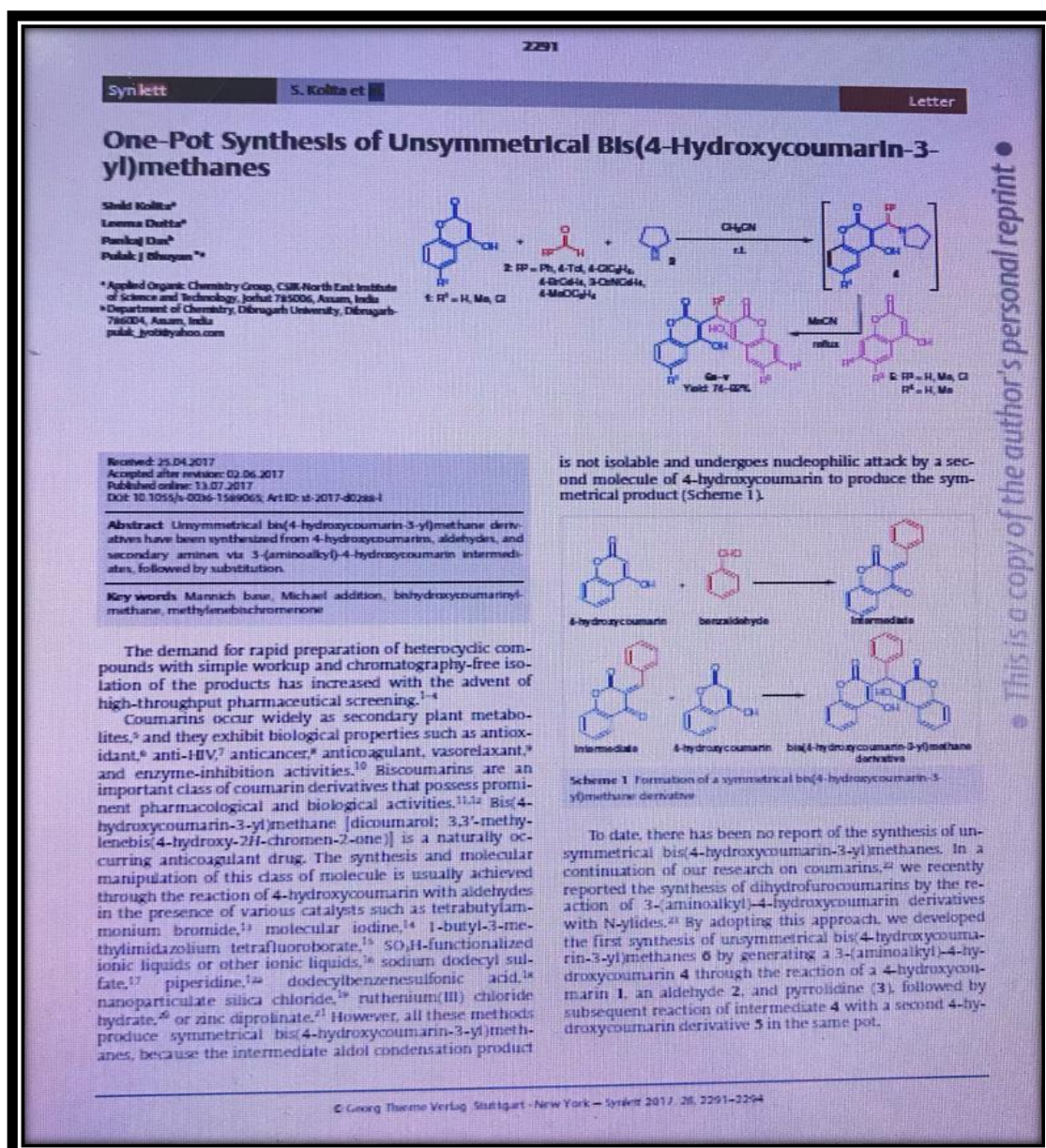
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Amine Bearing Windows Opening Membrane for CO₂ Adsorption

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Abstract: Membrane technology is one of the most efficient technologies for capturing CO₂ from a gaseous mixture and provides a way for minimizing the pollution problem around the whole world. Dendrimer incorporated polymeric membrane is mostly CO₂ selective and this membrane can be used for separation of CO₂ from a gaseous mixture. We have prepared CO₂ selective Polysulfone composite dendrimer membrane and characterized by IR, XRD, TGA- DTA, SEM analysis. IR data confirms the incorporation of NH₂ group in the membrane which plays an active role in the CO₂ adsorption. From the XRD data it is confirmed that the membrane is completely homogeneous in nature. SEM photograph shows the morphological change of the membrane due to facilitated transport mechanism. From the results, it is established that adsorption of CO₂ onto membrane is a chemical adsorption process. It is seen that the membranes have change in its crystalline structure after adsorption. The adsorption process was affected by the feed gas pressure, feed flow rate etc. The adsorption isotherm was investigated for the process and found that the adsorption behaviour for CO₂ adsorption was best fit with the Langmuir isotherm model. Adsorptive interaction is strongly related to the interaction energy between adsorbate and adsorbent. It was observed that the CO₂ adsorption onto the membrane follows the pseudo second order kinetics.

Key words: Dendrimer, membrane, gas separation, adsorption, facilitated transport, interaction energy.

1. Introduction

The concentration of CO₂ increases in the atmosphere and results numerous problems for environment which causes climate change for the whole world. Now a day, a number of technologies are developed for reducing the environmental polluting problems like global warming, greenhouse effect etc. by capturing CO₂ from various gaseous mixtures. Several technologies such as nanotechnology, absorption into a solution etc. are developed for CO₂ storage, but membrane technology for adsorption as well as separation of CO₂ achieves higher efficiency due to simple operation, environmental friendly, low investment cost and for the most selective separation [1-4].

A few numbers of research works have been carried out on membrane separation processes by the researchers throughout the world. However, work on adsorption of CO₂ onto the membrane is very limited. Sirkar et al. [5] reported that the Poly (amidoamine) (PAMAM) dendrimer and ionic liquid composite membranes provide a challenging way for CO₂ selectivity over other gases at one atmospheric pressure. The (Polyvinylalcohol) PVA composite polymeric membrane is also suitable for incorporation of CO₂ because of its higher gas permeability [6]. Youssef et al. [7] reported that amine bearing pore expanded MCM-41 (Mobil Composition of Matter, No 41) Silica can be used for gas purification applications by the adsorption of CO₂ from a gas mixtures. Jin Huang et al. [8] reported the capture of CO₂ using a CO₂ selective facilitated transport membrane. Toshihino et al. [9] reported about the efficiency of Zeolite composite membrane for the separation of CO₂/ CH₄ gaseous mixture. The novelty of our research study lies in the performance of membrane containing Amine compound (Dendrimer) for adsorption of CO₂ from CO₂/ N₂ gaseous mixture, as detail adsorption study for adsorption of CO₂ has not been reported elsewhere.

Adsorption of CO₂ occurs via Physisorption and Chemisorption processes. A large numbers of research workers carried out their studies on CO₂ adsorption process. Wang et al; 2011 [10] in their previous research study reported Zeolites as the physical adsorbents for the capture of CO₂. Mesoporous Silica can also be used as a suitable candidate for physical adsorption process as it has high surface area, tunable pore size and good mechanical stability. Liu et al; 2005 [11] Sun et al; [12] also reported about some Amorphous materials (SBA-n), Anionic surfactant – templated mesoporous silica (AMS) etc for physical adsorption process. Some disadvantages of physical adsorption are 1. Long range and weak van der Waals attraction between adsorbate and substrate (ΔH physisorption ~ 20 kJ mol⁻¹) – 2. No activation barrier, fast, 3. Reversible, 4. Surface symmetry insensitive, 5. Multilayer formation possible.

To overcome the disadvantages of physical adsorption processes, solid adsorption processes can be used as an alternative process for gas separation. From the previous research on CO₂ adsorption processes (Sayari et al., 2011, Choi et al., [13,14] it is possible to develop a suitable CO₂ adsorbent which satisfies the factors like (1) low heat capacity, (2) high

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RESEARCH ARTICLE

Antiviral compound screening, peptide designing, and protein network construction of influenza A virus (strain A/Puerto Rico/8/1934 H1N1)

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Enabling Technologies		Strategy, Management & Health Policy	
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Abstract

Plant based antiviral therapy is the current need for holistic health care management, which can be achieved through screening of phytochemicals and designing of antiviral peptides. There exist certain host's factors which are directly involved for rapid viral replication causing worldwide pandemic. A total of 177 phytochemicals from *Quercus sanctum* (L.), *Tinospora cordifolia* (Thunb.) Miers, *Cinnamomum camphora* (L.) J. Presl, *Allium sativum* (L.), *Curcuma longa* (L.), and *Aloe vera* (L.) Burm. f. were evaluated for their affinity to all viral proteins of H1N1. Applying drug filters and keeping the threshold of such filters relative to the standards, 82 compounds were found suitable for further analysis. Consensus scoring system was used for screening top ligands from 82 compounds, which screened the top 12 compounds. Highly conserved regions (>80%) which were hydrophilic, flexible, antigenic, and also charged were screened out as potent antiviral peptides. The viral proteins were taken as the targets for the modeled peptides for protein-protein docking. Further, host-pathogen interacting network was constructed to unveil host factors involved in viral replication, from which unique protein clusters representing their involvement in viral reproduction were selected through mapping with pathway databases. Twelve compounds and five peptides were found to be highly effective against all the proteins of H1N1. Based on the uniqueness, 13 clusters of proteins were obtained which are engaged in cellular process, namely, viral reproduction, fructose-6-phosphate metabolism, nitrogen compound metabolism, biosynthesis, cellular process, oligodendrocyte development, localization, multiorganism process, primary metabolism, response to unfolded protein, metabolism, and response to protein and catabolism.

Abbreviations: ADMET, Absorption, distribution, metabolism, excretion, and toxicity; AOT, acute oral toxicity; AVPs, antiviral peptides; BAF, Barrier-to-autointegration factor; BBB, blood-brain barrier; BINGO, Biological Network Gene Ontology; BLOSUM, Block Substitution Matrix; Caco2, human colon adenocarcinoma; CAPRI, Critical Assessment of Prediction Interactions; CMC, Comprehensive Medicinal Chemistry; CMV, cytomegalovirus; CNDH2, Condensin-2 complex subunit H2; COBAL, Constraint-based Multiple Alignment Tool; CREB3, Cyclic AMP-responsive element-binding protein 3; DLS, Consensus drug-like score; DVLT, dishevelled homolog 2 & 3; ER, endoplasmic reticulum; FDR, False Discovery Rate; GO, Gene Ontology; HA, hemagglutinin; HCMV, human cytomegalovirus; HCV, Hepatitis C Virus; hERG, human Ether-a-go-go-related gene; HFV, human foamy virus; HIA, human intestinal absorption; HIV, human immunodeficiency virus; HMG2, High mobility group AT-hook protein 2; HPV, human papillomavirus; HSV-1, herpes simplex virus-1; IAV, Influenza A virus; IMA4, importin subunit alpha-4; M, lead, lead-like score; M1, protein, viral matrix protein; M2, protein, ion channel; MDDR, MACCSII Drug Data Report; MK09, Mitogen-activated protein kinase 9; MSA, Multiple Sequence Alignment; NA, neuraminidase; NAI, Neuraminidase Inhibitors; NFIA, Nuclear factor 1 A-type; NLS, nuclear localization signal; NP, nucleoprotein; NS1 and NS2/NEP, nonstructural proteins 1 and 2; PA, polymerase acidic protein; PAM, Point Accepted Mutations; PB1 & PB2, polymerase basic protein 1 and 2; PKR, protein kinase R; PIANTS, Protein-ligand ANT system; PLP, piecewise linear potential; PPIA, Peptidyl-prolyl isomerase A; RRPMS, RNA-binding protein with multiple splicing; REVIGO, Reduced Visualization of GO; RIG/TRIM25, retinoic acid-inducible gene 1 / tripartite motif protein; ROS, Reactive Oxygen Species; SE, Simplex Evolution; ssRNA-, negative sense-single stranded RNAs; SVM, support vector machine; TCOFFEE, Tree-based Consistency Objective Function for alignment Evaluation; Tdp, Torsades de points; THO2, THO complex subunit 2; THO4, THO complex subunit 4; TREX, Transcription-Export; TRAF1/TRAF2, TNF receptor-associated factor 1 and 2; UPR, unfolded protein response; vRNPs, viral nucleoprotein complexes; VSV, vesicular stomatitis; WDI, World Drug Index; XRCC6, X-ray repair cross complementing protein 6

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RESEARCH ARTICLE

Volatile Inhibitors of Phosphatidylinositol-3-Kinase (PI3K) Pathway: Anticancer Potential of Aroma Compounds of Plant Essential Oils

Manobjyoti Bordoloi^{a*}, Surovi Saikia^a, Bhaskor Kolita^a, Rajeev Sarmah^b, Sonali Roy^a and Bardwi Narzary^a

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Abstract: Background: Cancer is a grave health problem for the world as the global cancer burden rises to 14 million new cases with 8.2 million deaths every year which is expected to rise by 70% in the next 2 decades as reported by the WHO. These steady rises in death demand for rapid developments in anti-cancer agents. Essential oils, being natural and multi-component complex systems have recently attracted a lot of attention in this search for novel anti-cancer agents.

Materials and Methods: The pharmaceutical attributes of essential oil components, specifically focusing on their affinity towards COX, 5-LOX, AKT, MDM2, PDK1 and mTOR which defines the phosphatidylinositol-3-kinase (PI3K) pathway, were assessed. 123 compounds present in essential oils of different plants were analyzed for their drug like attributes which were then allowed to dock with PI3K dependent receptors crucial for the development of cancer malignancies. Among them, 21 compounds were filtered possessing high druglikeness with favourable metabolism offered by major cytochrome P450 isoforms. Finally, the best docked compounds with highest binding affinities were employed for building a ligand based pharmacophore.

Being inhibitors of P-glycoproteins, these molecules also exhibited good absorption profiles and non-carcinogenic properties. Further from these 21, six compounds were evaluated against A549 lung cancer cells.

Results: The pharmacophoric feature obtained can be applied for both designing and screening moieties for active inhibitors of the phosphatidylinositol-3-kinase pathway specifically from essential oil compounds and these final 21 compounds can be further promoted to studies for anti-cancer drug development. Among these, six compounds exhibited promising inhibitory results against A549 lung cancer cells. Furthermore, immunoblotting assay confirmed the efficacy of the compounds for inhibiting mTOR and AKT enzymes which are bandmasters for downstream signaling of the PI3K pathway.

Conclusion: Methyl nonanoate, (R)-citronellol, cis-carveol (L-carveol), 3-methyl-Cyclohexanone, 4-carene and thujopsene were finally screened for PI3K targeted anti-cancer therapies which may find direct application as inhalers or sprays against lung cancer as these compounds are highly volatile.

Keywords: Essential oils, anti-cancer volatile molecules, phosphatidylinositol-3-kinase pathway, pharmacophore, docking, inhaling application against lung cancer.

1. INTRODUCTION

Aroma components of essential oils may have many pharmaceutical properties and are natural, multi-component, complex systems composed mainly of terpenoids, in addition to some other non-terpene components [1]. Essential oils have therapeutic potential of diverse nature and therefore, they have attracted the attention of researchers for exploring their anti-cancer profile. This is because they may have the mechanism of action quite dissimilar to classic cytotoxic chemotherapeutic agents. For example, perillyl alcohol as radio/chemosensitizer for malignant glioma, induction of cytotoxicity by myristicin in human neuroblastoma SK-N-SH cells through apoptotic mechanism and monoterpenes like geraniol, terpinen-4-ol, 1, 8-cineol for chemopreventive and chemotherapeutic attributes etc. [2-6]. Moreover, phenolic compounds like ellagic acid, gallic acid, gallic acid derivative and flavonoids present in essential oils act as potential natural anti-oxidants and this potential of reducing oxidative

stress in cells is of prime concern for cancerous conditions where imbalance is quite obvious in the oxidation of biomolecules leading to cell or tissue damage and development of cancer growth [7-9].

The PI3K pathway is inevitable for cell growth and their survival [10]. Genomic events like mutation, amplification and displacement easily disorient its normal regulation. Stimulated by several growth factors and regulators it promotes metastatic suitability and offers resistance to therapies [11]. Based on structure and function, PI3Ks are grouped into three classes from which Class I is further subdivided as Class I_A and Class I_B owing to its sequence similarity. Class I_A are highly responsible for promoting human cancers, consisting of a regulatory subunit p85 (α , β , γ isoforms) as encoded by three mammalian genes *PIK3R1*, *PIK3R2* and *PIK3R3* respectively. The catalytic domain, collectively known as p110 (α , β , δ isoforms) are products of *PIK3CA*, *PIK3CB* and *PIK3CD* genes of which *PIK3R1* and *PIK3CA* are commonly observed to be somatically mutated leading to cancers. p85 consist of domains SH2 (SRC Homology 2 domain) and SH3 (SRC Homology 3 domain); among which, SH2 domain docks to phosphorylated tyrosine residues resulting in inducing conformational changes,

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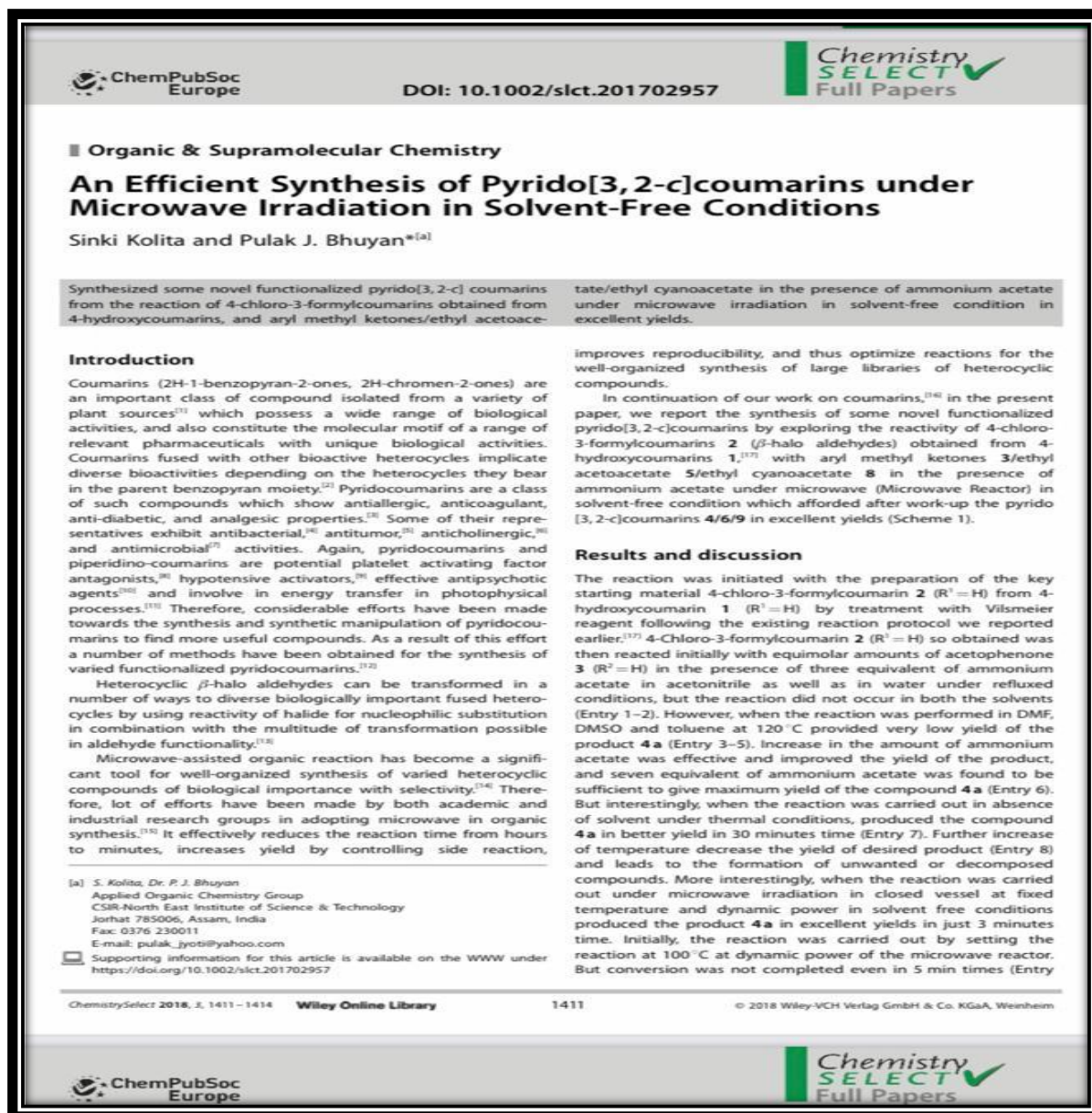


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Effect of Additives on Morphology and Permeability of Dendrimer Membrane for CO₂ Separation

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Abstract- PAMAM- Dendrimers are the molecules which selectively separated CO₂ from a gaseous mixture. We have prepared PAMAM – Dendrimer and Polysulfone composite membranes by using various non- solvent additives. The membranes have been prepared by phase inversion technique using different non - solvent additives with a definite amount of PAMAM - Dendrimer and Polysulfone. SEM (Scanning Electron Microscope) pictures showed that Poly (ethylene glycol) (PEG-400) containing membranes are dense membranes and homogeneous in nature. We have studied the CO₂ permeation performances of the prepared membranes. All membranes showed general efficiency for CO₂ permeation wherever the membranes containing PEG as non-solvent additive are the best membrane for CO₂ permeation.

Key Words: PAMAM –dendrimer, selectivity, phase inversion, homogeneous, CO₂ permeation, dense membrane.

1. INTRODUCTION

The membrane separation for removal of carbon dioxide from natural gas has advantages over the other conventional separation methods because of its low capital cost, high-energy efficiency and it is environmental friendly. The commercially available polymeric membranes have both high permeabilities and selectivities. One of the advantages of a gaseous membrane separation process is its simplicity; there is no need to regenerate an absorbent/adsorbent. In addition, membranes are simple to operate, compact and can be retrofitted easily etc.

A large numbers of researchers carried out their research studies to study the effect of various additives on membrane preparation. Lang et al; studied the roles of alkali metal counter-ions in the formation of PVDF/PFSA-M composite hollow fiber membranes [1]. Tager and his coworkers studied the effect of inorganic salt additives on the cellulose acetate membranes [2]. Han et al; studied the effect of additives on the performance and morphology of co Phthalazine ether sulfone composite UF membrane [3]. Vilakati investigated the mechanical and thermal properties of polysulfone composite membranes modified with synthetic and natural polymer additives [4]. Ismail et al; studied the effect of additives concentration on the surface properties and performance of PVDF ultrafiltration membranes for refinery produced waste water treatment [5].

PAMAM - Dendrimers are a new class of artificial macromolecules which are synthetic, highly branched, monodisperse, globular and nanopolymeric in configurations. These PAMAM- Dendrimer macromolecules have definite molecular weight, shape and size, which make them excellent candidates for numerous industrial applications. PAMAM- Dendrimers are globular nanostructures that are precisely engineered to carry molecules encapsulated in their interior void spaces or attached to the surface. PAMAM- Dendrimers provide polyvalent interactions between surfaces and bulk materials which makes it suitable for various applications such as surface coatings etc. Because of its control over size and surface makes PAMAM - Dendrimers one of the smartest or customizable commercially available nanotechnologies [6]. Due to their very well defined structures PAMAM- Dendrimers are the candidates for the purpose of membrane formation which facilitates the separation of CO₂ from a gaseous mixture [7]. PAMAM- Dendrimer based polymeric membranes have been developed for variety of industrial applications including reverse osmosis, ultra- filtration and gas separation processes because of their high permeability and selectivity. One promising means of lowering the cost of CO₂ separation is the development of high performance CO₂ separation membranes that allow CO₂ recovery via membrane separation. PAMAM-Dendrimer composite membrane comprising a gas selective layer is applicable for gas separation processes [8-10]. Thus, in continuation of our activities on membrane research, we have been pursuing research on preparation and characterization of PAMAM - Dendrimer composite membranes useful for CO₂ separation from a gaseous mixture. We have studied the effect of various non-solvent additives on membranes formation with an emphasis to study the morphology and performances of the membranes for CO₂ separation.

2. EXPERIMENTAL SECTION

2.1 Materials

Polysulfone (average molecular weight 22000) was obtained from Aldrich Chemicals were used as the main membrane material. N-Methyl-Pyrrolidone (NMP ;> 99%) obtained from Rankem, India was added as a solvent. Commercial PAMAM-

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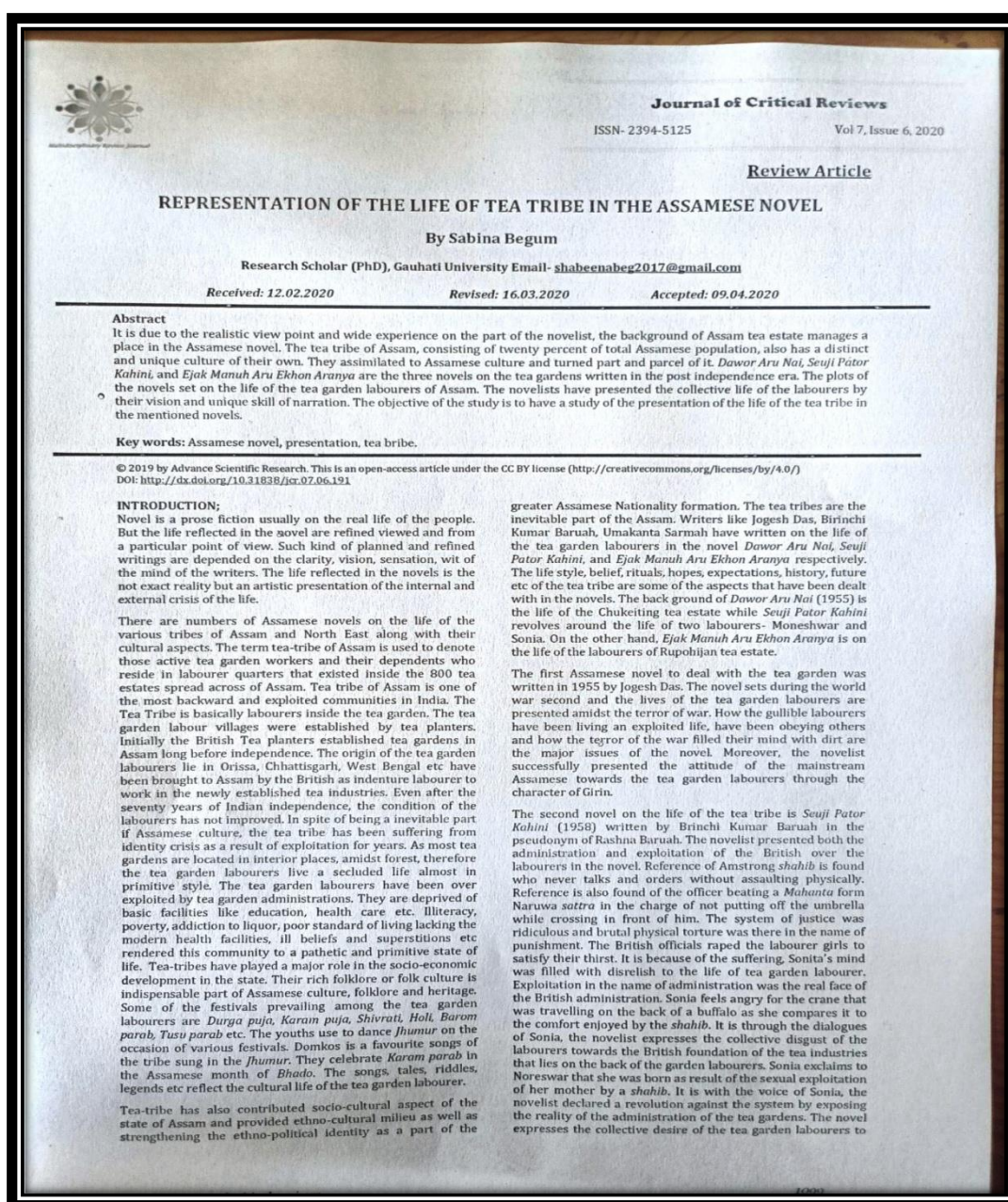


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AN ANALYSIS OF SELF-ESTEEM OF ENGINEERING STUDENTS

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Abstract: The aim of present study was to study the self-esteem of Engineering students. The study was conducted on a sample of 180 Engineering students studying in Government and private Engineering colleges of Kamrup district. Self-esteem Inventory prepared by M.S Prasad and G.P Thakur was used to collect data. Normative survey method was used to collect the data. The study indicate that most of the Engineering students have lack of knowledge on the concept of Self-esteem. Female Engineering students and students from joint family have more negative self than balance and positive self.

Key words : Self-Esteem, Engineering students.

I. INTRODUCTION

Self-esteem can be defined as the concept one holds about himself/herself as a total perception. It is not actual fact about oneself, but a belief of the person about himself/herself. This will inturn guide his/her actions. So self-esteem of a person can be measured by the way they act. It can also be said that self-esteem is the value one put on oneself. Self-esteem is called as the central of our survival. Self-esteem is a confidence in our ability to think, to cope with the basic challenges of life and confidence in our right to be successful and happy (Nathaniel Branden). Self-esteem is an evaluation of the emotional, intellectual and behavioural aspect of the self concept (Diane Frey and Jesse Carlock). High self-esteem refers good opinion about oneself and low self-esteem indicate bad opinion about oneself. A person having high self-esteem have shown satisfaction and confidence about oneself and a person with low self-esteem may show dissatisfaction and heavy self-criticism.

Student life is one of the most important part of human life. Basically this stage determine the future of a human being. In this globalized era level of competition is very high which leads the problems like anxiety, stress, depression which create for horrible life destroying condition. To tackle life peacefully and to overcome from this problems high self-esteem is very important. Various Studies reveal that high self-esteem help in good academic achievement. Therefore this area is selected as a research problem by the investigator.

II. OBJECTIVES OF THE STUDY

- i. To measure the self-esteem of Engineering students.
- ii. To study whether there is any significant difference in self-esteem of male and female students.
- iii. To check whether there is any significant difference in self-esteem of students from joint and nuclear family.

III. HYPOTHESES OF THE STUDY :-

Ho₁: There is no significant difference in self-esteem of male and female students.

Ho₂: There is no significant difference in self-esteem of students from joint and nuclear family.

IV. DELIMITATIONS OF THE STUDY :-

This study is delimited to some selected Engineering Colleges of Kamrup district (urban and rural) of Assam. The study is confined to the students of 1st semester B.E/B.Tech Engineering students which comprises both the sexes.

V. METHODOLOGY

The nature of the present study demand normative survey method. So the researcher had adopted this survey method. Stratified Random sampling technique for selecting the sample had been adopted by the researcher. A sample of 180 Engineering students from six Engineering colleges of Kamrup district was taken for the study.

Self-Esteem Inventory constructed and standardized by M.S Prasad and G.P Thakur was used as tool to collect the data. Mean, standard Deviation and t-test have been used as statistical technique for analyzing the collected data.

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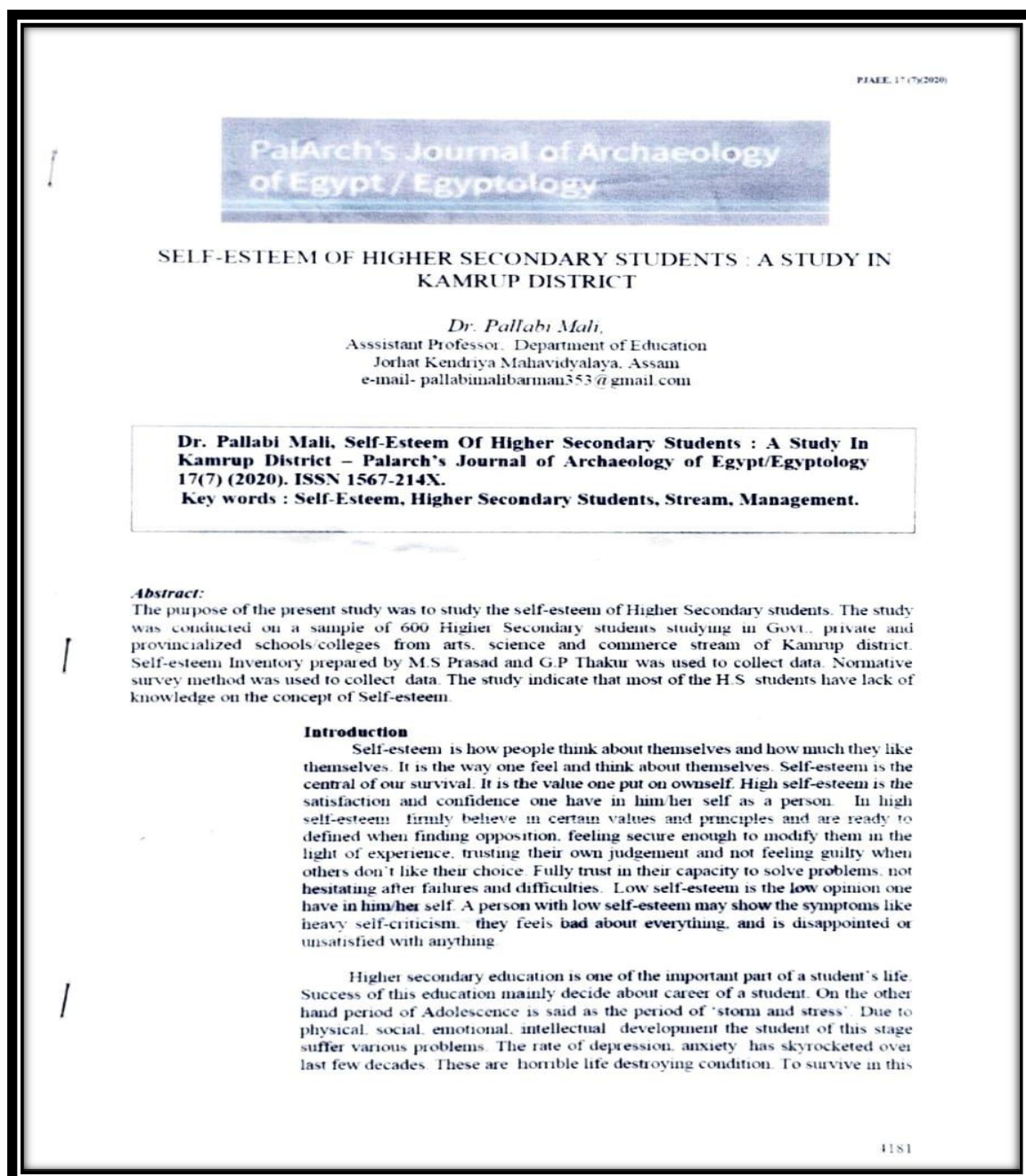


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Introduction

Self-esteem is how people think about themselves and how much they like themselves. It is the way one feel and think about themselves. Self-esteem is the central of our survival. It is the value one put on oneself. High self-esteem is the satisfaction and confidence one have in him/her self as a person. In high self-esteem firmly believe in certain values and principles and are ready to defend when finding opposition, feeling secure enough to modify them in the light of experience, trusting their own judgement and not feeling guilty when others don't like their choice. Fully trust in their capacity to solve problems, not hesitating after failures and difficulties. Low self-esteem is the low opinion one have in him/her self. A person with low self-esteem may show the symptoms like heavy self-criticism, they feels bad about everything, and is disappointed or unsatisfied with anything.

Higher secondary education is one of the important part of a student's life. Success of this education mainly decide about career of a student. On the other hand period of Adolescence is said as the period of 'storm and stress'. Due to physical, social, emotional, intellectual development the student of this stage suffer various problems. The rate of depression, anxiety has skyrocketed over last few decades. These are horrible life destroying condition. To survive in this

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A Study On Study Habits Of Engineering Students

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Abstract: The investigation has been undertaken in order to study the study habits of Engineering students and to check whether there is any significant difference in study habits of male and female Engineering students and also to find out whether there is any significant difference in study habits of Engineering students studying in Govt. and private management of Jorhat district. A representative sample of 200 Engineering students for this purpose have been selected by using simple random sampling techniques. Descriptive survey method has been used for the present study. Self made questionnaire made by the investigator was used to collect data. Simple percentage, t-test statistical technique was used to analysis the collected data. It has been found from the study that Engineering students have a good habit of study. They read magazines/journals which is related to their course content and help for the development of their career and also suit their interest. They surf internet for different purpose including educational. They also prefer to read books on various items i.e novel, poem, short stories, books on science and technology etc. The study indicate that female Engineering students acquire good habit of study and the Engineering students studying in private management has a better habit of study than the Engineering students study in Govt. management.

Keywords :- study habits, Engineering students, male, female, management

1. INTRODUCTION

Habits are the basics of ones success or may be downfall. Habits makes it possible for us to do things without spending much mental effort. One of the important habit of human being in the modern era is study habit. Study habit is acquired by putting some effort as it is not naturally gained and it should be developed at early stage of life-at the childhood stage. Study habit include home environment and planning of work, reading and note taking habits, planning of subjects, habits of concentration preparation, general habit and attitudes, school environment (Patel 1976). Good study habits help the students in critical reflection in skills outcomes such as selecting, analyzing, critiquing and synthesizing (Fielden 2004). Study habits shapes personality, intellectually of a person and helping him to become an educated, civilized person of the society. As such good study habits are considered necessary for successful professional and personal life. A poor study habit must likely to have negative image. Study habit is the way a student plan and execute his study. One cannot be said as student if he has no habit of study. Study habit may be systematic or unsystematic, efficient or inefficient. A good study habit is not only important for higher academic achievement but also an important tool for their fruitful use of leisure time.

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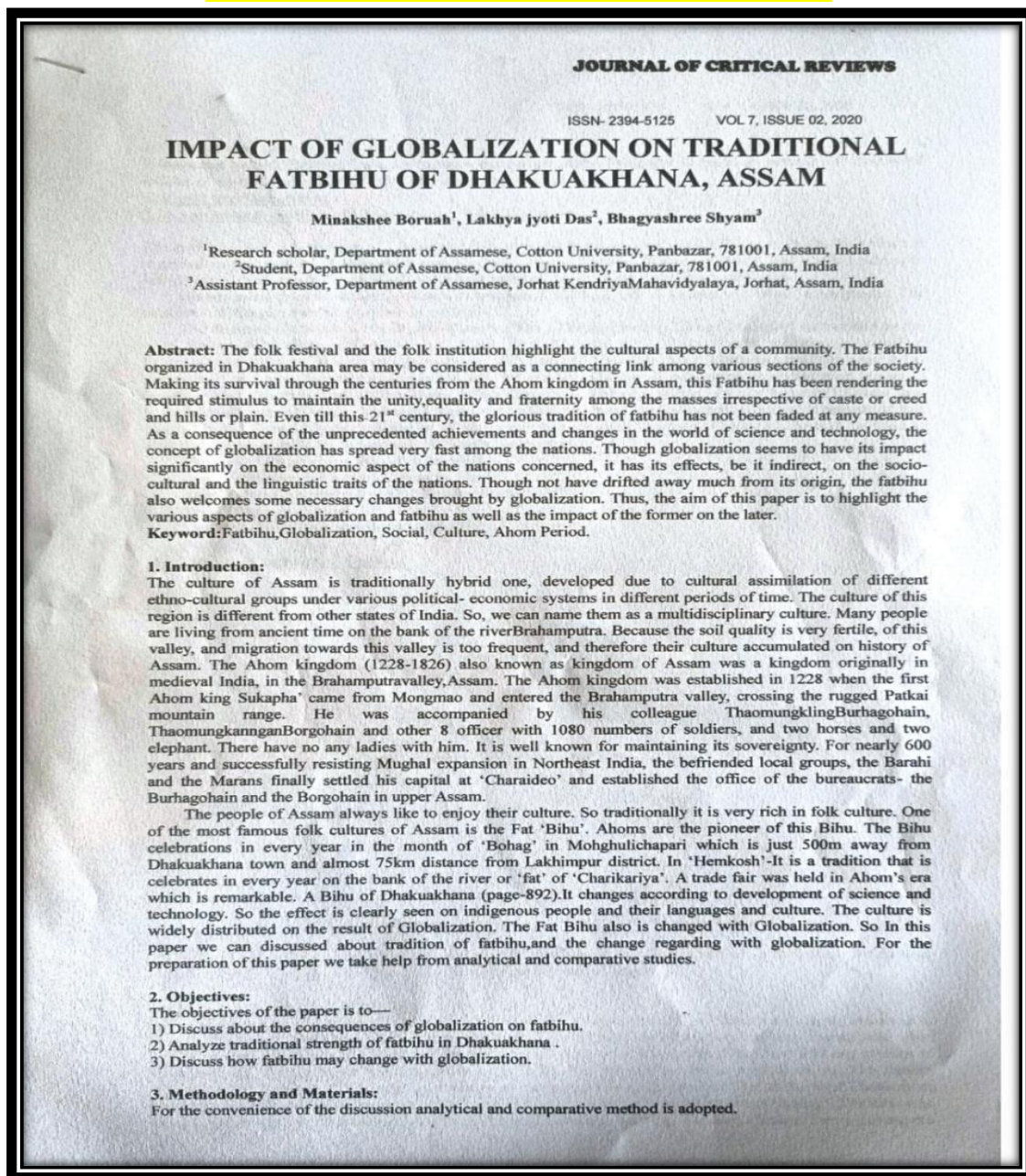
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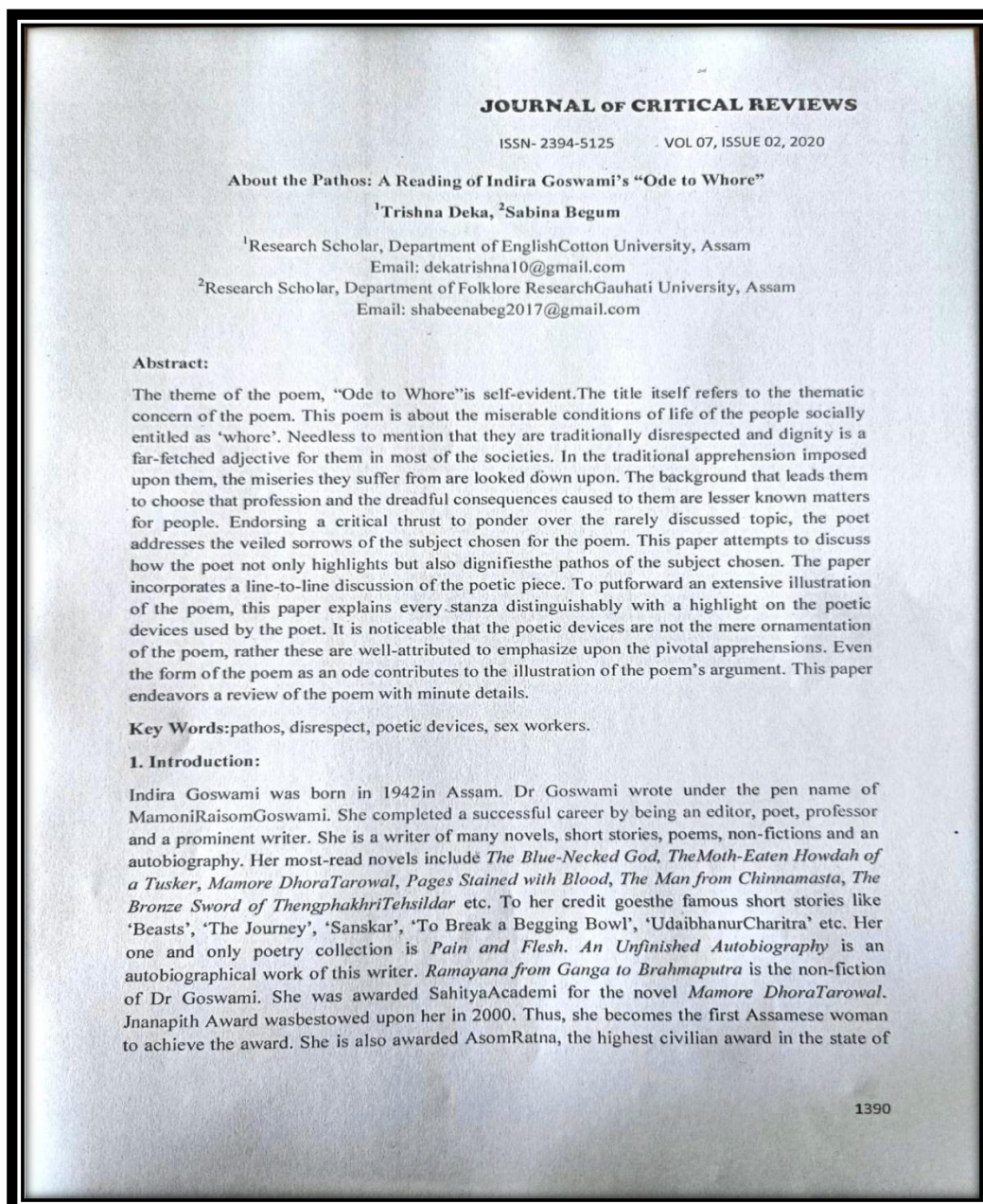


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Research Paper

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A Search of COVID-19 main Protease Inhibitor from Plant Derived Alkaloids using Chloroquine and Hydroxychloroquine as Reference: An In-silico Approach

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Abstract— Coronavirus disease 2019 (COVID-19) is an infectious disease that causes respiratory illness in human and has now become a major challenge for all over the world. As no drug is approved yet for COVID-19, it is strongly demanding to search lead compounds. Therefore, the current investigation is an attempt to screen lead molecule for inhibition of Covid-19 main protease. Herein, we considered 98 plant derived alkaloids having antimalarial activity, quinine and docked with COVID-19 main protease taking Chloroquine, hydroxychloroquine as reference. Finally, compounds Bidebiline E, Bisnordihydrotoxiniferine and Thaliferine were screened as lead molecule on the basis of Moldock score, H-bond interaction and ADMET study, and recommended for in vitro investigation.

Keywords— COVID-19; Chloroquine; Hydroxychloroquine; Alkaloids; ADMET

I. INTRODUCTION

COVID-19 is caused by a novel coronavirus severe acute respiratory syndrome coronavirus belong to genera β -CoV of subfamily Orthocoronavirinae [1, 2, 3]. The disease emerged in Wuhan city, China starting from December 2019. The World Health Organization declared this disease as pandemic, on 11th March 2020.

People infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. This disease easily attack and cause serious illness in old people, children and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer. Common symptoms include of this disease fever, tiredness, dry cough. Some other symptoms include shortness of breath, aches and pains, sore throat and very few people will report diarrhoea, nausea or a runny nose. To prevent and slowdown the transmission is to protect oneself washing our hands or using an alcohol based rub frequently and not touching our face and making social distance.

According to WHO Situation Report - 75 (4 April 2020), worldwide cases of COVID-19 climb above 1 million and deaths over 50,000. The first COVID-19 emerged country China reached 82,875 confirmed cases and 3335 deaths. Some other highly infected Country are-Italy reached 119827 confirmed cases, 14681 deaths, United States of America reached 241703 confirmed cases, 5854 death, Spain 117710 confirmed cases, 10935 deaths, India reached 2301 confirmed cases and 56 deaths. From this

WHO report we can observe the horror image of COVID-19 Globally.

Although many drugs have been tried for COVID-19, no drugs are approved yet. Different study and review suggested that Chloroquine and Hydroxychloroquine can be used to treat COVID-19 [4, 5, 6]. Different study revealed that plant derived alkaloid have antiviral properties [7, 8]. FDA approved antimalarial drug Quinine is also a plant derived alkaloid. It was isolated from cinchona tree bark and named in 1820 by Pierre Joseph Pelletier and Joseph Bienaimé Caventou [9]. Taking these view in consideration Chloroquine, Hydroxychloroquine, Quinine and 98 plant derived antimalarial compound with good IC₅₀ value reported earlier were taken for our study of COVID-19 main protease inhibitor search. Liu et al. (2020) have successfully crystallized COVID-19 main protease protein from COVID-19, which has been structured and repositioned in the Protein Data Bank (PDB) and is accessible by the public. This protease may be a potential target for the inhibition of COVID-19 replication. We took COVID-19 main protease as target protein and docked 101 compounds in search of lead molecule.

Rest of the paper is organized as follows-Section I contains the introduction of Covid-19, its present status and the aim of the study. Section II contains the related works on in-silico search of lead compound targeting COVID-19 main protease. Section III contains material and method. Section IV contains Result and discussion. Section V concludes research work with future directions.

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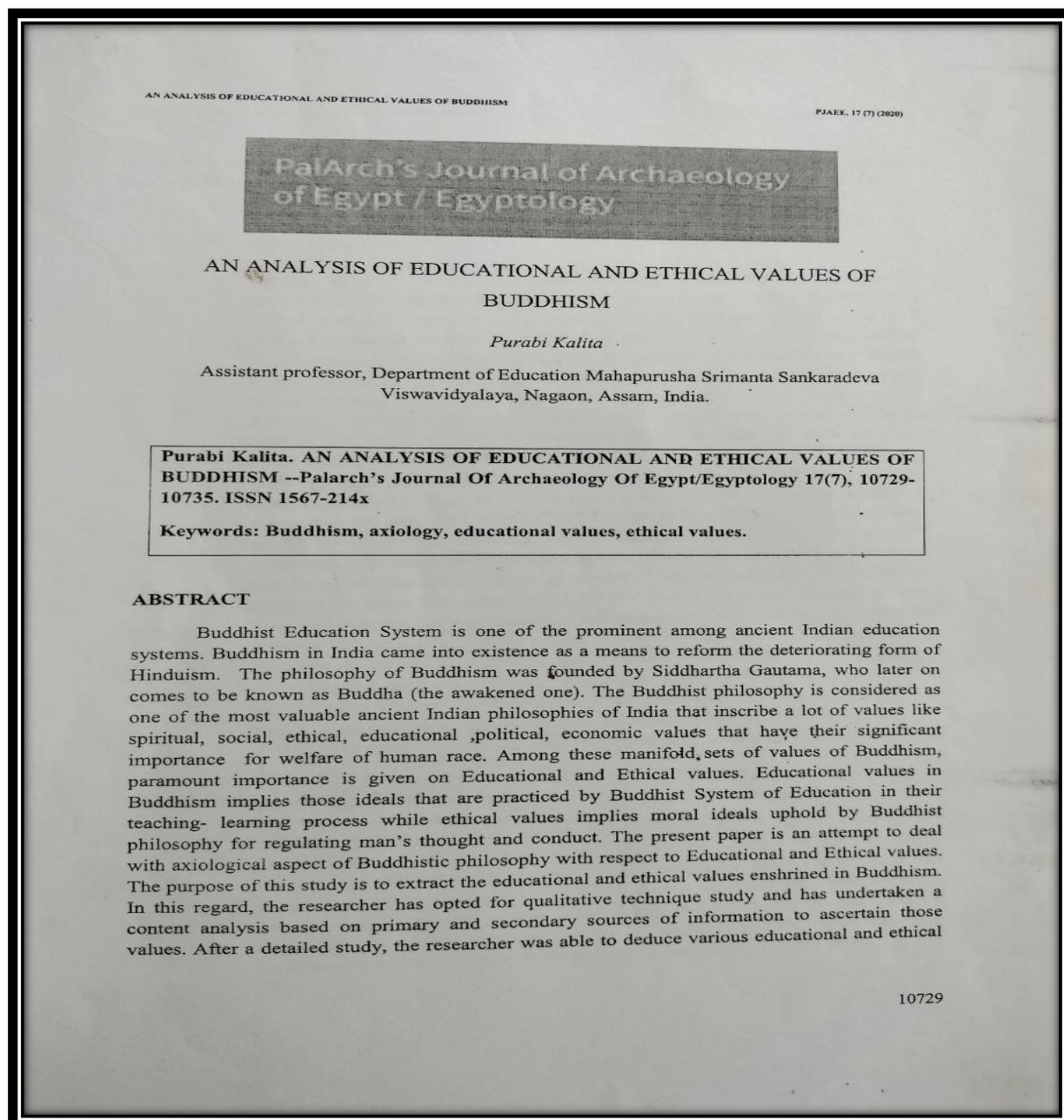


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RESEARCH ARTICLE

Combined CADD and Virtual Screening to Identify Novel Nonpeptidic Falcipain-2 Inhibitors

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Abstract: Background: *Plasmodium falciparum* is the most dangerous and widespread disease-causing species of malaria. Falcipain-2 (FP2) of *Plasmodium falciparum*, is a potential target for antimalarial chemotherapy since it is involved in an essential cellular function such as hemoglobin degradation during the parasite's life cycle. However, despite their central role in the life cycle of the parasite, no commercial drug targeting Falcipain-2 has been developed to date. Prior efforts to develop peptide-based drugs against *Plasmodium* have been futile due to their susceptibility to being degraded by host enzymes.

Objective: Here, we report computer-aided drug design of new nonpeptidic inhibitors against FP2, which are likely to be safe from degradation by host enzymes.

Methods: We have virtually screened for the probable FP2 inhibitors from the PubChem database by submitting the well-equilibrated 3-D structure of FP2. Furthermore, virtual screenings and dockings were carried out using PyRx and Discovery Studio.

Result: We found 15 top-ranking molecules with carbaldehyde pharmacophore having a good fit with the target protein. Based on the C-Docker values, the top 4 hits (PubChem 44138738, PubChem 20983198, PubChem 20983081 and PubChem 28951461) for FP2 were identified. These four hits have been observed to bound to the active cleft of the protein. Moreover, their complexes were also found to be stable from the RMSD and Radius of Gyration analysis.

Conclusion: The selected compounds 2-(benzylamino)-8-methylquinoline-3-carbaldehyde (PubChem 44138738), 6-bromo-2-(3,4-dihydro-1H-isoquinolin-2-yl)quinoline-3-carbaldehyde (PubChem 20983198), 2-(3,4-dihydro-1H-isoquinolin-2-yl)-6-ethylquinoline-3-carbaldehyde (PubChem 20983081) and 2-(benzyl(methyl)amino)quinoline-3-carbaldehyde (PubChem 28951461) may be the starting point for further modification as a new type of nonpeptidic drug for malaria disease.

Keywords: Antimalarial; docking; falcipain-2; MD simulation; nonpeptidic; drug design; virtual screening; *Plasmodium falciparum*; CADD.

1. INTRODUCTION

Increasing resistance of malaria parasites to conventional antimalarial drugs is an essential factor contributing to the persistence of the disease as a significant health threat [1]. This burden of resistant malaria is directing many drug discovery scientists to search for new antimalarial drugs or alternative therapeutic options to contend with the problem of resistant malaria.

The *Plasmodium falciparum* cysteine proteases, also known as Falcipains, are involved in erythrocyte invasion, hydrolysis of host hemoglobin, and erythrocyte rupture. With the biochemical characterization of four Falcipains so far: FP2 (Falcipain-2) and FP3 (Falcipain-3) are mainly involved in hemoglobin degradation [2-5]. Therefore, they may be considered as potential antimalarial drug targets in the search for novel antimalarial therapeutic, which could fight against the burden of increasing resistance to available antimalarial drugs.

Several types of research combining synthesis and *in silico* approaches have been carried out in the past decade to discover and optimize inhibitors targeting parasite's proteas-

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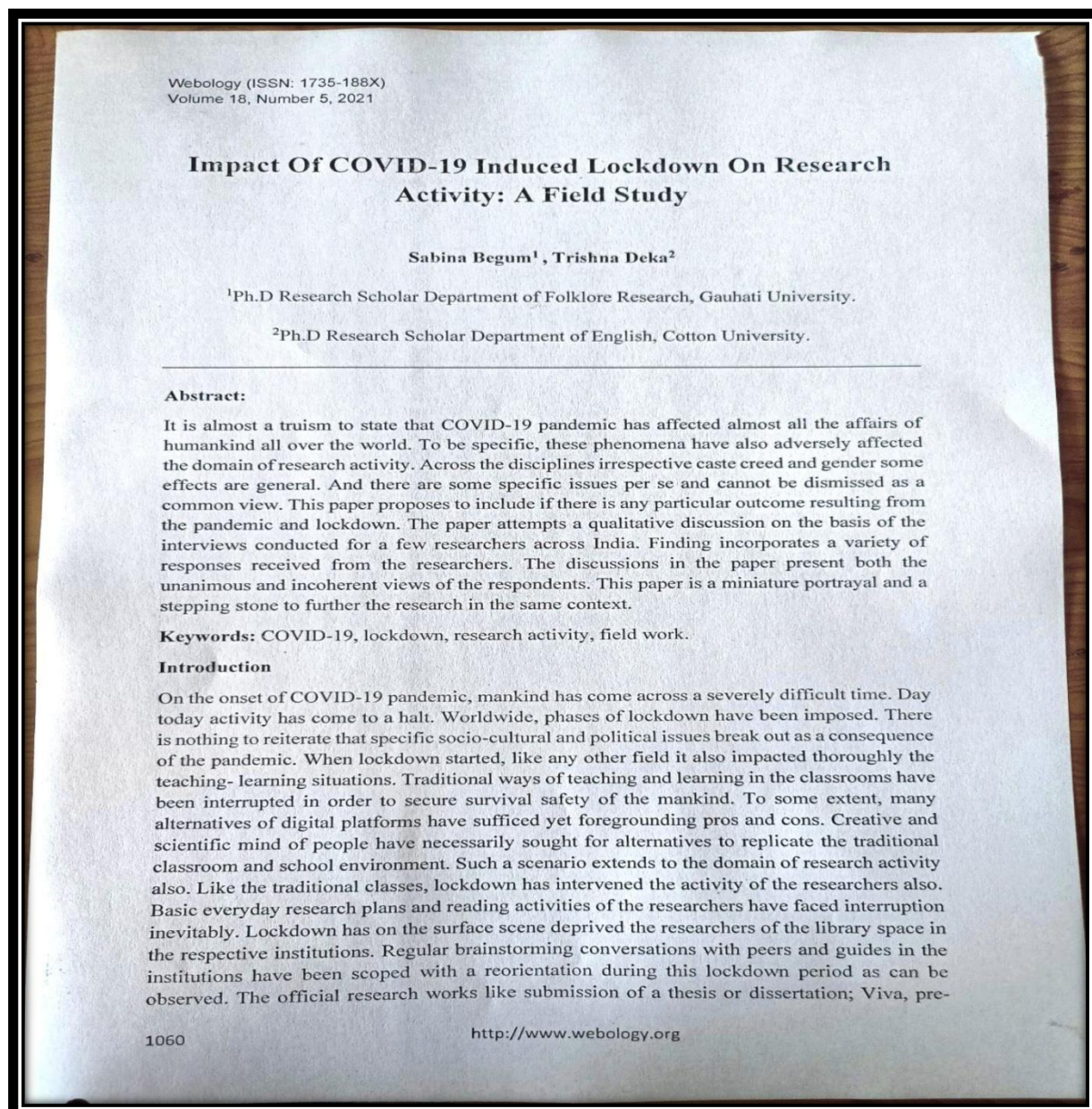


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International Journal of Mechanical Engineering

EMOTIONAL INTELLIGENCE OF HIGHER SECONDARY STUDENTS –A STUDY IN KAMRUP DISTRICT.

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Abstract :

The present study has been undertaken in order to study Emotional Intelligence of higher secondary students of Kamrup district. For this purpose a representative sample of 600 higher secondary students have been selected by using the stratified random sampling technique. Normative survey method has been used. This study has been undertaken in order to find out the Emotional Intelligence of higher secondary students. Emotional Intelligence Inventory was used to collect the data. The study implies that higher secondary students have lack of knowledge on the concept of emotional intelligence.

Key words : Emotional intelligence, higher secondary students.

INTRODUCTION:--

Emotional intelligence is the ability to understand, use, and manage your own emotions in positive ways to relieve stress, communicate effectively, empathize with others, overcome challenges and defuse conflict. We all know the word IQ and many times we judge our students with the score of their I.Q. It is also said that the person who scores high in IQ, test can become success in educational and occupational carrier. But in today's world another word become more popular and that is E.Q. The researches done by Dr. Deniyal Golman prove that the person who score high in E.Q become success in every field of life. Emotions are not the traits. They are feelings towards someone or something. A person feel many emotions during his/her life, which can either positive or negative. It is necessary for anyone to control the emotions as well as to show the emotions in right way and on right time. With all this thought the researcher here tried to know the emotional intelligence of higher secondary students.

NEED AND SIGNIFICANCE OF THE STUDY :--

In today's complex world the rate of depression, anxiety has skyrocketed over last few decades. These are horrible life destroying condition. To survive in this present world and to overcome from the problems of depression, anxiety etc. the right choice of emotional intelligence is very important. Thus, the investigator select this area as a research problem.

OBJECTIVES OF THE STUDY :--

1. To measure emotional intelligence of higher secondary students.
2. To check whether there is any significant difference in emotional intelligence of higher secondary students from urban and rural area.
3. To check whether there is any significant difference in emotional intelligence of the higher secondary students from joint and nuclear family.

HYPOTHESES OF THE STUDY :--

Ho₁: There is no significant difference in emotional intelligence of higher secondary students of urban and Rural areas.

Ho₂: There is no significant difference in emotional intelligence of higher secondary students from Joint and nuclear family.

DELIMITATIONS OF THE STUDY :--

The study is delimited to some selected Govt., Private and provincialised higher secondary schools and colleges of Kamrup district of Assam. The study is confined to class XII students of Govt., Private and provincialized higher secondary schools and colleges of Kamrup district which comprises rural and urban area. It includes higher secondary students from joint and nuclear family.

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ORIGINAL ARTICLE



Stripping of carbon dioxide from ethanol solution of PAMAM dendrimer using hollow Fibre membrane contactor

Panchali Bharali¹ · Indumoni Das¹ · Hrishikesh Sarmah¹ · Swapnali Hazarika¹

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Abstract

Separation of carbon dioxide was studied in microporous fiber (HF) membranes using the ethanol solution of PAMAM dendrimers. PAMAM dendrimers (Generations 0–4) are embedded in three membrane contactors called polyvinylidene fluoride (PVDF), polyvinyl chloride (PVC) and polypropylene (PP) separately and responsive. With higher flow rates in the dendrimer fluid, a faster chemical reaction occurs that can accelerate the transfer of carbon dioxide to the alcoholic solution. Flow rate and efficiency increase with increasing fluid flow rates. The emission rate was controlled by the distribution in the liquid section at moderate flow rates. The maximum acquisition flow is achieved at a flow rate in liquids and gases of approximately 0.5 mL / s. Empty fiber membranes can replace columns full of carbon dioxide removal from industrial packing power applications, greater connections between the shell side and the tube side with greater driving force, ease of sealing and easy retrieval, less expensive and smaller space requirement compared to other separation techniques.

Nomenclature List with SI Units

Hollow fiber mass transfer coefficient	$Sh_L = K_L^* \frac{d_c}{D_L}$	Mass transfer constant of physical diffusion	J_{phy}
Fiber diameter	d_f	Transfer coefficient of membrane	$K_m = D_{gas-membrane}$
Diffusion coefficient of liquid	D_L	Or	$\frac{D_{gas-shell}}{\delta \times \tau} \times \epsilon$
Inner fiber diameter	d_c	Membrane mass transfer coefficient	$D_{gas-membrane}$
Width of the membrane module	D	Effective diffusion coefficient inside the shell	$D_{gas-shell}$
Fiber length	L	Porosity of the membrane	ϵ
Velocity of the suction tube	$V_{absorbent tube}$	Thickness of the membrane	δ
Mass transfer coefficient	$K_L = \beta K_L^*$	Tortuosity of the membrane	τ
Mass transfer constant of chemical absorption	J_{chem}	Gas mass transfer coefficient	$Sh_g = k_g \frac{d_c}{D_{gas-shell}}$
	$\left(\beta = \frac{J_{chem}}{J_{phy}} \right)$		$= 5.85(1 - \phi) \frac{d_c}{L}$
			$Re_g^{0.6} Sc_g^{0.33}$
		Outer diameter of the fiber	d_c
		Packing density	ϕ
		Length of the membrane	L
		Sherwood number	Sh
		Reynolds number	Re
		Schmidt number	Sc
		Absorbent	i
		Reaction rate	R_i
		Diffusion coefficient	D_{i-tube}

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Molecular Dynamics Simulation of *P.falciparum* Haemoglobinase Falcipain 2, in its apo and holo structural state

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Abstract

Haemoglobinase in the food vacuole of the trophozoite stage of the malaria parasite *Plasmodium falciparum* are potent target for antimalarial drug discovery. In particular, falcipain 2 (FP2), a cysteine protease, present in abundance in the food vacuole of the parasite is shown to be inhibited by a lead compound E64. We have performed Molecular Dynamics (MD) simulation studies of the apo structure and the referred holo structure of FP2 using Gromacs software. Structural and dynamic differences in the apo and holo structures were analyzed using pairwise distance distributions. The results were analyzed using the Xmgrace package. These analyses reveal lesser backbone deviations in holo state (3 Å) than that in apo state (0.25-0.35) Å. Even the graphs of MD trajectories of holo state of FP2 showed decrease order of Radii of Gyration. Thus, it can be inferred that binding of the ligand leads to a more compact and stable conformations of the protein-ligand complex inducing more effective inhibition.

Key Words: Molecular Dynamics, Falcipain, RMSD, *P.falciparum*, apo and holo enzyme.

Introduction:

Despite important gains in some area, malaria remains to be one of the world's leading killer infectious diseases affecting around 200-300 million people and causing approximately 430,000 deaths every year globally [1]. Widespread drug resistance increasingly limits the effectiveness of available therapies. New targets are required for the development of novel classes of antimalarial drugs [2]. Trophozoite of *P. falciparum* hydrolyze hemoglobin in an acidic food vacuole to generate free amino acids essential for parasite survival [3, 4]. Among major haemoglobinase of *P. falciparum*, Falcipain-2 (FP-2) papain-family (C1A) cysteine

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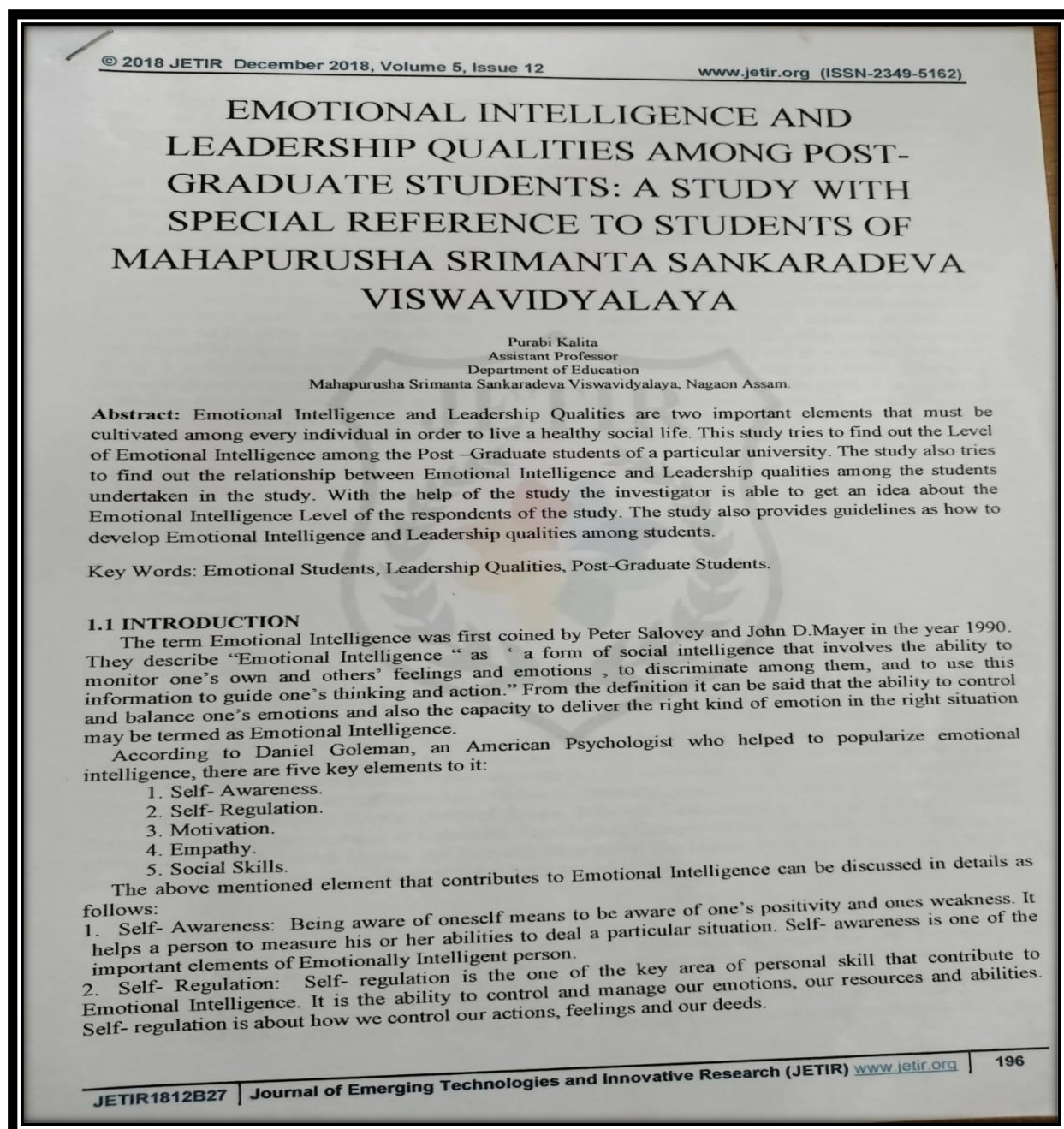


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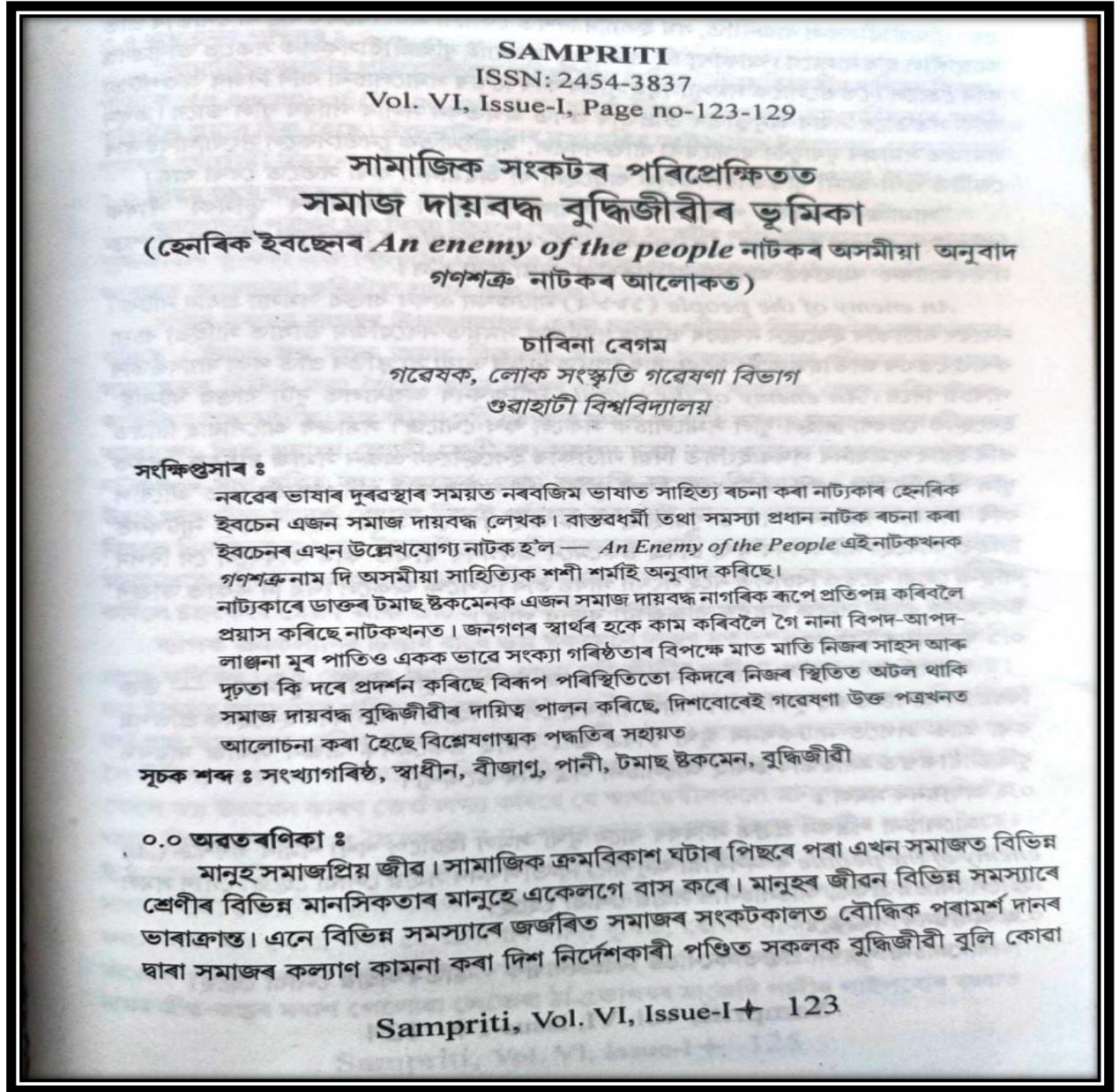


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Research Article

Selective Permeation of CO₂ through Amine Bearing Facilitated Transport Membranes

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ABSTRACT

The membranes containing facilitated transport groups for Carbon dioxide had been prepared by immobilizing PAMAM (Polyamidoamine) (Generations 0, 1, 2, 3, 4) dendrimer into the polymeric membranes. The dendrimer incorporated membranes were prepared by the phase inversion method. The permeation abilities of the membranes for pure CO₂ and binary mixture of CO₂/N₂ were calculated. The effects of feed gas pressure on the permeability of the membranes were studied. The results of the permeation experiments showed that PAMAM dendrimer (Generation 4) composite membrane possessed a better CO₂ permeability and selectivity over N₂ than the any other membranes composite with other generations of dendrimer (Generations 0, 1, 2, 3).

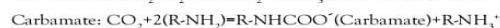
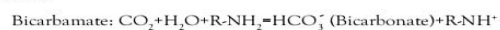
Keywords: Facilitated transport; Membranes; PAMAM dendrimer; Phase Inversion

INTRODUCTION

The increase in the concentration of various hazardous gases in the atmosphere results in numerous environmental problems like global warming, greenhouse effect etc. A large number of research studies have been carried out on the process of capturing and storage of CO₂ from gaseous mixture [1,2]. Membranes and membrane processes are not a recent invention. The preparation of synthetic membrane and their utilization on a large industrial scale however are a more recent development which has rapidly gained a substantial importance due to the large number of practical application. Now a days, membranes are used to produce potable water from sea to clean industrial effluent and recover valuable constituent, purify or fractionate macromolecular mixture in food and drug industries and to separate gas and vapours. They are also key component in energy conversion system and in artificial organs and drug delivery devices. Membrane technology is one of the most interesting technologies for its applications in various fields including Biological applications [3-6]. Lin et al. [5] in his research study reported the substrate selectivity of Lysophospholipid Transporter (LpLT) involved in Membrane Phospholipids remodelling in *Escherichia coli*. Tong et al. [6] carried out their research study on the structural insight into substrate selection and catalysis of Lipid Phosphate Phosphates in the cell membrane. Besides its applications in different fields membrane

separation technology can be used for the gas separation purpose as it is one of the cost effective process and easy to operate. Because of high permeability and selectivity, the facilitated transport membranes are very useful for gas separation applications. There are various kinds of membranes containing facilitated transport groups, such as ion-exchange membrane, fixed carrier membrane and liquid membranes etc. [1]. Because of the higher permeability and selectivity fixed carrier membranes are more suitable for gas separation. A few researchers have been reported about the fixed carrier membranes for CO₂ separation [2,7]. Works on gas separation applications using membranes composite with PAMAM dendrimer are limited. However, PAMAM dendrimer immobilized liquid membranes are reported by distinguished researchers [8,9]. In this research paper, we have been emphasized on gas separation behaviour of PAMAM dendrimer (G-0, G-1, G-2, G-3, G-4) composite solid membranes due to its stability and regeneration. The dendrimer composite membranes selectively permeated CO₂ because of the reaction between -NH₂ and CO₂ producing a carbamate ion and a protonated base [8].

Thus for separation of CO₂ molecules the reactions occurred as follows:



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INNOVATIONS FOR NEW NORMAL IN THE FIELD OF HIGHER EDUCATION

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Abstract:- Innovation means introduce something new or different ideas. It is the process of making changes, large and small, radical and incremental, to products, processes and services that result in the introduction of something new to gain more effective result. In modern meaning innovation is a new idea, creative thought, new imaginations in form of device or method. It is often also viewed as the application of better solutions that meet new requirements.

Higher education is defined as the education which is obtained after completing 12 years of schooling or equivalent. It provides people with an opportunity to reflect on the critical, social, economic, cultural, moral and spiritual issues facing humanity. It contributes to national development through dissemination of specialized knowledge and skill. Higher education aims to meet the socio cultural and developmental needs of a country. It provides an opportunity for individual to develop their potential. It fulfills the needs for high level manpower in a society. It also aims for cultural and material development.

The present pandemic of covid-19 changed the whole world in all aspects of life. School/ college and all educational Institutions are remained closed from about four month. The students are out of track from their educational life. The main objectives of this paper is study about the innovations for new normal to cope up with the present situation specially in the field of higher education. The investigator also try to find out the problems associated with innovation for new normal and try to provide suggestive measures.

Key words : innovations, new normal, higher education, online teaching-learning, pandemic.

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MID-DAY MEAL AND QUALITY IN PRIMARY EDUCATION : A STUDY IN EAST GUWAHATI AREA OF KAMRUP (METRO) DISTRICT

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Abstract: The main purpose of the present study was to study the mid-day meal and quality in primary education. The study was conducted on a sample of 15 Head master/Principals and 90 teachers of schools from East Guwahati area of Kamrup (metro) district. A standardized questionnaire made by the investigator was used to collect data. Primary and secondary data were used for the study. The study indicates that mid-day meal has a great impact on improving quality of primary education. It helps in enrollment of the students. MDMS also increased the attendance of the students. Akshaya Patra plays a very important role to provide fresh, hygienic meal to the students.

Key words : primary education, mid-day meal, quality, enrollment, hygiene.

Introduction

Primary education is the initial stage of education. This stage of education is the most important educational stage of one's life which covers the age group of 6-14 years. The aim of primary education is to create, establish and offer opportunities to all children regarding age, gender or community to achieve a balance cultural, emotional, intellectual and physical skills according to the best of their abilities. Sarva Siksha Abhiyan (SSA) is implemented as India's main

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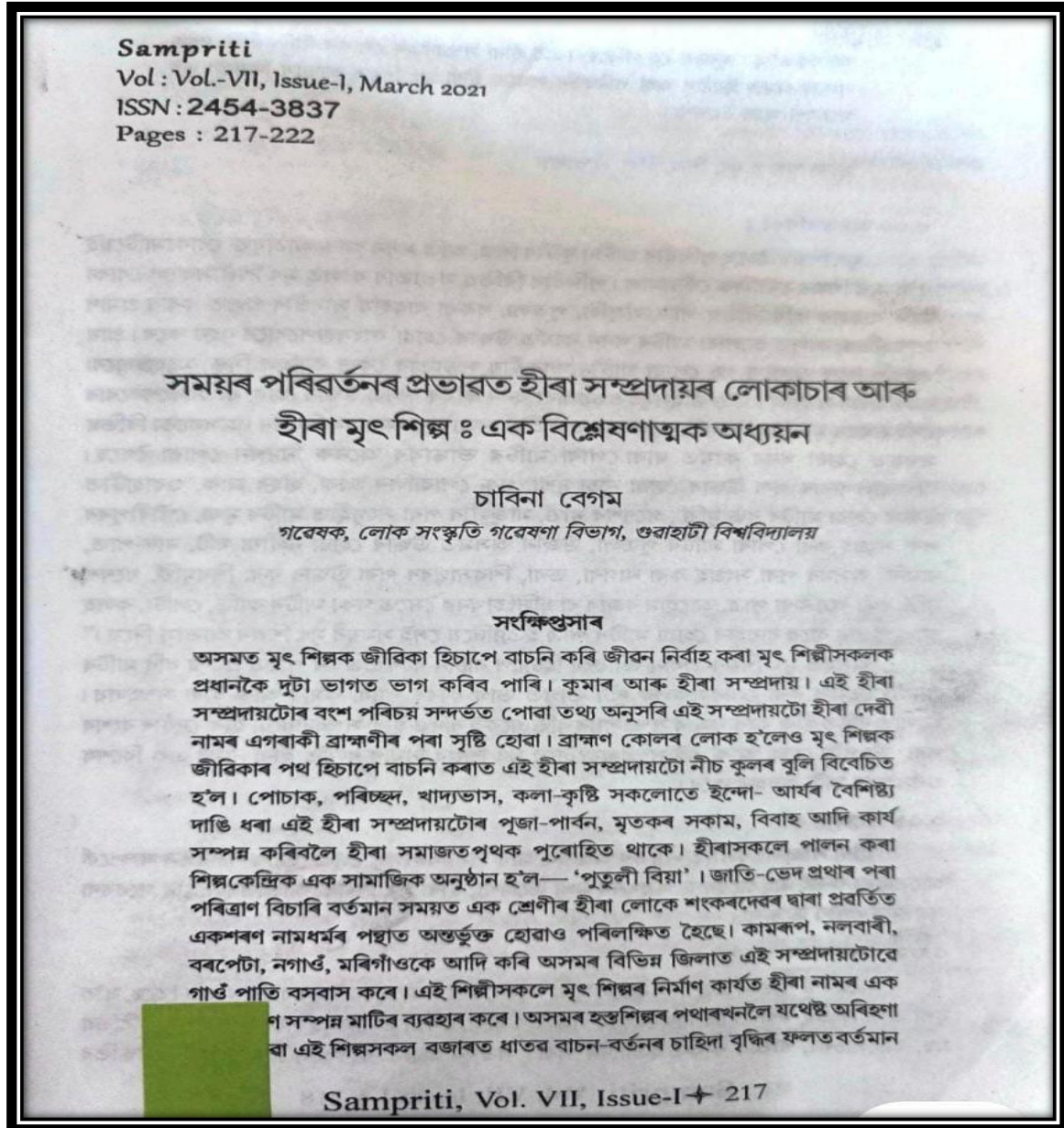


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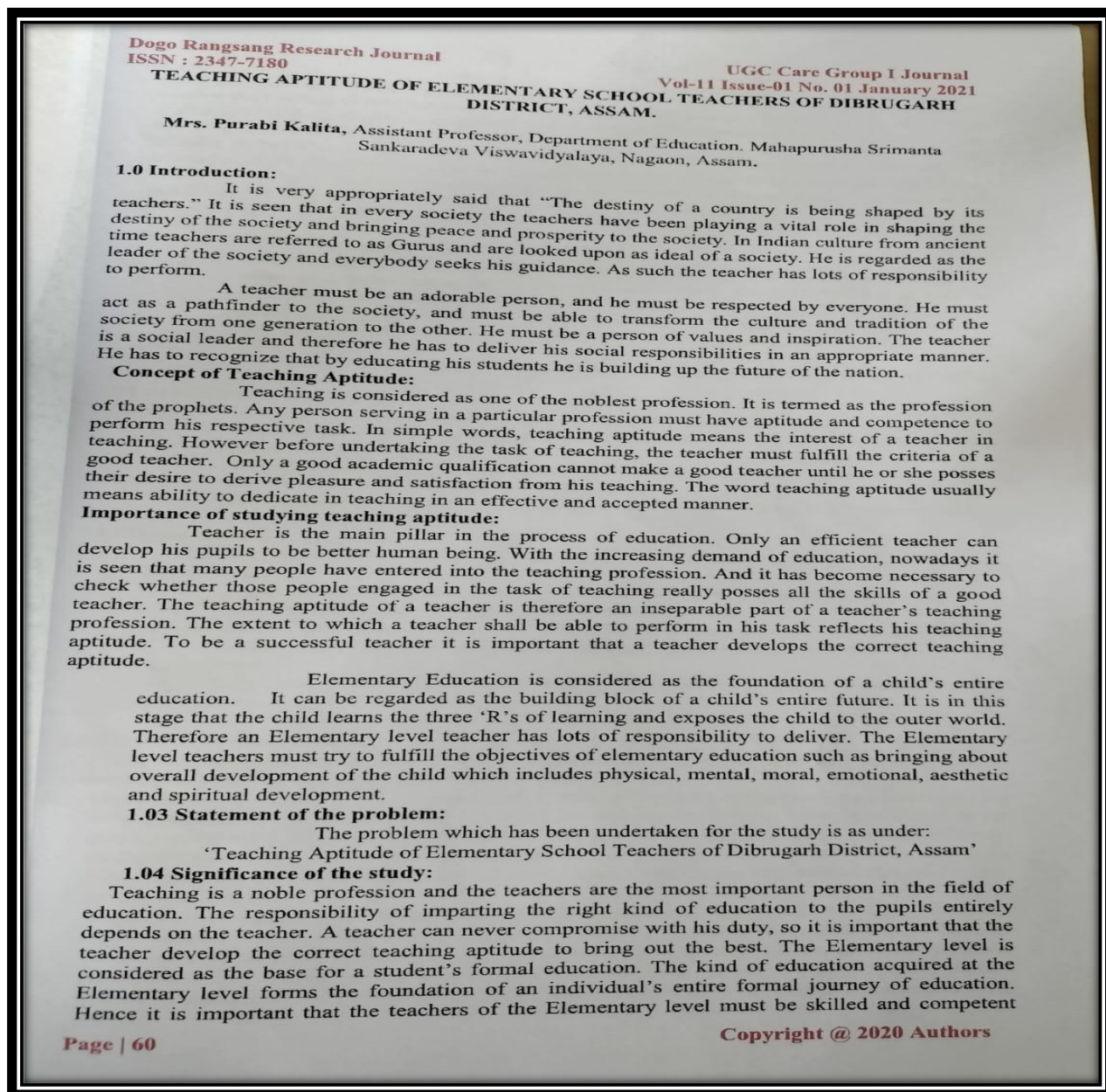


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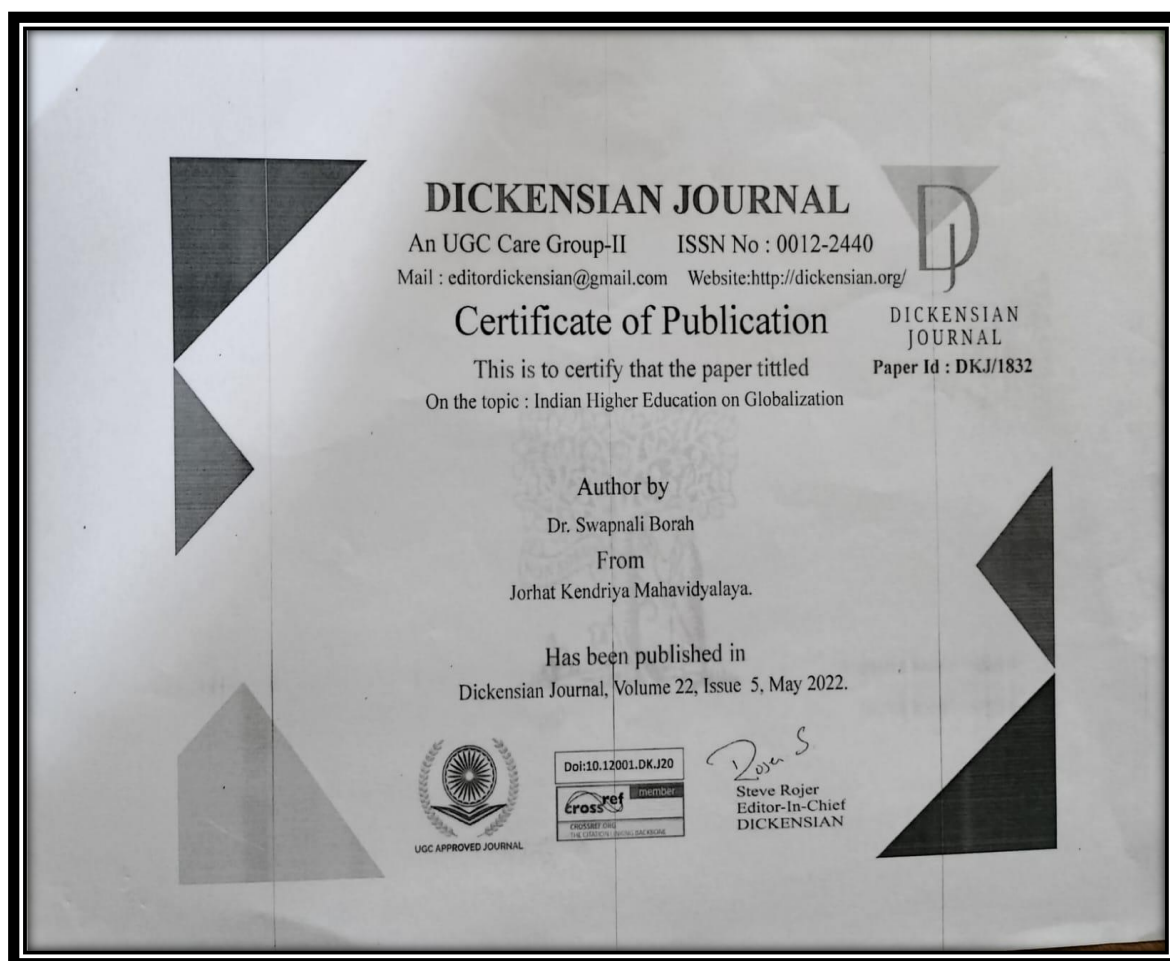


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Quest of Self-Discovery: A Psychoanalytical Study of Christ Gardner's novel- The PURSUIT of HAPPYNESS

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Abstract

Psychoanalysis is one of the modern theories that can be applied to modern English literature texts. Literature is the product of human thoughts, which talks about human life and their behavior in various circumstances expressed through the author's feelings inspired by reality and imagination. It displays an accurate picture of a society in a fictional form. Literature deals with human behaviors, expressions, thoughts, and motivations. The behavior of human beings is firmly related to psychological aspects such as anxiety, phobia, depression, frustration, etc. However, it's a behavioral pattern; the human mind can be identified seemed to be the father of psychoanalysis because his revolutionary remarks frazzled the established views about childhood, sexuality, and femininity. He disclosed the darkest tunnels and revealed the mysteries of the human mind—Freud divided our consciousness into different parts. The theory is made divisions regarded as a theory of personality organization and personality dynamics that guides psychoanalysis. It is known that the closest connection between literature and psychoanalysis has always been deployed by the academic field of literary criticism or literary theory. Among the critical approaches to literature, psychoanalysis has been one of the most controversial and, for many readers, the least appreciated. The proposed research work titled “Quest of Self-Discovery: A Psychoanalytical Study of Christ Gardner's novel- *The PURSUIT of HAPPYNESS*” explores where psychoanalysis has been used and how it has changed his ways of thinking in different directions.

Keywords: psychoanalysis, mental issues, anxiety, depression, motivation, discrimination

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