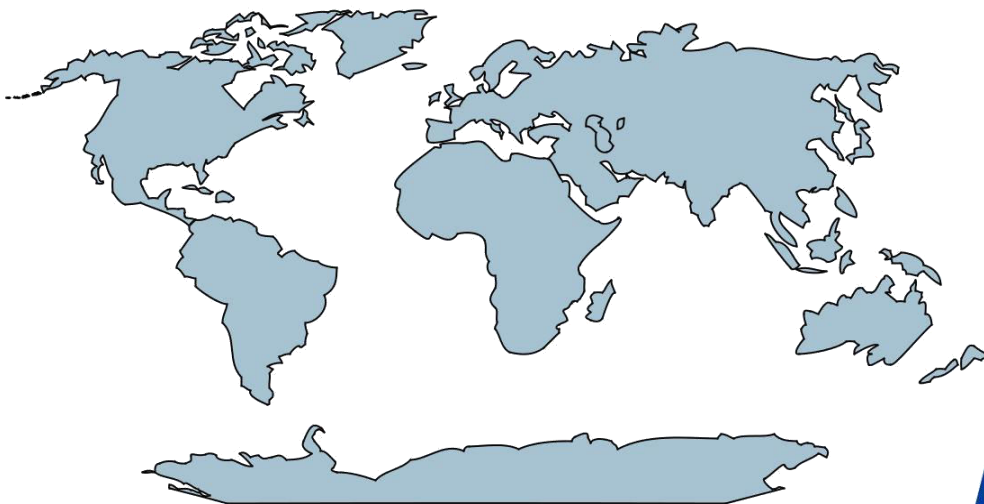


ISSN 2322 - 0899

INTERNATIONAL JOURNAL OF RESEARCH IN MANAGEMENT & SOCIAL SCIENCE



Volume 11, Issue 4
October - December 2023

International Journal of Research in Management & Social Science

Volume 11, Issue 4: October - December 2023

Chief Patron

Mr. Zahirul Alam Ahmed

Director, Empyreal Institute of Higher Education.
President, Bhramaputra Welfare Organization

Editor- In-Chief

Dr. Tazyn Rahman

Members of Editorial Advisory Board

Mr. Nakibur Rahman

Ex. General Manager (Project)
Bongaioan Refinery, IOC Ltd, Assam

Dr. Mukesh Saxena

Pro Vice Chancellor,
University of Technology and Management, Shillong

Dr. Alka Agarwal

Director,
Mewar Institute of Management, Ghaziabad

Dr. Archana A. Ghatule

Director,
SKN Sinhgad Business School, Pandharpur

Prof. (Dr.) Sudhansu Ranjan Mohapatra

Dean, Faculty of Law,
Sambalpur University, Sambalpur

Prof.(Dr.) Sharad Kumar Goel

Director,
Indirapuram Institute of Higher Studies, Ghaziabad

Dr. P. Malyadri

Principal,
Government Degree College, Hyderabad

Prof. (Dr.) Monoj Kumar Chowdhury

Professor, Department of Business Administration,
Guahati University, Guwahati

Prof.(Dr.) Shareef Hoque

Professor,
North South University, Bangladesh

Prof. (Dr.) Baljeet Singh Hothi

Professor,
Gitarattan International Business School, Delhi

Prof.(Dr.) Michael J. Riordan

Professor,
Sanda University, Jiashan, China

Prof. (Dr.) Badiuddin Ahmed

Professor & Head, Department of Commerce,
Maulana Azad Nationl Urdu University, Hyderabad

Prof.(Dr.) James Steve

Professor,
Fresno Pacific University, California, USA

Dr. Anindita Sharma

Dean & Associate Professor,
Jaipuria School of Business, Indirapuram, Ghaziabad

Prof.(Dr.) Chris Wilson

Professor,
Curtin University, Singapore

Prof. (Dr.) Jose Vargas Hernandez

Research Professor,
University of Guadalajara,Jalisco, México

Prof. (Dr.) Amer A. Taqa

Professor, DBS Department,
University of Mosul, Iraq

Prof. (Dr.) Himanshu Pandey

Professor, Department of Mathematics and Statistics
Gorakhpur University, Gorakhpur

Dr. Nurul Fadly Habidin

Faculty of Management and Economics,
Universiti Pendidikan Sultan Idris, Malaysia

Prof. (Dr.) Agbo Johnson Madaki

Faculty, Faculty of Law,
Catholic University of Eastern Africa, Nairobi, Kenya

Dr. Neetu Singh

HOD, Department of Biotechnology,
Mewar Institute, Vasundhara, Ghaziabad

Prof. (Dr.) D. Durga Bhavani

Professor,
CVR College of Engineering, Hyderabad, Telangana

Prof. (Dr.) Shashi Singhal

Professor,
Amity University, Jaipur

Prof. (Dr.) Alireza Heidari

Professor, Faculty of Chemistry,
California South University, California, USA

Prof. (Dr.) Badar Alam Iqbal

Adjunct Professor,
Monarch University, Switzerland

Dr. Dhananjay Prabhakar Awasarikar

Associate Professor,
Suryadutta Institute, Pune

Dr. Mohammad Younis

Associate Professor,
King Abdullah University, Saudi Arabia

Dr. Kavita Gidwani

Associate Professor,
Chanakya Technical Campus, Jaipur

Dr. Vijit Chaturvedi

Associate Professor,
Amity University, Noida

Dr. Marwan Mustafa Shammot

Associate Professor,
King Saud University, Saudi Arabia

Dr. Juhab Hussain

Assistant Professor,
King Abdulaziz University, Saudi Arabia

Dr. V. Tulasi Das

Assistant Professor,
Acharya Nagarjuna University, Guntur, A.P.

Dr. Urmila Yadav

Assistant Professor,
Sharda University, Greater Noida

Prof. (Dr.) Aradhna Yadav

Professor,
Krupanidhi School of Management, Bengaluru

Prof.(Dr.) Robert Allen

Professor
Carnegie Mellon University, Australia

Prof. (Dr.) S. Nallusamy

Professor & Dean,
Dr. M.G.R. Educational & Research Institute, Chennai

Dr. Sarmistha Sarma

Associate Professor,
Institute of Innovation in Technology and Management

Dr. Pranjal Sharma

Associate Professor, Department of Management
Mile Stone Institute of Higher Management, Ghaziabad

Dr. Lalata K Pani

Reader,
Bhadrak Autonomous College, Bhadrak, Odisha

Dr. Sunita Dwivedi

Associate Professor,
Symbolic Center for Management Studies, Noida

Dr. R. Navaneeth Krishnan

Associate Professor,
Bharathiyar College of Engg & Tech, Puducherry

Dr. Namita Dixit

Assistant Professor,
ITS Institute of Management, Ghaziabad

Mr. Sukhvinder Singh

Assistant Professor,
Institute of Innovation in Technology & Management

Dr. Nidhi Agrawal

Assistant Professor,
Institute of Technology & Science, Ghaziabad

Copyright @ 2023 Empryal Institute of Higher Education, Guwahati
All rights reserved.

No part of this publication may be reproduced or transmitted in any form or by any means, or stored in any retrieval system of any nature without prior written permission. Application for permission for other use of copyright material including permission to reproduce extracts in other published works shall be made to the publishers. Full acknowledgment of author, publishers and source must be given.

The views expressed in the articles are those of the contributors and not necessarily of the Editorial Board or the Institute. Although every care has been taken to avoid errors or omissions, this publication is being published on the condition and understanding that information given in this journal is merely for reference and must not be taken as having authority of or binding in any way on the authors, editors and publishers, who do not owe any responsibility for any damage or loss to any person, for the result of any action taken on the basis of this work. All disputes are subject to Guwahati jurisdiction only.

 THOMSON REUTERS	 INDEX COPERNICUS INTERNATIONAL	 University Grants Commission	 Journal Seeker Research Bible	 OAJ Open Academic .net Journals Index
 InnoSpace SJIF Scientific Journal Impact Factor	 CiteFactor Academic Scientific Journals	 JOURNAL INDEX .net	 Google scholar	 ResearchGATE scientific network
 SciSeek	 I2OR	 Scribd	 ADVANCED SCIENCE INDEX	 AcademicKeys UNLOCKING ACADEMIC CAREERS
 bing	 iseek	 entireweb Data	 Scholarsteer Scholarly Information	 WZB Berlin Social Science Center
 SJIF	 JISRA JIF	 DIIF	 GENERAL IMPACT FACTOR Universal Digital Object Information	 Research Impact Factor
 GIF GLOBAL IMPACT FACTOR	 Cosmos COSMOS IMPACT FACTOR		 iis	 JIF JIFACTOR
 SIS Scientific Indexing Services	 Pak Academic Search GROWING KNOWLEDGE FOR FUTURE	 ZB MED Wissen für Mensch & Umwelt www.zbmed.de	 Open Access Library Search Engine, Journal, Index, Repository	 EZB Electronic Journals Library
 Journal Seek	 JOUR INFORMATICS	 INTERNATIONAL Scientific Indexing	 UMS UNIVERSITI MALAYSIA SABAH	 OCLC WorldCat
 International Innovative Journal Impact Factor (IIJIF)	 bibliothek WISSENSCHAFTSPARK ALBERT EINSTEIN	 ESJI Eurasian Scientific Journal Index www.ESJIndex.org	 JOURNAL FACTOR	 INFOBASE INDEX
 DocSlide	 SJIFactor Scientific Journal Impact Factor	 UNIVERSIDAD DE GUADALAJARA Red Universitaria de Jalisco		 www.irmgm.ir
 ACADEMIA	 Yumpu	 STUDYLIB	 docshare.tips	 BASE Bielefeld Academic Search Engine
 International Institute For Research Impact Factor Journals (IFIJ)	 SSRN SOCIAL SCIENCE RESEARCH NETWORK	 Xactseek RELEVANT WEB SEARCH	 GIGA BLAST The Search Engine	 NSD ERIH PLUS EUROPEAN REFERENCE INDEX FOR THE HUMANITIES AND SOCIAL SCIENCES
 Baidu 学术	 FWS FreeWebSubmission.com	 INTERNATIONAL SERVICES FOR IMPACT FACTOR AND INDEXING ISIFI	 beta refseek	 zenodo

Certificate IC Journal Master List



Certificates that journal
**International Journal of Research in
Management & Social Science**

ISSN: 2322 - 0899

has been indexed in the
IC Journal Master List in 2014.

ICV: 6.35

1 May 2014

Date

A handwritten signature in black ink, appearing to read "Rocio Wiegato".

Signature:

CONTENTS

Research Papers

- A STUDY TO UNDERSTAND THE INFLUENCE OF CONTROVERSIAL ADVERTISING ON CONSUMER BEHAVIOR** 1 – 8

Dr. Harmeet Kaur Bhasin

- ACHYRANTHES ASPERA L. SEVERAL ACTIVITIES: A REVIEW** 9 – 14

Nishinandan R Suryawanshi*, Dr Aparark Moholkar, Rushikesh Patil and Nilesh Dhanve

- GLIMEPIRIDE LOADED NANOPARTICLES - A NOVEL APPROACH FOR THE TREATMENT OF DIABETES** 15 – 24

Nilesh D Dhanve, Dr. Aparark Moholkar, Rushikesh Patil and Nishinandan Suryawanshi

- QUERICETINE LOADED NONOFIBER - A NOVEL APPROACH IN HYPERTENSION** 25 – 30

Rushikesh S Patil, Dr Aparark Moholkar, Nnaishindan Suryawanshi and Nilesh Dhanve

- CHALLENGES AND PROPOSED SOLUTIONS FOR ACHIEVING SUSTAINABLE DEVELOPMENT GOALS 2030: CONTRIBUTION OF EDUCATION** 31 - 38

Dr. Mandira Gupta and Ms. Anuradha Daheriya

A STUDY TO UNDERSTAND THE INFLUENCE OF CONTROVERSIAL ADVERTISING ON CONSUMER BEHAVIOR

Dr. Harmeet Kaur Bhasin

Associate Professor, Department of Commerce (HOD), St. Andrew's College of Arts, Science and Commerce, Mumbai

ABSTRACT

This study aims to understand the reason of controversies of certain ads. of some leading brands and its impact on the audience perception about the brand and purchase intention. This research is trying to understand how communication done in the light of attracting attention of the audience and proving themselves unique in their creativity sometimes backfires the brand, so this research will help the content writers and visualizers to sink with the societies thought process, bringing in an idea which can help the society for its awareness and understanding towards social cause. The research is trying to focus on how some controversial advertisements had Ethical issues in Advertising. A controversy may come up to oppose the advertiser, which can be racist in its demonstration or may demonstrate or communicate something bad in taste for the society. Such controversies impact the decision-making process of the consumers. Some Advertisers which try to send a social cause message in their communication, but while doing so, may hurt sentiments of a particular section of society may needs to know the right way of putting it down for the benefit of the society. The research is based on Primary data and secondary data. Survey method is undertaken using quantitative tool- questionnaire which has questions on multiple controversial ads. Data is tested with statistical testing.

Keywords: Controversial Advertising, Social cause, Purchase intention, Brand image, Advertising Content, Advertising Communication.

SIGNIFICANCE OF THE RESEARCH:

This study aims to understand the reason of controversies of certain ads. of some leading brands and its impact on the audience perception about the brand and purchase intention. This research is trying to understand how communication done in the light of attracting attention of the audience and proving themselves unique in their creativity, sometimes backfires the brand, so this research will help the content writers and visualizers to sink with the societies thought process, bringing in an idea which can help the society for its awareness and understanding towards social cause.

RESEARCH GAP:

Controversial advertising as a term has not been deeply explored and its effectiveness and impact needs to be studies case by case and category by category, country by country.

Social relevance of research: The research is trying to focus on how some controversial advertisements had Ethical issues in Advertising. A controversy may come up to oppose the advertiser, which can be racist in its demonstration or may demonstrate or communicate something bad in taste for the society. Such controversies impact the decision-making process of the consumers. Some Advertisers which try to send a social cause message in their communication, but while doing so, may hurt sentiments of a particular section of society may needs to know the right way of putting it down for the benefit of the society

INTRODUCTION:

Controversial advertising is a branch of advertising which got acknowledgement after 1970s Recently it is observed that there has been a rise in situation of controversies with the content and demonstration of advertising communication, which has hot debates in the society. It is very difficult to gauge the true intentions of the companies behind such controversies, whether do the company deliberately allow such controversies or bring in a controversial content to draw the attention of the audience, audience which had become immune to the advertisements. The question is are these brands really honest in their efforts to bring in a creative content of social change, but gets into a controversy. Studies reveals that increased ethical awareness by consumer in the modern times influences the way consumers behave towards products and services. Over last few decades, ethics and social responsibility have increasingly become very fundamental in today's market. Ethics and socially responsible practices of the firm have significant influence on consumer purchasing behaviors. There is always a risk with the brand when they come up with some bold concept in the market which can be controversial social issue. Some concepts can be more idealistic but fails to be realistic. This is one of the risks of such bold content which can face criticism from a specific segment of society and the brand may suffer. It is not just the companies need to think about selling responsible products but also selling responsible images or demonstration or responsible communication. There will always be a debate on whether advertising is a driver

or mirror of change (Alexander 2011), Controversies in advertising can also be taken as a tool to drive change or support change. It is well understood that how companies should become a true instrument of social change, as advertising and social change are both complex issues, advertisers need to research multiple areas before getting in to an attempt of controversial advertising. Advertisers need to study where they can fit their communication to bring in a social change or a social climate and change their conversations accordingly. More effective campaigns can be made if the advertisers understand how he can word his content, create a creative demonstration or bring its message in such a way that is agreeable to the audience or make an honest justification and significance of the same to put forward its ideas in the society. It is also very important to know that the advertising agencies, which are generally global agencies, need to study and understand the cultural, emotional and religious sentiments of the consumers in the country which they are working towards. For an example Unilever brand “Fair and lovely” was been in controversy since a long time for being racist, by demonstrating that a person with dark skin is not successful or not acceptable in the society. After 2020 Unilever had to drop the word “fair” from its brand name and change it to “Glow and lovely” and proved themselves to be little sensitive towards their branding and communication content. Some controversial advertisement can be gaining attention for wrong reasons as it may have some shocking message or a shocking demonstration, as marketers try their level best to fit the ad, but this does not happen every time, sometimes they do mistakes and their commercials are stamped as controversial ads.

LITERATURE REVIEW;

The factors influencing the formation of attitudes among others are personal experience, the influence of others that are considered important, cultural influences, mass media, educational institutions and religious institutions as well as emotional factors (Awzar 1998). The result of research found that public response towards 70% controversial product advertisement was influenced by religious, perception of gender. (Akhter, 2011). Advertising has been around since human existence, the effect of it on society wasn't considered until the 1930s, when the literary critics (F.R. Leavis, 1933) accused advertising of evoking cheap, almost mechanical emotional responses” He believed that advertising was inherently evil, it increases material standards and social and political apathy (Dyer, 1988, Frankfurt School writers). Controversial ads are used by advertisers mainly to generate greater awareness among consumers so to increase sales of goods and services. Such ads can also offend consumers that could result in boycott of brand, company related to advertisement (Prendergast – 2002). (Bartos -1981) in their study clearly indicates the correlation between “dislike of ad and negative attitude towards ads”. The main reason he reported for disliking ads was due to “the insulting of consumer intelligence, advertising poor in taste, offensive and overtly sexual”. Multiple studies by (Waller 1999, phau and predergast - 2001 and Aaker and Bruzzone (1985) had put multiple products under controversial products, alcohol, cigarettes, condoms, female contraceptives, female hygiene products, gambling, male and female underwear, racially extremist ads, sexiest images etc.

Research methodology: To understand the influence of controversial advertising on consumer behavior the hypothesis drawn were as follows:

H₁ – Controversies in market related to the ad. impact consumer behaviour
H₂ ... Controversies in market related to the ads. may hardly impact the purchase intentions of the audience if they find the controversy meaningless.
H₃ – Controversies in market related to ad. is a big risk to the brand image if the communication is hurting sentiments of the society.
H₄ – Controversial advertising with social message is a powerful tool to bring in positive social change in the society

OBJECTIVE OF STUDY

- ❖ To understand the concept of controversial advertising and its impact on consumer behaviors
- ❖ To understand the role of controversies towards social change in the society
- ❖ To understand the impact of controversies on brand image in the minds of audience
- ❖ To understand the impact of controversies in ad on purchase intention of audience

Data collection

Survey method by using quantitative tool - questionnaire.

Sample size - 200 respondents

Data collected from both Primary and Secondary Sources. data tested with statistical testing using JASP software.

Data Analysis- One Sample t-test and average method.

Sampling technique – convenience sampling

Primary Quantitative data: Six brands were picked up in the questionnaire. The respondents were provided with the audio-visual and print ads for answering the related responses of controversial ads. The ad. description is mentioned below and also the controversy for which they are picked up.

Description of the ads.

Ad. 1	<p>Cadbury Diwali Ad – QR tech Ad. (Audio Visual Ad.) Dramatizing a Man trying to be kind with the hawkers and helps him to be more accessible in the market through a QR code. Diwali gift packs with QR code trying to give special individual identity to numerous hawkers. Tag line which says “Scan your hawkers nearby” Shops for Shop-less , also supported with the old tag line “Kuch accha ho jaye, Kuch Meetha Ho Jaye”</p> <p>Controversy – Ad. was trolled as the shop owner name was “Damodar” and the public wreaked absolute havoc over the fact that prime minister Narendra Modi’s fathers name was Damodar as well. This ad was actually termed as below the belt hit to PM’s poverty-stricken childhood as Chaiwala)</p>
Ad. 2	<p>Dabur’s Fem Bleach’s Ad on Karwa Chauth campaign supporting same sex couples, Audio Visual Ad. dramatizing two girls getting ready for karwa chauth celebration and are shown as couple. It has a tag line which says “Glow with Pride” Ad. trying to give message on social cause of acceptance.</p> <p>Controversy: According to critic, Karwa Chauth is pious event for married man and woman and such ads are putting blot on the holiness of the bond.</p>
Ad. 3	<p>Fab India – Jashn -e- Riwas: Celebration of life by Fab India- Audio visual Ad. Dramatizing relations and festival moments where the new bride trying to understand the family culture .</p> <p>Controversy: The Hindu diaspora in India had a controversy against the campaign using Urdu tint to the Hindu festival. The complainers said that the Indian traditional clothing brand had inappropriately used an Urdu name for a Hindu festival and the brand is forcing the Islamic ideologies on Hindu festival.</p>
Ad. 4	<p>Kent - Tag line “Are you allowing your maid to knead atta dough by Hand?The demonstration showing Mother- daughter (Celebrity endorsed - Hema Malini) trying to convince the audience to be safe and using KENT roti maker and not getting it done by a maid and method of how to keep them away.</p> <p>Controversy: Every brand during pandemic changed their communication content towards more safety and tried to make the most of it during that situation. So KENT bought in an ad. for Atta and Bread maker which was criticised due to its tag line and demonstration. The whole internet community opposed the discriminating message against the house-help during covid and being insensitive towards domestic help during covid.</p>
Ad. 5	<p>Starbucks ad.– Audio – Visual Ad.– dramatizing the love of the father to her transgender son. (LGBTQ community ad.)</p> <p>Controversy- reaction has praise and also shock in the community. Praises for speaking on behalf of the LGBTQ and shock for using a transgender model</p>
Ad. 6	<p>Javed Habib – Stylist to the god – tag line Gods too visit JH Salon, illustration showing Lord Ganesh, Goddess Durga and other relaxing and waiting in salon for the treatment from Javed Habib.</p> <p>Controversy: People criticised him for his wrong and insensitive illustration and asked him for an apology.</p>

	AGE	PERCENTAGE		GENDER	PERCENTAGE
1.	16-20	35		MALE	47.5
2	21-24	42		FEMALE	49.6
3	25 -30	23		PREFER NOT TO SAY	2.9

The respondents responded in the following manner. The Average findings are as follows: Using a five-point scale the below mentioned questions had the following range for averages

Scale	Range	Response
5	4.21 - 5.00	Strongly Disagree
4	3.41 - 4.20	Disagree
3	2.61 - 3.40	Neutral
2	1.81 - 2.60	Agree
1	1.00 - 1.80	Strongly Agree

		Total of responses	Average total/200 respondents	Average Response findings
	Advertisement No.1 -Cadbury			
1	I really liked this Ad. of Cadbury with the theme of helping hawkers	300	1.50	Strongly Agree
2	This Cadbury ad. is a strong positive communication and can be an instrument of change in the society.	310	1.55	Strongly Agree
3.	In-spite of the controversy for this ad of Cadbury , I still have a positive brand image	499	2.49	Agree
4	In-spite of the controversy for this ad. of Cadbury I still have a positive purchase intention for the brand	468	2.34	Agree
5	Due to this ad. Cadbury controversy in the market, I am developing negative brand image and have no intention buying this brand	700	3.50	Disagree
6	This Ad. of Cadbury is Bad in taste for the society and is unethical.	690	3.45	Disagree
	Ad. 2- Dabur's Fem Bleach ad.			
1	I really liked this Ad. of Fem bleach supporting lesbians' acceptance in family and society	489	2.44	Agree
2	The Fem Bleach ad. has a very strong communication through dramatization which brings out importance of acceptance to LGBTQ very positively	470	2.35	Agree
3.	The ad. of Fem bleach and their efforts spreading the idea of Lesbian acceptance is developing a very positive attitude towards the brand and the company	500	2.50	Agree
4	In-spite of the controversy for the Ad of Fem Bleach I still have a positive brand image and a positive purchase intention as I find the controversy meaningless	340	1.7	Strongly agree
5	Due to the controversy of this brand (Fem Bleach) due to this ad. I am developing negative brand image	716	3.58	Disagree
6	The Ad. of Fem Bleach is Bad in taste for the society and is unethical.	740	3.70	Disagree
7	Due to this ad. of (Fem Bleach) controversy in the market, I have no intention buying his brand	756	3.78	Disagree
	Ad. 3- 5-Fab India – Jash -e Riwas			
1	I really liked this Ad. of Fab India – Jash – e - Riwas	600	3.00	Neutral
2	This Ad of Jash-e- Riwas has a strong communication about the idea of secularism and can bring positive change in the society.	740	3.70	Disagree
3	The Ad. of Fab India -Jash – e- Riwas is helping me develop a very positive attitude towards the brand and the	623	3.11	Neutral

	company			
4	The ad. of Fab India -Jash-e-Riwas has hurt the sentiments of Hindu religion.	612	3.06	Neutral
5	Due to this ad. Fab India -Jash-e-Riwas controversy in the market about hurting Hindu religious people sentiments I am developing negative brand image.	644	3.22	Neutral
6	Even after the controversy of this brand due to this ad. of (Fab India -Jash-e-Riwas) I have intentions of buying this brand.	656	3.28	Neutral
	Ad.4- Kent Ad. Roti Maker			
1	I really liked and appreciate this Ad. of Kent which is making us take precautions during pandemic by not calling our maids to work	344	1.72	Strongly Disagree
2	The AD. of Kent – Roti maker has made a very insensitive communication content which can create a bad brand image and can be risky for companies' reputation	301	1.50	Strongly agree
3.	The Ad. of Kent of being safe in pandemic had brought in a right suggestion for the society and promotions can be successful with such content.	756	3.78	Disagree
4	The ad. of Kent is helping me develop a very positive attitude towards the brand and the company	657	3.28	Neutral
5	Due to this ad. of Kent and its controversy in the market I am developing negative brand image	666	3.33	Neutral
6	Even after the controversy of this brand due to this ad. of Kent I have intentions of buying this brand	645	3.22	Neutral
	Ad.5 – Star bucks - LGBTQ – with transgender mode			
1	I really liked this Ad. of Star-bucks of giving acceptance and status to transgender in family and society	356	1.78	Strongly Agree
2	The above Ad. of Star-Bucks has convinced me that this content is instrumental for bringing a social change in the society	299	1.49	Strongly Agree
3.	Even after the controversy of this brand (Star-bucks) due to this LGBTQ issue, I have intentions of buying this brand	456	2.28	Agree
4	This ad. of Star-bucks (LGBTQ) is helping me develop a very positive attitude towards the brand and the company	449	2.24	Agree
5	This s Ad. of Star-bucks is bad in taste for the society	766	3,83	Disagree
6	Due to this controversy of this ad of Star-bucks (LGBTQ) in the market I am developing negative brand image.	789	3.94	Disagree
7	Due to this controversy of this ad of Star-bucks (LGBTQ) in the market I have no intention buying his brand	773	3.86	Disagree
	Ad.6- Javed Habib – Print ad – “Stylist to the god”			
1	I really liked this Ad. of Javed Habib with this tag line – “Stylist to the god.”	890	4.45	Strongly Disagree
2	The Ad. of Javed Habib with the tag line “Stylist to the god” is just an ad. with soft sell copy and not hurting anyone's sentiments	860	4.30	Strongly Disagree
3.	The Ad. of Javed Habib with a tag line “Stylist to the god” is helping me develop a good brand image	866	4.33	Strongly Disagree
4	The Ad. of Javed Habib with a tag line “Stylist to the god” is helping me develop a positive purchase intention.	776	3.88	Disagree
5	The ad. of Javed Habib with tag line “Stylist to the god” is bad in taste.	298	1.9	Strongly Agree
6	Due to this ad. of Javed Habib and its controversy in the	460	2.3	Agree

	market I am developing negative brand image			
7	Due to this ad. of Javed Habib and its controversy in the market I have no intention of using this service provider	429	2.14	Agree

FINDINGS

From the above-mentioned averages of 200 respondents, it is found out that most of the customers look into the intentions of the brand of bringing in such communication content. If the communication content is in controversy due to some critics which may be a part of a religious group or a conservative social group it does not impact much on the consumer behaviour and its attitude towards the brand sometimes remains neutral. If the customer can relate with the social cause and the issue which the company and the brand wants to highlight, the audience seems to be supporting, such controversial ads for example in the above case the Star-bucks ad. with a social cause of bringing acceptance for LGBTQ and also the Fem bleach ad supporting Lesbians. The controversies do not harm the brand image. But attempt like Javed Habib which directly attacks a religious sentiment and also Kent- Roti Maker which shows its inventiveness towards the poor during an emergency situation is also criticised by the audience and it impacted the brand name and purchase intentions negatively. At the same time a brand like Fab India trying to bring a content of issue related to social cause and do not do justify its communication fails to bring a change in the society. Audience even does not support cheap controversies like the controversy of the Cadbury ad. of Damodar the name of the hawker being the name of the prime minister's father, instead it appreciated the efforts of the company and brand.

Testing hypothesis through one sample t- test

One Sample T-Test -1

	t	df	p
After watching the above Ad.-Kent – roti maker - answer the following questions. Where 1 - strongly agree 2- Agree 3. Neutral 4- Disagree 5- Strongly disagree [Due to this ad. of Kent 28.815 199 < .001 and its controversy in the market I am developing negative brand image]			

Note. For the Student t-test, the alternative hypothesis specifies that the mean is different from 0.

Note. Student's t-test.

Findings: On conducting one sample t-test (Table 1) to understand influence of controversial ad. and controversies related to the ad. on the consumer behaviour. The p value of the above tables is 0.001 which is statistically significant. This allows us to accept the hypothesis- **H₁**– Controversies in market related to the ad. impact consumer behaviour

One Sample T-Test -2

	t	df	p
After watching the above Ad.- Cadbury – QR Code – Helping the hawkers - answer the following questions. Where 1 -strongly agree 2- agree 3. Neutral 4- Disagree 5- Strongly disagree [In-spite of the controversy for this ad of Cadbury , I still have a positive brand image]	38.747	200	< .001

Note. For the Student t-test, the alternative hypothesis specifies that the mean is different from 0.

Note. Student's t-test.

One Sample T-Test -3

	t	df	p
After watching the above Ad.-Dabur – Fem Bleach - answer the following questions. Where 1 -Strongly agree 2- Agree 3. Neutral 4- Disagree 5- Strongly disagree [In-spite of the controversy for the Ad of Fem Bleach I still have a positive brand image and a positive purchase intention as I find the controversy meaningless]	37.822	198	< .001

Note. For the Student t-test, the alternative hypothesis specifies that the mean is different from 0.

One Sample T-Test -3

t	df	p
---	----	---

Note. Student's t-test.

Findings: On conducting one sample t-test (Table 2 and 3) to understand influence of controversial ad. and controversies related to the ad. on the consumer behaviour. The p value of the above tables is 0.001 which is statistically significant. This allows us to accept the hypothesis- H_2 ... Controversies in market related to the ads. may hardly impact the purchase intentions of the audience if they find the controversy meaningless.

One Sample T-Test -4

t	df	p
---	----	---

After watching the above Ad. of Javed Habib – “Stylist to God” - answer the following questions. Where 1 -Strongly agree 2- Agree 3. Neutral 4- Disagree 5- Strongly disagree 32.437 189 < .001
[Due to this ad. of **Javed Habib** and its controversy in the market I have no intention of using this service provider]

Note. For the Student t-test, the alternative hypothesis specifies that the mean is different from 0.

Note. Student's t-test.

Findings: On conducting one sample t-test (Table 4) to understand influence of controversial ad. and controversies related to the ad. on the consumer behaviour. The p value of the above tables is 0.001 which is statistically significant. This allows us to accept the hypothesis- H_3 – Controversies in market related to ad. is a big risk to the brand image if the communication is hurting sentiments of society

One Sample T-Test -5

t	df	p
---	----	---

After watching the above Ad.-Star-bucks -transgender model - answer the following questions. Where 1 -Strongly agree 2- Agree 3. Neutral 4- Disagree 5- Strongly Disagree 38.030 199 < .001
[The above Ad. of **Star-Bucks** has convinced me that this content is instrumental for bringing a social change in the society]

Note. For the Student t-test, the alternative hypothesis specifies that the mean is different from 0.

Note. Student's t-test.

Findings: On conducting one sample t-test (Table 5) to understand influence of controversial ad. and controversies related to the ad. on the consumer behaviour. The p value of the above tables is 0.001 which is statistically significant. This allows us to accept the hypothesis- H_4 – Controversial advertising with social message is a powerful tool to bring in positive social change in the society

LIMITATIONS OF THE STUDY:

1. This study has done analysis of the young age group and do not generalize about age beyond 35.
2. The study was done with the help of few cases and few controversies.
3. This study is focused on promotion of FMCG and local services
4. This study is done on Indian ads only and so the generalization does not apply to the western countries ads.

CONCLUSION WITH SUGGESTIONS:

Companies need to be very careful with the communication content which they are using in the ad. to bring in an attraction value. If the company wants to play with controversial ads, then the company and the brand needs to do careful research on the sentiments of the customers before bringing in a controversial content. It is observed that if the content has a very authentic approach towards an important social issue and is dramatized and worded with full responsibility then the customers definitely supports the brand, such controversial ads helps to bring a positive image of the brand in the minds of the customers. The brands should not get into the brand wagon of creating a surprise element irresponsibly. Mature brand and reputed brand can face a set back in the market with un- researched content. At the same time the companies need to support social-cause irrespective to the oppositions coming from conservative audience and bring in content which are more realistic than being idealistic.

REFERENCES

1. Andrew B. Gustafson Creighton University, Omaha, NE, USA” Advertising Ethics”
2. Abbas Dadras, Sayed Naser Zahiri, Ali Memari and Zeinab Shahi,” How corporates can have a good advertising? (A Review of Ethics and Crs in adertsing “-International journal of Mangement Sciences and Business Research, June – 2017 – ISSN (2226-8235), Vol 6, Issue 6.
3. Azwar, S (1998) Sikap Manusia Teori dan Pengukurnnya , Yogyakarta , Pustake pelajar.
4. Akhter, W, Abassi, A. S. And Umar, S (2011) Ethical Issues Advertising in Pakistan: An Islamic Perspective. World Applied Sciences Journal, 13 (3). 444-452
5. Alexander, Joe etal. (2011) “Tink of Me as Eveil? Opening the Eththical Debate in Advertising. Public interest research center and WWF-UK.
6. Bartos, R. (1981), “Ads that irritate may erode trust in advertised brands”, Havrad Business.
7. Dyer, Gillian. (1988) Advertising as communication. London: Routledge
8. George K. Amoaka “Ethics in advertising -Challenges in Ghana” MJAE, vol 1, no. 1, 2012.
9. Leiser B (1978) the ethics of advertising. In De George RT, Pichler JA (eds) Ethics, free enterprise, and public policy: original essays on moral issues in business oxford university press, New York.
10. Neha Munjal” Study on Ethical Issues in Advertising and Anglicizing different advertisements with results of ASCI Decision; An Indian Perspective “(Eco-forum Journal (University of Suceava, Romania, Volume 5, Issue 2(9) 2016.)
11. Nirav Halvadia ,Dr. Vipul Patel, Shekha Patel,” Shock Advertising and its impact “ International Journal of sales and Marketing , Vol 1 , Issue (2011)
12. Michael Adhi Nugroho. Rudy Harjanto, “Advertising Proposition as Effective Marketing Communication Too”, Advance in socieal science education and humanities research volume 655.
13. Palvinder Pal singh, H, s. Chahal, “Controversial Advertising and Consumer Behavious “Asian Journal of Multidimensional Research (AJMR) ISSN – 2278-4853, Volume 8, Issue 5, May 2019.
14. Phau, Ian and Prendergast, Gerard (2001), “Offensive Advertsing : A view from Singapore”, Journal of Promotional Management, 7 (1/2) 71-90.
15. Prendergast, G, Ho, B and Phau. I (2002) . A Hong Kong View of offensive view of advertising” Journal of Marketin communications, 8 (3) : 165 - 177
16. Recep Yilmaz, Nurdan Oncel Taskiran PhD, “A model for advertising aestheticization: How an ad is aesthetically created and has an impact on audience – product, advertising mood and target audience triangle” International journal of Research in Business and Social Science, Vol 2, No.1, 2013 ISSN: 2147-4478
17. Salihah Khairawati , Mustashim Billah Murtadio,” How does the public attitude towards advertising controversial products and advertising ethics? Journal of Management Business, vol 11. (2020)
18. Waller, D.S. (1999) Attitde Towards offensive Advertsing: An Australian Study, Journal of Consumer Marketing, 16 (3), 288-294.
19. Waller, D, (2006) A proposed respose model for controversial advertising, Journal of promotional Mangement 11(2/3)-3-16.
20. Yun Kuan, “Controversy Advertising: An Exploratory study on controversy advertising and its effects “University Honor’s thesis

ACHYRANTHES ASPERA L. SEVERAL ACTIVITIES: A REVIEW

Nishinandan R Suryawanshi*, Dr Aparark Moholkar, Rushikesh Patil and Nilesh Dhanve

Department of Pharmaceutics, Channabasweshwar Pharmacy College (Degree) Latur - 413512

ABSTRACT

Amaranthacear, or Achyranthes aspera, is a significant medicinal herb that grows as a weed all over India. Almost all of its parts are used in traditional system of medicines such as seeds, roots, shoots and leaves are the most important medical parts of plants which are used medicinally. According to this article, a large number of phytochemical compounds that have been isolated from the plant and indicate characteristics like diuretic, antiperiodic, laxative, antiasthmatic, antiallergic, antifungal and several other important medicinal properties. This article provides an overview of the most recent data regarding its pharmacological and phytochemical characteristics especially antifungal property. Extensive research has been conducted in the last few decades to demonstrate the biological activities and pharmacology of its extracts. Several chemical constituents have been isolated, including saponins, alkaloids, long chain compounds and many other chemical constituents have been isolated which shows antifungal activity. The aim of the study was to investigate antifungal activity of the various leaves extract of Achyranthes aspera Linn.

Keywords: Antifungal activity, Extract, Chemical constituents, Phytochemical Characteristics.

INTRODUCTION

Nature has been a source of medicinal agents for thousands of years and an impressive number of modern drug have been isolated from natural source [1]. The success of popular therapeutic diversity is herbal medicine. Natural product medicines have come from various source materials including terrestrial plants, terrestrial microorganisms, marine organisms, and terrestrial vertebrates and invertebrates. Medicinal plants are the nature's gift to human being to make disease free healthy life. India is one of the most medico-culturally diverse countries in the world where the medicinal plant sector is part of a time-honoured tradition that is respected even today. Hence, the main traditional systems of medicine include Ayurveda, Unani and Siddha [2]. They play a significant role in providing primary health care services to rural people in addition to large number of economic products. It is in fact secondary metabolites, like alkaloids, glycosides, tannins, phlobatannin, terpenoid, flavonoid, phenol, volatiles oils and many more compounds which serve as important therapeutic agents [3].

According to World Health Organization, 80% of the population of the world depends on traditional medical practitioners for their medicinal needs. Yet a scientific study of plants to determine their antimicrobial active compounds [4]. The present study was conducted to evaluate antibacterial and antifungal activities of leaf extract and various fractions of this plant against selected strains of bacterial and fungal pathogens in order to detect new sources of antimicrobial agents [5]. *Achyranthes aspera* Linn. belong to the family Amaranthaceae. It is an annual, stiff erect herb, and found commonly as a weed throughout India and used by traditional healers for the treatment of fever, dysentery and diabetes [6]. Roots are used as astringents to wounds, in abdominal tumor and stomach pain [7]. The benzene extract of the stem bark shows abortifacient activity in the rat [8]. Leaf extracts were reported to possess thyroid stimulating and antiperoxidative properties [9]. The aqueous and methyl alcohol extracts of the plant also decreased blood glucose levels in normal and alloxan diabetic rabbits [10]. It is reported to contain alkaloids, flavonoids, saponins, steroids and terpenoids. The water soluble alkaloid achyranthine isolated from *Achyranthes aspera* possess anti-inflammatory activity [11]. The present study was carried out to test the antifungal efficacy of the leaves extract of *Achyranthes aspera* Linn with reference to fungal spp.

Taxonomic Classification

Kingdom – Plantae

Subkingdom - Tracheobinota

Super Division - Spermatophyta

Division - Mangoliophyta

Class - Mangoliophsida

Subclass - Caryophyllidae

Order - Caryophyllales

Family - Amaranthaceae

Genus - Achyranthes

Species – Aspera

Botanical description

Synonyms

Latin - Achyranthes aspera

Sanskrit - Aghata

Hindi - Latjira, Chirchira

Gujarati - Safad Aghedo

Tamil - Shiru-kadaladi

Telugu - Uttaraene

Malayalam - Kadaladi

Punjabi - Kutri

Unani - Chirchitaa

Ayurvedic - Apaamaarga, Chirchitaa, Shikhari, Shaikharika

Persian - Khare-vazhun

Arabian - Atkumah

French - Achyranth a feuillesrudes, collant, gendarme

Spanish - Mosotillo, rabo de gato, rabo de chango, rabo de raton

Achyranthes aspera Linn. belongs to the family Amaranthaceae is a perennial stiff erect herb, 2.0 m high is growing up to 1000 m in height. Stems are square, leaves elliptic ovate or broadly rhombate, 5-22 cm long, 2.5 cm broad, and adpressed pubescent [12]. *Achyranthes aspera* L. also known as “Prickly chaff flower” in English. The plant is highly esteemed by traditional healers and used in treatment of asthma, bleeding, in facilitating delivery, boils, cold, cough, colic, debility, dropsy, dog bite, dysentery, ear complications, headache, leucoderma, pneumonia, renal complications, scorpion bite, snake bite, and skin diseases etc. Traditional healers claim that addition of *Achyranthes aspera* would enhance the efficacy of any drug of plant origin [13].

Geographical source

It is found on road sides, field boundaries and waste places as a weed throughout India up to an altitude of 2100 m and in South Andaman Islands [14]. The plant is also widespread in Baluchistan, Ceylon, Tropical Asia, Africa, Australia and America

Traditional uses

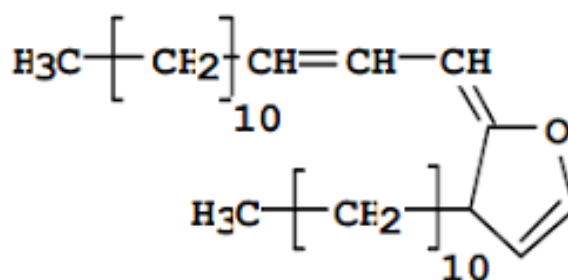
The dried leaf powder (2-5gms) is taken with honey for diarrhoea. Leaf juice is useful remedy for skin diseases like pruritis and scabies. Leaf paste is applied externally for toxic bites. Whole plant ash is a good remedy for bleeding piles and abdominal problems. Root is used as tooth brush to clean the mouth and to cure halitosis. Infusion of the twig is also used as a wash for toothache. Root extract is used as an eye drop at bed time for night blindness [15]. For snake bites the ground root is given with water until the patient vomits and regains



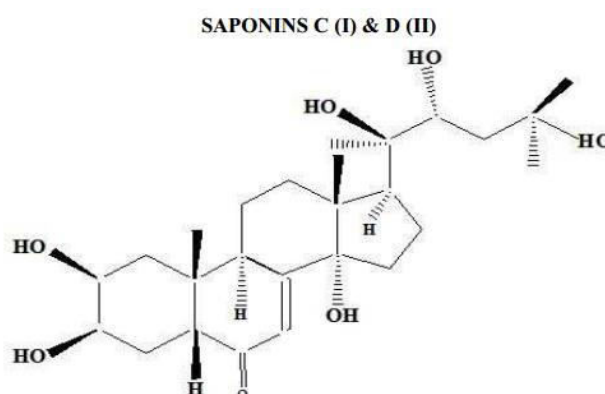
consciousness. Inhaling the fume of *Achyranthes aspera* mixed with *Smilax ovalifolia* roots is suggested to improve appetite and to cure various types of gastric disorders [16]. It is useful in haemorrhoids, leaves and seeds are emetic, hydrophobia, carminative, resolve swelling, digestive and expel phlegm. Ash of the plant is applied externally for ulcers and warts. The crushed leaves rubbed on aching back to cure strained back [17].

Phytochemistry

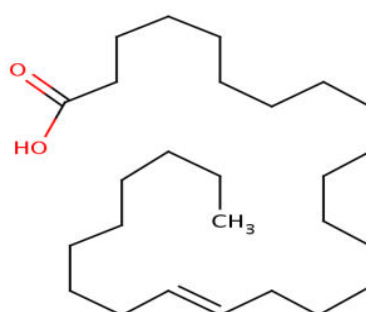
The plant is reported to yield a water-soluble base and a chloroform soluble base. The former was earlier designated as achyranthine and was characterized as a betaine derivative of N-methylpyrrolidine-3-carboxylic acid [18]. The ethanol extract of the plant contained alkaloids and saponins while flavonoids and tannins were found absent [19]. *A. aspera* contains triterpenoid saponins which possess oleanolic acid as the aglycone. Ecdysterone, an insect moulting hormone, and long chain alcohols are also found in *Achyranthes aspera* [20]. Other chemical constituents such as achyranthine, betaine, pentatriacontane, 6- pentatriacontanone, hexatriacontane, and tritriacontane are also present [21].



Cyclic Chain Aliphatic Fatty Acid



ECDYSTERONE



N-HEXACOS-14-ENOIC ACID

Structure of some phytoconstituents isolated from *Achyranthes aspera*

Pharmacological actions

Antimicrobial Activity

The agar-solid diffusion method was used to determine antibacterial and antifungal activities [22]. P. Saravanan et al. (2008) reported the solvent leaf extracts were tested for antibacterial and antifungal activities against *E. coli*, *P. aeruginosa*, *P. vulgaris*, *S. aureus*, *Klebsiella* species [23]. T.N. Misra et al. (1992) reported 17-

pentatriacontanol as a chief constituent isolated from essential oil of the shoots of plant, the oil shows antifungal activity against *Aspergillus carneus* [24]. S. Sharma et al. (2006) studied the alcoholic extract which shows the presence of the triterpenoid saponin with dose dependent inhibitory activity against *Staphylococcus aureus*, a bacteria causing skin disease in human beings. Minimum inhibitory concentration was found to be highest (0.15 mg) for purified fraction. The identification of the compound on spectral analysis gave a triterpenoidal saponin purified fraction [25].

Plant extract of *A. aspera* leaves was screened against *Escherichia coli* species of bacteria and *Candida albicans* species of fungi were evaluated using the standard agar disc diffusion method. The disc diffusion method is used to detect the antimicrobial activity of plant extract. The solidified Nutrient agar plates were swabbed with the test organism and the samples were impregnated. After the incubation the zone was measured. The antimicrobial activity of plant extracts was detected by the indication of zone around the disc [26].

Anti-allergic Activity

Abhaykumar Kamble, Department of Biochemistry, Gulbarga University, Kalaburagi, India, studies the Anti allergy activity of *Achyranthes aspera* caused by heavy metal potassium dichromate in albino mice [27].

S.B. Datir et al. (2009) reported that the petroleum ether extract (200 mg/kg, i.p.) of the plant shows significant antiallergic activity in both milk induced leukocytosis and milk induced eosinophilia in mice. Thus the antiallergic activity of *A. aspera* may be due to nonpolar constituents. The phytochemical screening of petroleum ether extract shows the presence of steroids. Literature shows the presence of steroids like β -sitosterol, ecdysone and ecdysterone. Thus these steroids present in the plant may be responsible for the antiallergic activity [28].

Anti-depressant Activity

C.C. Barua et al. (2009) showed that Methanolic extract of the leaves of *Achyranthes aspera* shows anti-depressant effect in mice and rats using forced swimming test in mice and rats and tail suspension test in rats [29].

Wound Healing Activity

S. Edwin et al. (2008) investigated the ethanolic and aqueous extracts of leaves of *Achyranthes aspera* for wound healing activity. The wound healing activity was studied using two wound models, excision wound model and incision wound model [30].

Cardiovascular Activity

Water-soluble alkaloid Achyranthine, isolated from *Achyranthes aspera*, dilated blood vessels, raised the rate and amplitude of respiration in frogs and dogs, and lowered blood pressure and heart rate. The alkaloid's contractile impact on the frog rectus abdominal muscle at 0.5 mg/ml muscle compared to acetylcholine's (0.1 mg/ml) and its spasmogenic impact was not as strong. The tubocurarine block [31].

Anti-oxidant Activity

P. Tahiliani & A. Kar (2000) studied various extracts of the leaves for anti-oxidant activity. D.S. Gayathri et al. (2009) also reported antioxidant activity on leaves and roots [32].

Anti-inflammatory and anti-arthritis activity

Rats with carrageenan-induced paw edema and the formalin model demonstrate anti-inflammatory activity in response to alcoholic extracts of leaves and seeds [33].

Hepatoprotective Activity

A.R. Bafna & S.H. Mishra (2004) reported that the methanolic extract of the aerial parts of *Achyranthes aspera* shows hepatoprotective activity on rifampicin induced hepatotoxicity in albino rats. Methanolic extract showed dose dependent decrease in the levels of SGPT, SGOT, ALKP and total bilirubin [34].

Immunomodulatory Activity

R. Chakrabarti & R.Y. Vasudeva reported that *Achyranthes aspera* show immuno-stimulant action in *Catla catla*. *Achyranthes* has significantly ($P < 0.05$) enhanced the BSA-specific antibody titers than the untreated control group throughout the study period. The efficiency of antigen clearance was also enhanced [35].

CONCLUSION

The use of medicinal plants in the management of various illnesses is due to their phytochemical constituents and dates back antiquity [36]. *A. aspera* methanolic leaves extracts have great potential to use a new phytomedicine against multiple resistant *Candida albicans* [37]. Recently the attention has been directed toward extracts and biologically active compounds isolated from popular plant species. The use of medicinal plants

plays a vital role in converging the basic health needs in developing countries and these plants may offer a new source of antibacterial, antifungal and antiviral agents with significant activity against infective microorganisms [38, 39]. *Achyranthes aspera* shows great promise as a multifunctional medicinal agent, more clinical trials ought to be conducted to validate its effectiveness.

REFERENCES

1. Cragg, GM, Newman, DJ. Medicinals for the millennia. Ann.NYAcad Sci. 2001;953:3-25.
2. R. Rama and V. Latha World Journal of Science and Research 3(1): 16-22 (2018).
3. Binit Baraik, Paras Jain and H.P. Sharma, American Journal of Advanced Drug Delivery, ISSN 2321-547X
4. Madhumitha G, Saral AM. Free radical scavenging assay of thevetia neriifolia leaf extracts. Asian Journal of chemistry. 2009; 21: 2468-2470
5. Fazli khuda, Zafar iqbal, Pak. J. Pharm. Sci., Vol.28 No.5, September 2015, pp.1797-1800
6. Girach RD, Khan ASA . Ethnomedicinal uses of *Achyranthes aspera* leaves in Orissa (India). Int J Pharmacogn.1992; 30:113-115
7. Ghani, A. Medicinal Plant of Bangladesh with Chemical Constituents and Uses. 2nd ed. Asiatic Society of Bangladesh, Dhaka. 2003, p.71-72.
8. Bhattarai, N. Folk herbal remedies for gynaecological complaints in Central Nepal. Int J Pharmacog. 1994;32(1):13-26
9. Tahiliani, P, Kar, A. *Achyranthes aspera* elevates thyroid hormone level and decrease hepatic lipid peroxidation in male rats. J Ethanopharmacol. 2000;71: 527-532.
10. Akhtar, MS, Iqbal, J. Evaluation of the hypoglycaemic effect of *Achyranthes aspera* J. Ethnopharmacol. 1991; 31: 49.
11. Gokhale, AB, Damre, AS, Kulkarni, KR, Saraf, MN. Preliminary evaluation of antiinflammatory and anti-arthritic activity of *S. lappa*, *A. speciosa* and *A. aspera*. Phytomed. 2002;9(5): 433-37.
12. Ganesh et al., IJP, 2021; Vol. 8(2): 58-64, E- ISSN: 2348-3962, P-ISSN: 2394-5583
13. Jain BJ, Sheetal C and Bhattacharya SK: Indian Journal of Traditional Knowledge 2006; 5(2): 237-42.
14. Anonymous. The Wealth of India - Raw Materials, Council of Scientific & Industrial Research, New Delhi, 2005, 55-57
15. Vijai Lakshmi, Abbas Ali Mahdi, Dilutpal Sharma, Santosh Kumar Agarwal, Journal of Scientific and Innovative Research 2018; 7(1): 27-29
16. N.K. Bhattaraj. Fitoterapia (1992), 63(6), 497-506
17. V.K.Singh, Z.A. Ali, S.T.H. Zaidi. Fitoterapia (1996), 67(2), 129-139.
18. N.K. Basu. The chemical constitution of achyranthine. J Proc Inst Chem. 29: 73-76 (1957).
19. S. Kumar, J.P. Singh, S. Kumar S. Phyto chemical screening of some plants of Manipur-I. J Econ Bot Phytochem. 1: 13-16 (1990).
20. Indian Herbal Pharmacopodia Vol. II, Page-5
21. Saurabh Srivastav, Pradeep Singh, Garima Mishra, Jha KK, Khosa RL. *Achyranthes aspera*-An important medicinal plant: A review. J. Nat. Prod. Plant Resour. 2011; 1(1):1-14
22. Ramesh Londonkar et al./Rec Res Sci Tech 3 (2011) 53-57
23. P. Saravanan, V. Ramasamy, T. Shivakumar. Asian Journal of Chemistry, 2008, 20(1), 823- 825.
24. T.N. Misra, R.S. Singh, H.S Pandey, C. Prasad, B.P. Singh, Phytochemistry, 1992, 31(5), 1811-1812.
25. S. Sharma, P. N. Shrivastava, R. C. Saxena. Asian Journal of Chemistry, 2006, 18(4), 2766- 2770.
26. R. Rama and V. Latha, World Journal of Science and Research, 3(1): 16-22 (2018).
27. Abhaykumar Kamble, World Scientific News 106 (2018) 24-45

28. S.B. Datir, A.B. Ganjare, S.A. Nirmal, S.B. Bhawar, D.K. Bharati, M.J. Patil. Pharmacologyonline, 2009, 921-925.
29. C.C. Barua, A. Talukdar, S.A. Begum, B. Buragohain, J.D. Roy, R.S. Borah, M. Lahkar. Pharmacologyonline, 2009, 2, 587-594
30. S. Edwin, E. Jarald, D.L. Edwin, A. Jain, H. Kinger, K.R. Dutt, A.A. Raj. Pharmaceutical Biology, 2008, 46(12), 824-828
31. N. C. Neogi, R. D. Garg, R. S. Rathor. Indian Journal of Pharmacy, 1970, 32(2), 43-46.
32. D.S. Gayathri, A. Archanah, P. Abiramasundari, V. Priya, K. Uma, T. Abirami. Indian Journal of Nutrition and Dietetics, 2009, 46(12), 485-490.
33. F.A. Mehta, B.G. Patel, S.S. Pandya, K.B. Ahir, S.B. Patel. Pharmacologyonline, 2009, 3, 978-985.
34. A.R. Bafna, S.H. Mishra. Ars Pharmaceutica, 2004, 45(4), 343-351.
35. R. Chakrabarti, R.Y. Vasudeva. International Immunopharmacology, 2006, 6(5), 782-790.
36. N. Chahlia. Journal of medicinal plants research, 2009, 3(6), 481-484.
37. J. Rani and G. Shanthi, Asian Journal of Innovative Research 1(3) 42-47 (2016)
38. Shadomy S, Espinel-Ingroff A, Gebhar RJ. (1985). In vitro studies with sf 86-327, new orally active allylamine derivatives. I Med Vet Mycologia 23:125-32.
39. Odds FC. (1989). Antifungal activity of saperconazole (R. 66905) in vitro J. Antimicrobiol Chemother 24:533-7

GLIMEPIRIDE LOADED NANOPARTICLES - A NOVEL APPROACH FOR THE TREATMENT OF DIABETES**Nilesh D Dhanve*, Dr. Aparark Moholkar, Rushikesh Patil and Nishinandan Suryawanshi**

Department of Pharmaceutics, Channabasweshwar Pharmacy College (Degree) Latur - 413512

ABSTRACT

Diabetes is a group of metabolic disorders characterized by hyperglycaemia and abnormalities in carbohydrate, fat, and protein metabolism. For that we used various antidiabetic drug. In this article we focus on Glimepiride drug. Glimepiride lowers blood sugar by causing the pancreas to produce insulin and helping the body use insulin efficiently. we mainly used here nanotechnology. Nanotechnology word indicates use of technology at nanoscale. Any technology which deals with nanoscale is called as nanotechnology. Desired properties of therapeutic agents can be enhanced by use of nanotechnology. The aim of the study was investigate 'Glimepiride loaded nanoparticles a novel approach for the treatment of diabetes mellitus.' Because of this technology we can get sustained release effect with maximum drug efficacy and with minimum drug toxicity.

Keywords: Diabetes, Glimepiride, nanotechnology, Hyperglycaemia.

INTRODUCTION

Diabetes is a group of metabolic disorders characterized by hyperglycaemia and abnormalities in carbohydrate, fat, and protein metabolism.

PATHOPHYSIOLOGY

1. Type 1 DM (5%–10% of cases) usually develops in childhood or early adulthood and results from autoimmune-mediated destruction of pancreatic β -cells, resulting in absolute deficiency of insulin. The autoimmune process is mediated by macrophages and T lymphocytes with autoantibodies to β -cell antigens (eg, islet cell antibody, insulin antibodies).
2. Type 2 DM (90% of cases) is characterized by a combination of some degree of insulin resistance and relative insulin deficiency. Insulin resistance is manifested by increased lipolysis and free fatty acid production, increased hepatic glucose production, and decreased skeletal muscle uptake of glucose.
3. Uncommon causes of diabetes (1%–2% of cases) include endocrine disorders (eg, acromegaly, Cushing syndrome), gestational diabetes mellitus (GDM), diseases of the exocrine pancreas (eg, pancreatitis), and medications (eg, glucocorticoids, pent-amidine, niacin, α -interferon).
4. Microvascular complications include retinopathy, neuropathy, and nephropathy. Macrovascular complications include coronary heart disease, stroke, and peripheral vascular disease.

CLINICAL PRESENTATION:-**A) TYPE 1 DIABETES MELLITUS:-**

1. The most common initial symptoms are polyuria, polydipsia, polyphagia, weight loss, and lethargy accompanied by hyperglycaemia.
2. Individuals are often thin and are prone to develop diabetic ketoacidosis if insulin is withheld or under conditions of severe stress.
3. Between 20% and 40% of patients present with diabetic ketoacidosis after several days of polyuria, polydipsia, polyphagia, and weight loss.

B) TYPE 2 DIABETES MELLITUS

1. Patients are often asymptomatic and may be diagnosed secondary to unrelated blood testing.
2. Lethargy, polyuria, nocturia, and polydipsia can be present. Significant weight loss is less common; more often, patients are overweight or obese.

DIAGNOSIS

Criteria for diagnosis of DM include any one of the following:

1. A1C of 6.5% or more
2. Fasting (no caloric intake for at least 8 hours) plasma glucose of 126 mg/dL (7.0 mmol/L) or more

3. Two-hour plasma glucose of 200 mg/dL (11.1 mmol/L) or more during an oral glucose tolerance test (OGTT) using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water
4. Random plasma glucose concentration of 200 mg/dL (11.1 mmol/L) or more with Classic symptoms of hyperglycemia or hyperglycemic crisis:-

In the absence of unequivocal hyperglycemia, criteria 1 through 3 should be confirmed by repeat testing.

	FPG	2-h PPG	HbA _{1c}
ADA ¹⁹	90–130 mg/dL (5–7.22 mmol/L)	<180 mg/dL (10 mmol/L)	<7%
IDF ¹⁷	<110 mg/dL (6.11 mmol/L)	<145 mg/dL (8.06 mmol/L)	<6.5%
ADA/EASD Consensus ¹⁴	70–130 mg/dL (3.89–7.22 mmol/L)	<180 mg/dL (10 mmol/L)	<7%
AACE ¹⁵	<100 mg/dL (5.56 mmol/L)	<140 mg/dL (7.78 mmol/L)	≤6.5%

Abbreviations: FPG, fasting plasma glucose; PPG, postprandial glucose; HbA_{1c}, hemoglobin A_{1c}; ADA, American Diabetes Association; IDF, International Diabetes Federation, EASD, European Association for the Study of Diabetes; AACE, American Association of Clinical Endocrinologists.

Table no 1:-

Drugs Used for Diabetes				
Subclass	Mechanism of Action	Effects	Clinical Applications	Pharmacokinetics, Toxicities, Interactions
Insulins				
Rapid-acting: Lispro, aspart, glulisine Short-acting: Regular Intermediate-acting: NPH Long-acting: Determir, glargine	Activate insulin receptor	Reduce circulating glucose promote glucose transport and oxidation, glycogen, lipid, protein synthesis, and regulation of gene expression	Type 1 and type 2 diabetes	<ul style="list-style-type: none"> Parenteral (subcutaneous or intravenous) Duration varies Toxicity: Hypoglycemia, weight gain, lipodystrophy (rare)
Sulfonylureas				
Glipizide Gliburide Glinapiride	Insulin secretagogue: Close K ⁺ channels in beta cells, increase insulin release	In patients with functioning beta cells, reduce circulating glucose, increase glycogen, fat, and protein formation gene regulation	Type 2 diabetes	<ul style="list-style-type: none"> Orally active Duration 10–24 h Toxicity: Hypoglycemia, weight gain
<i>Tolazamide, tolbutamide, chlorpropamide: Older sulfonylureas, lower potency, greater toxicity; rarely used</i>				
Glitinides				
Repaglinide	Insulin secretagogue: Similar to sulfonylureas with some overlap in binding sites	In patients with functioning beta cells, reduces circulating glucose increases glycogen, fat, and protein formation gene regulation	Type 2 diabetes	Oral very fast onset of action duration 5–8 h Toxicity: Hypoglycemia
Nateglinide	Insulin secretagogue: Similar to sulfonylureas with some overlap in binding sites	In patients with functioning beta cells, reduces circulating glucose increases glycogen, fat, and protein formation gene regulation	Type 2 diabetes	Oral very fast onset and short duration (< 4 h) Toxicity: Hypoglycemia
Biguanides				
Metformin	Obscure: Reduced hepatic and renal gluconeogenesis	Decreased endogenous glucose production	Type 2 diabetes	Oral Toxicity: Gastrointestinal symptoms, lactic acidosis (rare). Cannot use if impaired renal/hepatic function congestive heart failure, hypoxic/acidotic states, alcoholism

Table no 2:- Drug Used For Diabetes

Treatment :-

Alpha-Glucosidase inhibitors				
Acarbose,	Inhibit intestinal-glucosidases	-Reduce conversion of starch and disaccharides to monosaccharides -Reduce postprandial hyperglycemia	Type 2 diabetes	Oral Rapid onset <i>Toxicity:</i> Gastrointestinal symptoms cannot use if impaired renal/hepatic function, intestinal disorders
Thiazolidinediones – Glitazones				
Rosiglitazone	Regulates gene expression by binding to PPAR γ	Reduces insulin resistance	Type 2 diabetes	Oral long-acting (> 24 h) <i>Toxicity:</i> Fluid retention, edema, anemia, weight gain, macular edema, bone fractures in women, cannot use if CHF, hepatic disease may worsen heart disease
Pioglitazone	Regulates gene expression by binding to PPAR γ and PPAR α	Reduces insulin resistance	Type 2 diabetes Can be combined with insulin	Oral long-acting (> 24 h) <i>Toxicity:</i> Fluid retention, edema, anemia, weight gain, macular edema, bone fractures in women cannot use if CHF, hepatic disease
Incretin-based drugs				
Exenatide	Analog of GLP-1: Binds to GLP-1 receptors	Reduces post-meal glucose excursions: increases glucose-mediated insulin release, lowers glucagon levels, slows gastric emptying, decreases appetite	Type 2 diabetes	Parenteral (subcutaneous) half-life ~2.4 h <i>Toxicity:</i> Nausea, headache, vomiting, anorexia, mild weight loss, pancreatitis
Sitagliptin	DPP-4 inhibitor: Blocks degradation of GLP-1, raises circulating GLP-1 levels	Reduces post-meal glucose excursions: Increases glucose mediated insulin release, lowers glucagon levels, slows gastric emptying, decreases appetite	Type 2 diabetes	Oral half-life ~12 h 24-h duration of action <i>Toxicity:</i> Rhinitis, upper respiratory infections, rare allergic reactions

Table no 3.- Treatment Of Diabetes

In this study we will be focus on glimepiride drug.

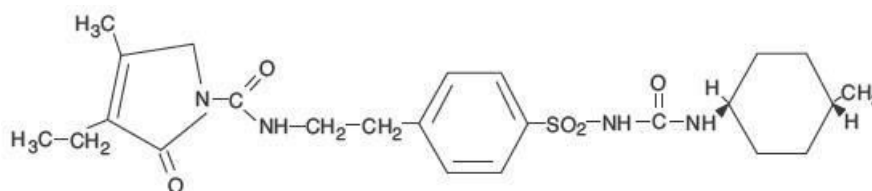
Glimepiride

Glimepiride Tablets, USP are an oral blood-glucose-lowering drug of the sulfonylurea class. Glimepiride, USP is a white to yellowish-white, crystalline, odourless to practically odourless powder formulated into tablets of 1-mg, 2-mg, and 4-mg strengths for oral administration. Glimepiride Tablets, USP contain the active ingredient glimepiride, USP and the following inactive ingredients: lactose monohydrate, magnesium stearate, povidone, and sodium starch glycolate. In addition, Glimepiride 1-mg tablets contain Ferric Oxide (Iron Oxide Red), Glimepiride 2-mg tablets contain Ferric Oxide (Iron Oxide Yellow), and FD and C Blue #2 Aluminium Lake, and Glimepiride 4-mg tablets contain FD and C Blue #2 Aluminium Lake.

Chemically, glimepiride is identified as 1-[[p-[2-(3-ethyl-4-methyl-2-oxo-3-pyrroline-1-carboxamido)ethyl]phenyl]sulfonyl]-3-(trans-4-methylcyclohexyl)urea.

TheCAS Registry Number is 93479-97-1

The structural formula is:



Structure no 1:- Glimepiride

MolecularFormula:C₂₄H₃₄N₄O₅S

MolecularWeight:490.62

Glimepiride is practically insoluble in water.

Dosing and Indications

Adult Dosing

1. Important Note

1. Beers Criteria: Use caution or avoid use as potentially inappropriate in older adults.

2. Type 2 diabetes mellitus

1. Initial, 1 to 2 mg orally once daily
2. Maintenance, increase in increments of 1 to 2 mg orally no more than every 1 to 2 weeks based on glycaemic response; MAX 8 mg/day

Paediatric Dosing

1. Important Note

1. Beers Criteria: Use caution or avoid use as potentially inappropriate in older adults.

2. General Dosage Information

1. not recommended in paediatric patients due to adverse effects on body weight and hypoglycaemia

Dose Adjustments

1. **Renal impairment:** Initiate at 1 mg/day.
2. **Hepatic impairment:** Initiate and titrate cautiously
3. **Elderly:** Initiate at 1 mg/day
4. **Dialysis:** Initiate at 1 mg/day.
5. **Debilitated or malnourished patients:** Initiate and titrate cautiously.
6. **Adrenal or pituitary impairment:** Initiate and titrate cautiously

Indications

FDA-Labelled

Indications

Type 2 diabetes mellitus

Contraindications/Warnings

Contraindications

1. History of allergic reaction to sulfonamide derivatives
2. Hypersensitivity to glimepiride or any of the product components

Precautions

1. Beers Criteria: Avoid use in older patients due to increased risk for severe prolonged hypoglycaemia.

2. Cardiovascular: An increased risk of cardiovascular mortality has been reported with the use of sulfonylurea anti-hyperglycaemic; evidence of macrovascular risk reduction has not been established with use.
3. Endocrine and metabolic: Hypoglycaemia may impair concentration during activities such as driving or operating machinery.
4. Endocrine and metabolic: Severe and potentially fatal hypoglycemia may occur; increased risk with elderly, debilitated, or malnourished patients, adrenal or pituitary impairment, with deficient caloric intake, with concurrent anti-hyperglycemic medications, following intense or prolonged exercise, or with concomitant alcohol use.
5. Hematologic: Haemolytic anemia may occur during use; patients with glucose-6 phosphate dehydrogenase (G6PD) deficiency are at an increased risk, use with caution or consider use of non-sulfonylurea agents.
6. Hepatic: Increased risk of hypoglycemia in patients with hepatic impairment
7. Immunologic: Hypersensitivity reactions such as cutaneous eruptions, anaphylaxis, dyspnea, angioedema, and Stevens-Johnson Syndrome have been reported; promptly discontinue use if suspected.
8. Renal: Increased risk of hypoglycemia in patients with renal impairment; dosage adjustment recommended
9. Special populations: Warning signs of hypoglycemia may be less pronounced or different in elderly patients, those with autonomic neuropathy, or patients taking concomitant beta-adrenergic blocking medications or sympatholytic agents; decreased awareness may result in severe hypoglycemia.
10. Special populations: Use not recommended in pediatric patients due to hypoglycemia and adverse effects on body weight

Pregnancy Category

Fetal risk cannot be ruled out. (MDX)

Breast Feeding

Micromedex: Infant risk cannot be ruled out.

Drug Interactions**Major**

1. Aspirin (theoretical)
2. Bexagliflozin (theoretical)
3. Capecitabine (theoretical)
4. Chloroquine (theoretical)
5. Ciprofloxacin (theoretical)

Moderate

1. Acebutolol (probable)
2. Aminolevulinic Acid (probable)
3. Atenolol (probable)
4. Betaxolol (probable)
5. Bisoprolol (probable)

Adverse Effects**Common**

1. **Endocrine metabolic:** Hypoglycaemia (4% to 19.7%)
2. **Gastrointestinal:** Nausea (5%)
3. **Neurologic:** Asthenia, Dizziness (5%), Headache (8.2%)

Serious

Dermatologic: Cutaneous hypersensitivity (Less than 1%), Lichenoid drug eruption

Drug Name Info**US Trade Names**

Amaryl

Class

1. 2nd Generation Sulfonylurea
2. Hypoglycaemic

Regulatory Status

RX

Generic Availability

Yes

Mechanism Of Action

Glimepiride is a sulfonylurea; it stimulates insulin release from functioning pancreatic beta cells by binding to the sulfonylurea receptor, leading to closure of the ATP-sensitive potassium channel, which results in insulin release and a subsequent decrease in blood glucose.

Pharmacokinetics**Absorption**

1. T_{max}, oral: 2 to 3 hours.
2. Effects of food: C_{max} reduced by 8%, AUC reduced by 9%

Distribution

1. Protein binding: Greater than 99.5%
2. V_d: 8.8 L (113 mL/kg)

Metabolism

1. Oxidative biotransformation: Complete
2. Cyclohexyl hydroxy methyl derivative (major): Active
3. CYP2C9 substrate

Excretion

1. Renal excretion, oral: 60%
2. Faecal excretion, oral: 40%
3. Biliary excretion, IV: None
4. Total body clearance, IV: 47.8 mL/min
5. Total body clearance, oral (geriatric): Increased by 11%

Elimination Half Life

Cyclohexyl hydroxy methyl derivative: 3 hours.

Administration**Oral**

1. give with breakfast or the first main meal
2. administer glimepiride at least 4 hours prior to colessevelam if used concomitantly

Monitoring

1. Achievement of glycaemic control, including meeting HbA1c goal, is indicative of efficacy.
2. HbA1c: Twice yearly in patients who are meeting treatment goals; every 3 months in patients whose therapy has changed and/or who are not meeting glycaemic goals; more frequently as clinically warranted
3. Blood glucose: As needed to assist in meeting goals of therapy
4. Signs and symptoms of hypoglycaemia, especially in elderly and renally impaired patients
5. Signs and symptoms of hyperglycaemia

How Supplied**1. Generic**

1. Oral Tablet: 1 MG, 2 MG, 4 MG

2. Amaryl

1. Oral Tablet: 4 MG

3. Glimepiride AvPak

1. Oral Tablet: 1 MG, 2 MG, 4 MG

Toxicology**Clinical Effects****SULFONYLUREA AND RELATED DRUGS**

1. **USES:** Class of oral hypoglycaemic agents used to treat type II diabetes. **PHARMACOLOGY:** Antagonizes the potassium channel on beta islet cells of the pancreas resulting in increased release of insulin.
2. **TOXICOLOGY:** Hypoglycaemic effects develop in overdose.
3. **EPIDEMIOLOGY:** Poisoning is not common, but often results in symptomatic hypoglycaemia which can result in serious neurological injury.
4. **INTENTIONAL EXPOSURE:** Sulfonylurea poisoning has been associated with Munchausen-by-proxy syndrome and homicide attempts. In one study, it was suggested that more than 20% of poisonings reported in the literature were due to these events. Children may be at greater risk to develop complications than adults and become profoundly hypoglycaemic.
5. **MILD TO MODERATE TOXICITY:** Toxicity results almost exclusively from hypoglycaemia. Tremor, diaphoresis, nausea, headache, and tachycardia may occur in mild hypoglycaemia although these responses may not be seen in longstanding diabetics. Alternatively, patients with longstanding poor glycaemic control may become symptomatic at more "normal" serum glucose concentrations.
6. **SEVERE TOXICITY:** Severe CNS symptoms resulting from hypoglycaemia including seizures, altered mental status, delirium, focal neurologic effects, and coma may result. In addition, patients may have dysrhythmias (usually sinus tachycardia, atrial fibrillation, or premature ventricular contractions). Patients with underlying cardiac conditions are at risk for ischemic events secondary to the increased myocardial stress. Patients with prolonged severe hypoglycaemia may sustain permanent neurologic injury.
7. **ADVERSE EFFECTS:** Hypoglycaemia is the primary adverse effect associated with therapeutic use. Other common adverse effects include: nausea, vomiting and abdominal pain. Use of sulfonylurea with ethanol can result in a disulfiram-like reaction. Chlorpropamide and
8. Tolbutamide have been associated with the syndrome of inappropriate antidiuretic hormone.

Clinical Teaching

1. Drug may cause severe hypoglycaemia that may impair concentration and reaction times. Warn patient to use caution when doing activities requiring mental alertness or coordination, such as driving a car or operating heavy machinery.
 2. This drug may cause nausea, asthenia, flu-syndrome, headache, or dizziness.
 3. Advise patients to monitor for signs/symptoms of hypoglycaemia, and instruct on how to manage.
-

4. Instruct patient to take drug with breakfast or first main meal of the day.
5. Advise patient there are multiple significant drug-drug interactions for this drug. Consult healthcare professional prior to new drug use (including over-the-counter and herbal drugs).
6. Patient should not drink alcohol while taking this drug.

Nanotechnology

Nanotechnology word indicates use of technology at nanoscale. Over the past couple of decades nanotechnology is proving its importance in drug delivery. In Latin language, meaning of word nano is dwarf (small). In 1974, Tokyo science university Professor Norio Taniguchi coined the word nanotechnology and since then it is being used. (1) Any technology which deals at nanoscale is called as nanotechnology. Nano word indicates size of 10^{-9} meter.

Nanotechnology is multidisciplinary field covering areas like engineering, electronics, physics, molecular biology, biophysics, medical and pharmaceuticals. The properties of material at nanoscale are different than macro scale. (2) These changed particles of drug molecule in nano scale can lead to increased performance in different dosage form. If we trace back the use nanotechnology in medicine, we can find the use of colloidal gold in ancient time. The growth of nanoscience can be drawn to the time of the Greeks and Democritus in the 5th century B.C. (3) Nanotechnology in dosage form development have many advantages like enhanced solubility, increased dissolution rate, enhanced stability, reduction in dosage, increase in bioavailability and rapid onset of action. (4) Nanotechnology is playing vary important role to fight against various life-threatening diseases like cancer.

It helps in detection of various neurodegenerative diseases like Alzheimer's disease and Parkinson's disease, diabetes mellitus, sensing viruses and microorganism. Nanotechnology can be used in pharmaceutical sciences like development of nanomedicines, diagnosis, tissue engineering and development of biomarkers, biosensors, targeted drug delivery. (5) Various nano based technologies are used in pharmaceutical sciences like Quantum dots, Dendrimers, Carbon nanotubes, Liposomes, Polymeric nanoparticles, Metallic nanoparticles, Polymeric micelles, Nanocomposites and many more.

NANOTECHNOLOGY IN PHARMACEUTICALS:

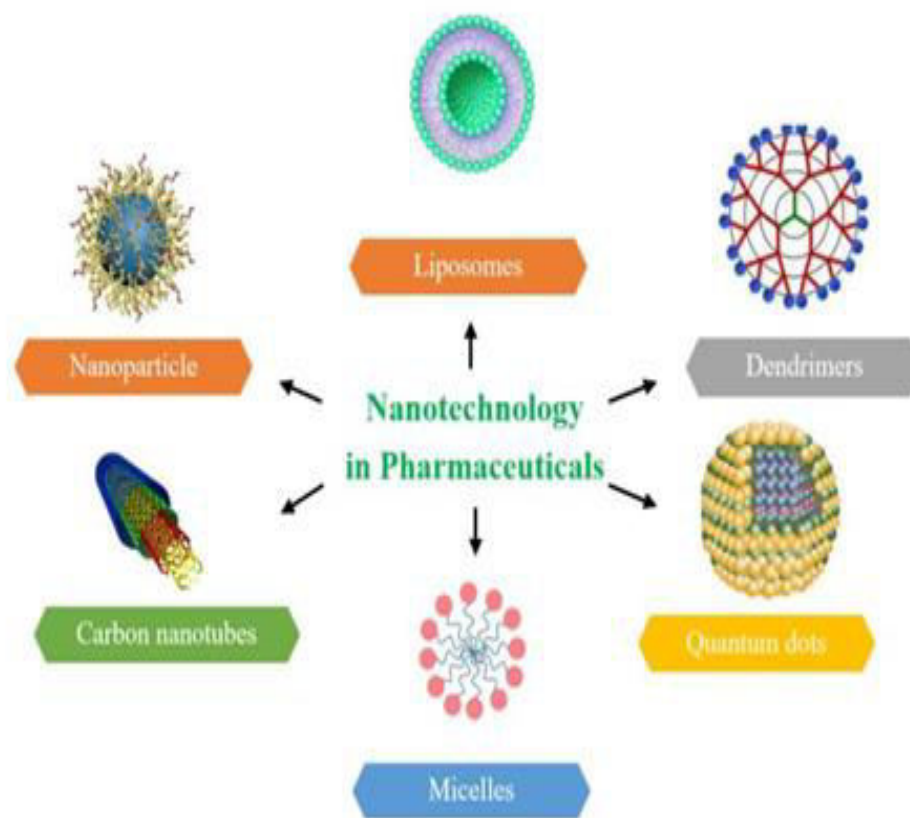
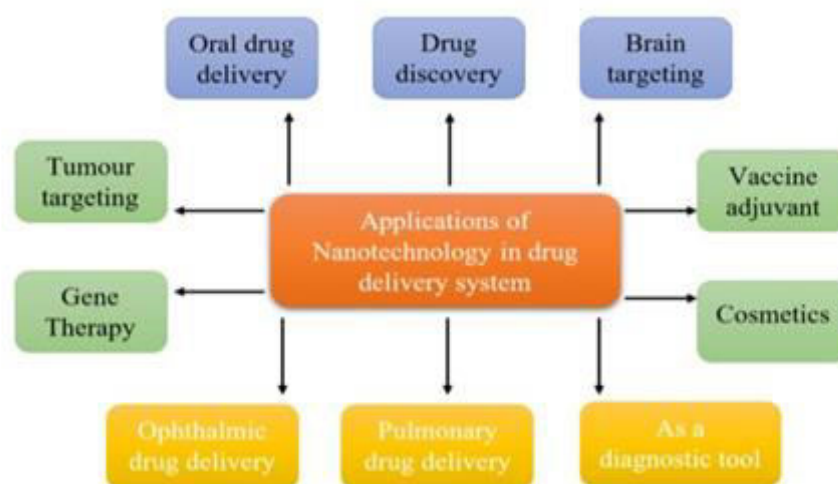


Fig no.1:-Nanotechnology in Pharmaceuticals

APPLICATIONS OF NANOTECHNOLOGY IN DRUG DELIVERY:**Fig no.2:- Application Of Nanotechnology In Drug Delivery****ORAL DRUG DELIVERY:**

Oral drug delivery remains one the prominent route of drug administration. It is oldest as well as commonest route of drug administration owing to its several advantages. However, this route fails to deliver certain category of drugs like water insoluble drugs, protein and peptides, drugs which gets destroyed by gastric environment. In such cases nanotechnology can play a vital role. Drugs loaded in nanoparticles will be protected from gastric environment as well as solubility of such drugs can be increased which in turn increases the bioavailability. Also, protein and peptide delivery through oral route is possible by use of nanotechnology.

CONCLUSION

Diabetes mellitus (DM) is a group of metabolic disorders characterized by hyperglycaemia and abnormalities in carbohydrate, fat, and protein metabolism. We can control it by using various antidiabetic drugs. We mainly focus on sulfonylurease class drug i.e. Glimepiride. It's used leads to hypoglycaemic effect. Then further we focused on nanotechnology. Nanotechnology is the future of medicines. It has enormous potential as drug delivery system. Nanotechnology is used to deliver therapeutic and pharmacological agents. Desired properties of therapeutic agents can be enhanced by use of nanotechnology. So here we used as 'Glimepiride loaded nanoparticles as novel delivery approach in treatment of diabetes mellitus.' Because of this technology we can get sustained release effect with maximum drug efficacy and with minimum drug toxicity.

REFERENCE

1. Barbara G wells , Joseph T . Dipiro, Cecily V. Dupari, Diabetes Mellitus, Pharmacotherapy Handbook, Ninth Edition , Pg No.161-175
2. Begum Y, Sirisha H, Reddy P. Nanoparticulate Drug Delivery System-An Overview.
3. International journal of Pharmaceutical Sciences and Clinical Research. 2017; 1:15-25.
4. Chandrababu D, Patel H, Patel H, Dimeshbhai M. A review on pharmaceutical nanotechnology, Asian Journal of Pharmacy and Life Science. 2012;2(2):324-338.
5. Bayda S, Adeel M, Tuccinardi T, Cordani M, Rizzolio F. The History of Nanoscience and Nanotechnology: From Chemical-Physical Applications to Nanomedicine. Molecules. 2019;25(1):112.
6. Rangasamy M. Nano Technology: A Review. Journal of applied pharmaceutical science 2011;1(2):8-16.
7. Sutte A, Singh G, Yadav N, Barnwal R, Singla N, Prabhu K, Mishra V. A Review on Status of Nanotechnology in Pharmaceutical Sciences, International Journal of Drug Delivery Technology. 2019;9(1):98-103
8. Bailey R, Smith A, Nie S. Quantum dots in biology and medicine. Physica E. 2004;25:1-12.
9. Du X, Shi B, Liang J, Bi J, Dai S, Qiao S. Developing Functionalized Dendrimer Like Silica Nanoparticles with Hierarchical Pores as Advanced Delivery Nanocarriers. Adv. Mater. 2013; 25:5981-5985.
10. Zhu Y, Liu C, Pang Z. Dendrimer-based drug delivery systems for brain targeting. Biomolecules, 2001; 9(12): 1-29.

11. Kesharwani P, Jain K, Jain N.K. Dendrimer as nanocarrier for drug delivery, *Prog Poly Sci*, 2014; 39: 268–307.
12. Varshney K. Carbon Nanotubes: A Review on Synthesis, Properties and Applications. In *J Eng Re Gen Sci*. 2014;2(1): 660-677.
13. Rajwant K, Vatta P, Kau M. Carbon Nanotubes: A Review Article. *Int J Res App Sci Eng Tech*. 2018;6: 5075-5079.
14. Sharma A, Sharma U. Liposomes in drug delivery: Progress and limitations, *Int J Pharm*. 1997;154(2):123-140.
15. Mayer D, Cullis R, Balley B. Medical applications of liposome. Elsevier science BV, New York, 1998.
16. Saraswathi M. *Int J Res Pharm Nano Sci*. 2014;3(3):159 - 169.
17. Maincent P, Marchal-Heussler I, Sirbat D, Thouvenot P, Hoffman M, Vallet A.
18. Proceedings of International Symposia, Control Release Bioactive Materials. 1992;18:226.
19. Mohanraj Y, Chen Y. Nanoparticles – A Review. *Trop J Pharm Res*. 2006; 5(1): 561-573.
20. Harishkumar K, Nagasamy V, Himangshu V, Anuttam K. Metallic nanoparticles- A
21. review. *Biomed J Sci &Tech Res*. 2018; 4(2): 3765-3775.
22. Ferrari M. Cancer nanotechnology: opportunities and challenges. *Nature Reviews/Cancer*. 2005;5: 161-171.
23. Paravastu V, Yarraguntla S, Suvvari A. Role of nanocomposites in drug delivery. *GSC Biological and Pharmaceutical Sciences*, 2019;08(03): 094–103.
24. Goldberg M, Langer R, Jia X. Nanostructured materials for applications in drug delivery and tissue engineering *J Biomater Sci Polym*. 2007; 18(3):241-68.
25. Kim S. Emerging nanotechnology approaches in tissue engineering and regenerative medicine. *Int J Nanomedicine*, 2014;9: 1-5.
26. Edwards L. Carbon nanotubes in scaffolds for tissue engineering, *Expert Rev Med Devices*, 2009;6: 499-505.
27. Jung W, Kamm A, Breitenbach E, Kaiserling X, Xiao T, Kisse. Biodegradable nanoparticles for oral delivery of peptides: is there a role for polymers to affect mucosal uptake? *Eur. J. Pharm. Biopharm*. 2000;50: 147–160.
28. Purkayastha H, Hossian S. Nanosuspension: A Modern Technology Used in Drug Delivery System. *Int J Curr Pharm Res*. 2019;11(3): 1-3.
29. Wang Z, Li Z, Zhang D, Miao L, Huang G. Development of etoposide-loaded bovineserum albumin nanosuspensions for parenteral delivery. *Drug Deliv*. 2015;22(1):79-85.
30. Lee V, Robison J. Topical Ocular Drug Delivery: Recent Developments and Future Challenges. *J Ocul Pharmacol Ther*. 2009;2(1):67-108.
31. Lai S, Wei Y, Wu Q. et. al. Liposomes for effective drug delivery to the ocular posterior chamber. *J Nanobiotechnol*. 2019;17(64):1-12.
32. Paranjpe M, Müller-Goymann CC. Nanoparticle-mediated pulmonary drug delivery: a review. *Int J Mol Sci*. 2014;15(4):5852-5873.
33. Pardridge M. The blood-brain barrier: bottleneck in brain drug development. *NeuroRx*. 2005;2(1):3-14.
34. Li Z, Düllmann J, Schiedlmeier B, et al. Murine leukemia induced by retroviral gene marking. *Science*. 2002;296(5567):497.
35. Manivannan R. Nano Technology: A Review. *J App Pharm Sci*. 2011;01(02): 08-16.
36. Madaan T, Pandey S, Talegaonvkar S. Nanotechnology: A smart drug delivery tool in modern healthcare *Journal of Chemical and Pharmaceutical Research*. 2015;7(6):257-264.

QUERICETINE LOADED NONOFIBER - A NOVEL APPROACH IN HYPERTENSION

Rushikesh S Patil*, Dr Aparark Moholkar, Nnaishindan Suryawanshi and Nilesh Dhanve

Department of Pharmaceutics, Channabasweshwar Pharmacy College (Degree) Latur - 413512

ABSTRACT

One of the most well-known flavonoids, quercetin, has long been a part of the human diet. Numerous health benefits, such as those related to antioxidant, anti-inflammatory, antiviral, and anticancer properties, as well as the ability to mitigate certain cardiovascular diseases (such as heart disease, hypertension, and high blood cholesterol), have been linked to the use of quercetin. Nevertheless, quercetin's low bioavailability, chemical instability, and poor solubility in water severely restrict its range of uses. Delivery system use can increase the drug's bioavailability, stability, and effectiveness.

Flavonoid quercetin for its antibacterial, anticancer, and antioxidant properties is quercetin, which is present in high concentration in a variety of foods and plants. Quercetin is becoming more and more used in studies on wound dressings because of its superior capacity to scavenge reactive oxygen species. quercetin loaded polycaprolactone (PCL)/gelatin (GLN) electrospun nanofiber was synthesized and their hypertensive activity was studied. sustained release of QT was demonstrated in vitro. These results reveal that CNF is an ideal natural nanoscale dietary carrier and offers high encapsulation efficiency for healthcare supplementation. This work also provides a promising nanoformulation candidate for managing sustained antioxidant and antihypertensive requirements.

Keywords: quercetin, flavonoids, antioxidant, anti-inflammatory, electrospun nanofiber, polycaprolactone

INTRODUCTION

Nanofibers are polymeric filaments with a diameter of less than 1µm. These ultrathin strands have unique characteristics such as high surface area-to-volume ratio, elevated porosity and mechanical properties, and extreme flexibility and low basis weight. Due to increasing interest in generation of nanofibers for a diverse range of applications, several nanofiber manufacturing techniques have been introduced, with the most commonly used being self-assembly (Hartgerink et al., 2001), phase separation (Nam and Park, 1999), and electrospinning (Doshi and Reneker, 1995; Reneker and Chun, 1996)[1]. Quercetin (3,3',4',5,7-pentahydroxyflavone) belongs to a group of dietary flavonoids and polyphenols and occurs in high quantities in many vegetables and fruits, including capers, fig, cranberry, red onion, radish leaves, asparagus, broccoli, walnuts, and coriander [2]. Quercetin is a well-known plant flavanol that exhibits multiple biological activities, including antioxidant, anti-inflammatory and anticancer activities. The role of quercetin in wound healing has been widely explored by a range of researchers in different models. However, the physicochemical properties, such as solubility and permeability, of this compound are low, which ultimately limits its bioavailability on the target site. To overcome these limitations for successful therapy, scientists have developed a range of nanoformulations that provide effective therapeutic potential[3]. Under normal conditions, endogenous antioxidants provide oxidative stability by taking precautions against reactive oxygen species (ROS) increase [4]. Quercetin is flavonoid compound found in many plants and nutrients such as red grapes, green tea, onions, apples, St. John's wort [5]. As well as quercetin is known for its antioxidant activity [6] in the literature, there are many studies on its anticancer [7], antimicrobial [8] and antiviral [9] properties. As quercetin one of the most powerful agents in scavenging reactive oxygen species, its use in wound healing and wound dressing studies are increasing [10].

Blood pressure (BP) is controlled by neural and humoral mechanisms. Neural regulation is carried out by the autonomic nervous system whereas humoral regulation is performed by a variety of substances released by different cell types [11]. Treatment of hypertension depends on the etiology of the disease and includes diet alterations, weight loss, exercise, and pharmacological interventions. Quercetin therapeutic uses are diverse and have been widely reported to impact positively on chronic conditions such as cancer[12] hypertension, and inflammatory-based disorders[13] some of which may be attributed to its potent antioxidant effects. Hypertension is a complex, multifactorial polygenic disorder, with different animal models attesting to this. In the spontaneously hypertensive rat model (SHR), quercetin lowered blood pressure,[14] 3 which has been attributed to the downregulation of NADPH oxidase, increases in endothelial nitric oxide synthase (eNOS) activity, and prevention of endothelial dysfunction[15] It has been reported that quercetin and wine polyphenols might be of therapeutic benefit in cardiovascular diseases; however, controlled clinical studies are still lacking[16]. Combined analysis of 9 RCT arms revealed a significant reduction of DBP (WMD: -2.63 mm Hg,

95% CI: $-3.26, -2.01, P < 0.001$) following supplementation with quercetin. Removal of the study by Zahedi et al [43] yielded an effect size equivalent to -0.98 mm Hg (95% CI: $-2.44, 0.49, P = 0.191$).

Quercetin

Phytochemicals, or phytonutrients, are biologically active plant constituents that occur naturally to protect against insect invasion, disease, and infection. Phytochemicals also provide color, flavor, and aroma. Flavonoids are a specific class of phytochemicals which are divided into more than 10 different subclasses based on their molecular structure. The structure of the flavonoid also determines particular contributions to the health benefits associated with fruit and vegetable consumption [17]. Quercetin is absorbed in the small intestine and colon where it and its glycosides are conjugated with glucuronic acid in the intestinal epithelium. It is then bound to albumin and transported to the liver [18]. Very little free quercetin is found in circulation, and most appears in the blood in glucuronide form and as quercetin metabolites.

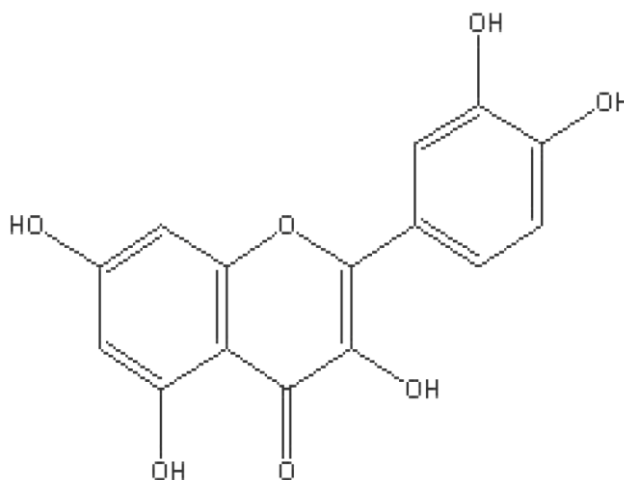


Figure 1. Quercetin aglycone.

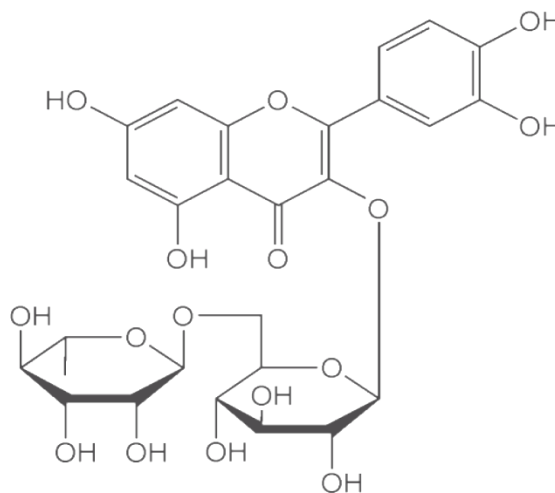


Figure 2. Conjugated quercetin

Quercetin: A Treatment for Hypertension?

Effects of Quercetin on BP in Animals

quercetin decreases BP and/or reduces the severity of hypertension in spontaneously hypertensive rats [20], rats fed a high-fat high-sucrose diet. Quercetin has also been shown to have in vitro vasodilator effects in isolated rat arteries [21]. While translating results observed in animals directly to humans should be done with caution, these studies nevertheless provide proof of principle that a quercetin-induced reduction in BP might be responsible for the reduction of CVD risk observed in humans with high quercetin diets [22].

Effects of Quercetin on BP in Humans

Epidemiological studies have found an inverse relationship with flavonoid intake and chronic disease [23]. Evidence from the Zutphen Elderly Study suggests a strong cardio-protective effect of several flavonoids, including quercetin [24]. In this study the risk of coronary death was reduced by as much as 68% in men who consumed >29 mg flavonols/day compared to men who consumed <10 mg flavonols/day. While the specific

association between quercetin intake and BP was not examined in this study, the authors did report an inverse relationship between high quercetin-containing foods and BP [25]. The ability of quercetin to lower BP in hypertensive but not prehypertensive or normotensive models is not unique to this flavonoid. For example, the BP lowering effect of a diet rich in fruits and vegetables in hypertensive patients is well known; however, no reduction in BP is observed in normotensive subjects after a similar dietary intervention [26].

Bioavailability of Quercetin

The bioavailability of quercetin depends on the absorption and metabolism of this flavonoid. Absorption is dependent upon the type ingested (e.g., quercetin aglycone or quercetin glycosides), the food matrix in which it is found, and individual differences in colon flora [27, 28]. Quercetin glycosides (Figure 2) have a carbohydrate moiety and are more commonly found in foods [29]. Supplements are sold in both forms and studies indicate that both are readily bioavailable [30].

Possible Methods for Lowering Blood Pressure

There is evidence to support a number of possible mechanisms through which quercetin may lower blood pressure and lessen the severity of hypertension in both humans and animals. Quercetin, for instance, may lessen oxidative stress, obstruct the RAS, and/or enhance vascular and/or endothelial function.

Oxidative Stress

In the past, the mechanism for quercetin-induced BP reduction in hypertensive animals and humans has been attributed to a reduction in oxidative stress. Animal studies that have observed reduced BP after quercetin supplementation have also shown improvements in oxidant status, such as reduction in plasma lipid peroxides and urinary isoprostanes when compared to untreated animals [31]. It was hypothesized that improvement in oxidant status was the underlying mechanism behind improved vascular function observed in these studies [31,32]. While a great deal of evidence obtained from hypertensive animal models indicates that quercetin might be effective in lowering oxidant load, available data from humans is equivocal. In general, higher doses of quercetin have been evaluated in animals vs. humans, and this may lead to significant differences in the intracellular concentrations of quercetin, and subsequent antioxidant effects. For example, we have previously observed reductions in liver malondialdehyde levels in quercetin supplemented rats (150 mg quercetin/kg) [33], but no change plasma antioxidant power or urinary isoprostanes in quercetin supplemented humans (~8.1 mg quercetin/kg) [34].

Renin-Angiotensin System

The RAS is involved in the regulation of BP and controls fluid loss. Long-term overactivation of the RAS is associated with hypertension and can have negative cardiovascular effects. Interference with the RAS by pharmacological ACE inhibitors such as captopril and imidapril can reduce circulating angiotensin II, a potent vasoconstrictor, resulting in lower blood pressure and fewer cardiovascular events in high-risk populations [35].

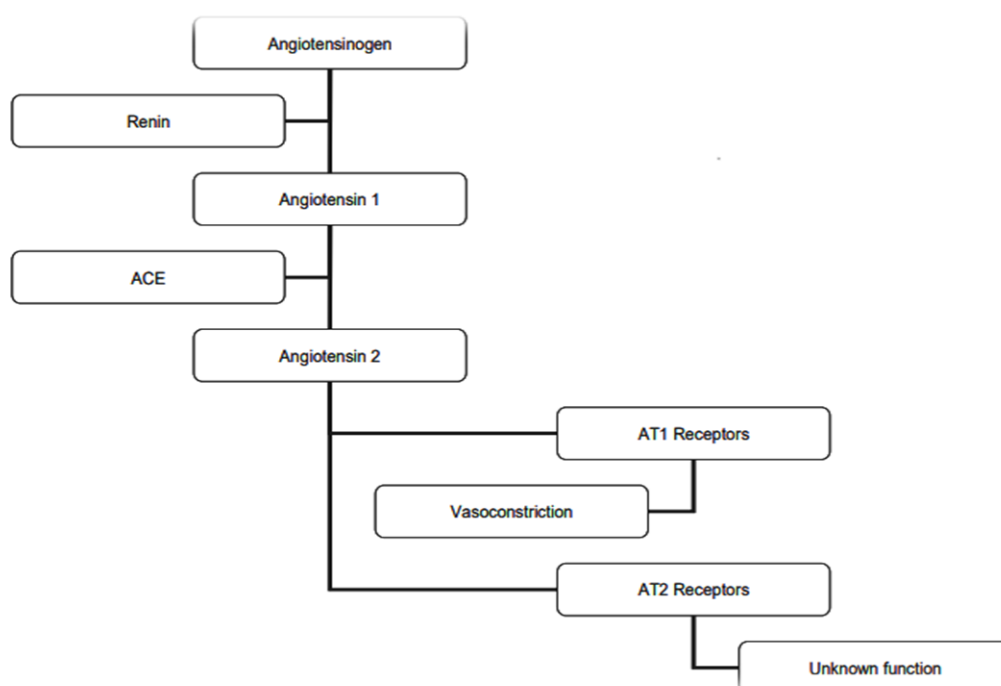


Figure-The renin-angiotensin system (RAS).

Pharmacological inhibitors, such as captopril and imidapril, inactivate the ACE molecule via binding a zinc molecule at the active site and slow the conversion of angiotensin I to angiotensin II[36]. Some flavonoids are also known to bind metal ions, such as zinc. Quercetin is particularly known for this property [37] and there is evidence that quercetin may inhibit ACE activity via this mechanism [38].

Safety of Quercetin

Quercetin is believed to be antimutagenic in vivo and long-term studies have found that quercetin is not carcinogenic [39]. Very few negative side effects have been noted with short-term [40], but there have been reports of nausea, headache, and tingling of the extremities with chronic quercetin supplementation of 1,000 mg/day (as reviewed by Harwood et al [41]). Quercetin is also an inhibitor of CYP3A4, an enzyme that breaks down many commonly prescribed drugs in the body; therefore, quercetin should not be taken with drugs that depend on this enzyme for metabolism. Since many flavonoids have been found to inhibit platelet aggregation (via inhibition of thromboxane A₂)[42] it is also possible that pharmacological doses of quercetin could increase risk of bleeding when taken with anticoagulant drugs.

Recent formulation of quercetin

- a. Quercetin Capsule
- b. Quercetin Tablet
- c. Quercetin Gel
- d. Quercetin Cream

CONCLUSIONS

Despite the uncertainty of quercetin's mechanism of action of BP reduction in humans, it holds promise for the treatment of hypertension and promoting cardiovascular health. Research on animal models, both in vitro and in vivo, has revealed a variety of mechanisms of action that may result in the lowering of blood pressure observed in hypertensive humans. Further controlled randomized human research studies are required to confirm quercetin's efficacy in addition to identifying primary mechanisms. It must be ascertained if quercetin is a useful treatment for hypertension in all of its forms, regardless of its pathological cause. Before suggesting quercetin as a treatment option for the general public, more research on the safety of quercetin supplementation must be done, particularly long-term studies involving women and people of different ethnicities.

REFERENCE

1. M. Mohiti-Asli, E.G. Lobo, Available online 3 June 2016, Version of Record 3 June 2016.
2. Patel, R.V. et al. (2018) Therapeutic potential of quercetin as a cardiovascular agent. *Eur. J. Med. Chem.* 155, 889–904.
3. Panthi, Imran, Chaudhary, Paudel & Mohammed, *Nanomedicine (Lond.)* (2023) 18(4), 391–411.
4. Tuncer B, Mansuroğlu B, Derman S. Antioxidant effect of catechin loaded polymeric nanoparticle. *Sigma J Eng Nat Sci* 2016; 34:453–465.
5. Boots AW, Haenen GR, Bast A. Health effects of quercetin: From antioxidant to nutraceutical. *Eur J Pharmacol* 2008; 585:325–337.
6. Zhang Y, Yang Y, Tang K, Hu X, Zou G. Physicochemical characterization and antioxidant activity of quercetin-loaded chitosan nanoparticles. *J Appl Polym Sci* 2008; 107:891–897.
7. Lu J, Papp LV, Fang J, Rodriguez-Nieto S, Zhivotovsky B, Holmgren A. Inhibition of mammalian thioredoxin reductase by some flavonoids: implications for myricetin and quercetin anticancer activity. *Cancer Res* 2006; 66:4410–4418.
8. Bravo A, Anaconda JR. Metal complexes of the flavonoid quercetin: Antibacterial properties. *Transit Met Chem* 2001; 26:20–23.
9. Choi HJ, Kim JH, Lee CH, Ahn YJ, Song JH, Baek SH, et al. Antiviral activity of quercetin 7-rhamnoside against porcine epidemic diarrhea virus. *Antivir Res* 2009;81:77–81.
10. Suzuki N, Mittler R. Reactive oxygen species-dependent wound responses in animals and plants. *Free Radic Biol Med* 2012;53:2269–2276
11. Zago, A.S.; Zanesco, A. Nitric oxide, cardiovascular disease and physical exercise. *Arq. Bras. Cardiol.* 2006, 87, 264–270.

12. . Xing N. Quercetin inhibits the expression and function of the androgen receptor in LNCaP prostate cancer cells. *Carcinogenesis*. 2001;22: 409–414.
13. Ferry DR. Phase I clinical trial of the flavonoid quercetin: pharmacokinetics and evidence for in vivo tyrosine kinase inhibition. *Clin Cancer Res*. 1996; 2:659–668.
14. Duarte J. Antihypertensive effects of the flavonoid quercetin in spontaneously hypertensive rats. *Br J Pharmacol*. 2001;133:117–124.
15. Sanchez M. Quercetin downregulates NADPH oxidase, increases eNOS activity and prevents endothelial dysfunction in spontaneously hypertensive rats. *J Hypertens*. 2006;24:75–84.
16. Erlund I. Review of the flavonoids quercetin, hesperetin, and naringenin. Dietary sources, bioactivities, bioavailability, and epidemiology. *Nutr Res*. 2004;24:851–874
17. Nijveldt, R.J.; van Nood, E.; van Hoorn, D.E.; Boelens, P.G.; van Norren, K.; van Leeuwen, P. A. Flavonoids: A review of probable mechanisms of action and potential applications. *Am. J. Clin. Nutr*. **2001**, 74, 418–425.
18. Chen, X.; Yin, O.Q.; Zuo, Z.; Chow, M.S. Pharmacokinetics and modeling of quercetin and metabolites. *Pharm. Res*. **2005**, 22, 892–901
19. Carlstrom, J.; Symons, J.D.; Wu, T.C.; Bruno, R.S.; Litwin, S.E.; Jalili, T. A quercetin supplemented diet does not prevent cardiovascular complications in spontaneously hypertensive rats. *J. Nutr*. **2007**, 137, 628–633
20. Yamamoto, Y.; Oue, E. Antihypertensive effect of quercetin in rats fed with a high-fat high-sucrose diet. *Biosci. Biotechnol. Biochem*. **2006**, 70, 933–939
21. Chen, C.K.; Pace-Asciak, C.R. Vasorelaxing activity of resveratrol and quercetin in isolated rat aorta. *Gen. Pharmacol*. 1996, 27, 363–366
22. Abigail J. Larson, *Pharmaceuticals* 2010, 3, 237-250
23. Geleijnse, J.M.; Launer, L.J.; Van der Kuip, D.A.; Hofman, A.; Witteman, J.C. Inverse association of tea and flavonoid intakes with incident myocardial infarction: The Rotterdam Study. *Am. J. Clin. Nutr*. 2002, 75, 880–886.
24. Hertog, M.G.; Feskens, E.J.; Hollman, P.C.; Katan, M.B.; Kromhout, D. Dietary antioxidant flavonoids and risk of coronary heart disease: The Zutphen Elderly Study. *Lancet* 1993, 342, 1007–1011.
25. Hertog, M.G.; Feskens, E.J.; Hollman, P.C.; Katan, M.B.; Kromhout, D. Dietary antioxidant flavonoids and risk of coronary heart disease: The Zutphen Elderly Study. *Lancet* 1993, 342, 1007–1011.
26. Appel, L.J.; Moore, T.J.; Obarzanek, E.; Vollmer, W.M.; Svetkey, L.P.; Sacks, F.M.; Bray, G.A.; Vogt, T.M.; Cutler, J.A.; Windhauser, M.M.; Lin, P.H.; Karanja, N. A clinical trial of the effects of dietary patterns on blood pressure. DASH Collaborative Research Group. *N. Engl. J. Med*. 1997, 336, 1117–1124.
27. Manach, C.; Williamson, G.; Morand, C.; Scalbert, A.; Remesy, C. Bioavailability and bioefficacy of polyphenols in humans. I. Review of 97 bioavailability studies. *Am. J. Clin. Nutr*. 2005, 81, 230–242.
28. Scalbert, A.; Williamson, G. Dietary intake and bioavailability of polyphenols. *J. Nutr*. 2000, 130, 2073–2085
29. Hooper, L.; Kroon, P.A.; Rimm, E.B.; Cohn, J.S.; Harvey, I.; Le Cornu, K.A.; Ryder, J.J.; Hall, W.L.; Cassidy, A. Flavonoids, flavonoid-rich foods, and cardiovascular risk: A meta-analysis of randomized controlled trials. *Am. J. Clin. Nutr*. 2008, 88, 38–50
30. Loke, W.M.; Hodgson, J.M.; Proudfoot, J.M.; McKinley, A.J.; Puddey, I.B.; Croft, K.D. Pure dietary flavonoids quercetin and (-)-epicatechin augment nitric oxide products and reduce endothelin-1 acutely in healthy men. *Am. J. Clin. Nutr*. 2008, 88, 1018–1025.
31. Duarte, J.; Perez-Palencia, R.; Vargas, F.; Ocete, M.A.; Perez-Vizcaino, F.; Zarzuelo, A.; Tamargo, J. Antihypertensive effects of the flavonoid quercetin in spontaneously hypertensive rats. *Br. J. Pharmacol*. 2001, 133, 117–124.

32. Duarte, J.; Jimenez, R.; O'Valle, F.; Galisteo, M.; Perez-Palencia, R.; Vargas, F.; Perez-Vizcaino, F.; Zarzuelo, A.; Tamargo, J. Protective effects of the flavonoid quercetin in chronic nitric oxide deficient rats. *J. Hypertens.* 2002, 20, 1843–1854.
33. Jalili, T.; Carlstrom, J.; Kim, S.; Freeman, D.; Jin, H.; Wu, T.C.; Litwin, S.E.; David Symons, J. Quercetin-supplemented diets lower blood pressure and attenuate cardiac hypertrophy in rats with aortic constriction. *J. Cardiovasc. Pharmacol.* 2006, 47, 531–541.
34. Edwards, R.L.; Lyon, T.; Litwin, S.E.; Rabovsky, A.; Symons, J.D.; Jalili, T. Quercetin reduces blood pressure in hypertensive subjects. *J. Nutr.* 2007, 137, 2405–2411.
35. Sica, D.A. Angiotensin-converting enzyme inhibitor use in the year 2005. *J. Clin. Hypertens.* (Greenwich) 2005, 7, 8–11.
36. Wyld, P.J.; Grant, J.; Lippi, A.; Criscuoli, M.; Del Re, G.; Subissi, A. Pharmacokinetics and biochemical efficacy of idrapril calcium, a novel ACE inhibitor, after multiple oral administration in humans. *Br. J. Clin. Pharmacol.* 1994, 38, 421–425.
37. Chen, C.K.; Pace-Asciak, C.R. Vasorelaxing activity of resveratrol and quercetin in isolated rat aorta. *Gen. Pharmacol.* 1996, 27, 363–366.
38. Loizzo, M.R.; Said, A.; Tundis, R.; Rashed, K.; Statti, G.A.; Hufner, A.; Menichini, F. Inhibition of angiotensin converting enzyme (ACE) by flavonoids isolated from *Ailanthus excelsa* (Roxb) (Simaroubaceae). *Phytother. Res.* 2007, 21, 32–36.
39. Harwood M.; Danielewska-Nikiel B.; Borzellaca J.F.; Flamm G.W.; Williams G.M.; Lines T.C. A Critical review of the data related to the safety of quercetin and lack of evidence of in vivo toxicity, including lack of genotoxic/carcinogenic properties. *Food Chem. Toxicol.* 2007, 45, 2178–2205.
40. Egert, S.; Wolfram, S.; Bosy-Westphal, A.; Boesch-Saadatmandi, C.; Wagner, A.E.; Frank, J.; Rimbach, G.; Mueller, M.J. Daily quercetin supplementation dose-dependently increases plasma quercetin concentrations in healthy humans. *J. Nutr.* 2008, 138, 1615–1621.
41. Harwood M.; Danielewska-Nikiel B.; Borzellaca J.F.; Flamm G.W.; Williams G.M.; Lines T.C. A Critical review of the data related to the safety of quercetin and lack of evidence of in vivo toxicity, including lack of genotoxic/carcinogenic properties. *Food Chem. Toxicol.* 2007, 45, 2178–2205.
42. Perez-Vizcaino, F.; Duarte, J.; Andriantsitohaina, R. Endothelial function and cardiovascular disease: Effects of quercetin and wine polyphenols. *Free Radic. Res.* 2006, 40, 1054–1065.
43. Zahedi M, Ghiasvand R, Feizi A, Asgari G, Darvish L. Does quercetin improve cardiovascular risk factors and inflammatory biomarkers in women with type 2 diabetes: a double-blind randomized controlled clinical trial. *Int J Prev Med.* 2013; 4:777.

CHALLENGES AND PROPOSED SOLUTIONS FOR ACHIEVING SUSTAINABLE DEVELOPMENT GOALS 2030: CONTRIBUTION OF EDUCATION

Dr. Mandira Gupta¹ and Ms. Anuradha Daheriya²

Principal, Institute of Vocational Studies (GGSIPU), New Delhi

Assistant Professor, Institute of Vocational Studies (GGSIPU), New Delhi

ABSTRACT

Providing quality education to all plays a central role for socio-economic development of a country. As a signatory to the Sustainable Development Goals, India has committed to ensuring inclusive and quality education to all children by 2030. This includes collaborative efforts in sharing the experience and expertise in diversified areas such as universal mass education, higher and professional education, open and distance education with special emphasis on quality and gender equality. India has made substantial progress in implementing Education for All. Several programmes and policies have been initiated to provide free and compulsory education to all children in the age group of six to fourteen years with initiatives such as Sarva Siksha Abhiyan and Right to Education. To meet the changing dynamics regarding quality education, innovation and research, New Education Policy 2020 aims to make India a knowledge hub by equipping its students with skill development and up gradation including vocational training and focus on technology. Economic survey of India 2019-20 also emphasizes role of education on entrepreneurship, stating that "literacy and education in the district foster local entrepreneurship significantly". The paper discusses various goals for Sustainable Development and in particular related to education including various programmes and initiatives by Govt. to achieve the targets and their status. This paper also discusses various challenges being faced for implementation including the desired learning outcomes and proposes few solutions to overcome the challenges. As compared to the aging population worldwide, India has an added advantage with its young population, with an average age of 29 years, which can be harnessed with an improvement in health, education, and skill development.

Keywords: Sustainable Development Goals (SDGs), Technical and Vocational Education and Training (TVET), Education for Sustainable Development (ESD), Global Citizenship Education (GCED), Central Sector Schemes (CSS), Skill development

SUSTAINABLE DEVELOPMENT GOALS:

The United Nations General Assembly adopted the universal, integrated, and transformative 2030 Agenda for Sustainable Development, along with a set of 17 Sustainable Development Goals and 169 associated targets on 25 September 2015. These goals are indivisible and encompass economic, social, and environmental dimensions.

- Goal 1: End poverty in all its forms everywhere
- Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- Goal 3: Ensure healthy lives and promote well-being for all at all ages
- Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
- Goal 5: Achieve gender equality and empower all women and girls
- Goal 6: Ensure availability and sustainable management of water and sanitation for all
- Goal 7: Ensure access to affordable, reliable, sustainable, and modern energy for all
- Goal 8: Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all
- Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
- Goal 10: Reduce inequality within and among countries
- Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable
- Goal 12: Ensure sustainable consumption and production patterns
- Goal 13: Take urgent action to combat climate change and its impacts

- Goal 14: Conserve and sustainably use the oceans, seas, and marine resources for sustainable development
- Goal 15: Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
- Goal 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable, and inclusive institutions at all levels
- Goal 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development

This paper discussed in detail the initiatives taken in India for achieving Goal four which focus on providing quality education to all, their status, various challenges being faced and proposed solutions to overcome challenges.

Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

It aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. It comprises of following targets to be achieved by 2030:

4.1 - Free Primary and Secondary Education: To ensure that all children receive equitable and quality Primary and Secondary education leading to relevant and effective learning outcomes. The provision of 12 years of free, publicly-funded, inclusive, equitable, quality primary and secondary education, of which at least nine years are compulsory, leading to relevant learning outcomes should be ensured for all, without discrimination.

Centrally Sponsored /Central Sector Schemes:

- Sarva Shiksha Abhiyan
- National Programme of Mid-Day Meal in Schools
- Rashtriya Madhyamik Shiksha Abhiyan
- National Means-cum-Merit Scholarship Scheme
- Strengthening of Teacher Training Institutions
- Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching
- National Scheme for Incentive to Girl Child for Secondary Education
- Pre-matric scholarships for SC, OBC and vulnerable groups
- Pre-matric scholarships for children of those engaged in unclean occupations and prone to health hazards
- Pre-matric Scholarship to students with disabilities
- Other scholarships & fellowships for SC, OBC Students
- Free coaching for SC students
- Hostels for SC & OBC students
- Pre-matric scholarships for ST students
- Pre-matric scholarships for minority students
- National Child Labour Project (including grants-in-aid to voluntary agencies & reimbursement of assistance to bonded labour)

4.2 - Equal access to quality Pre-primary education: To ensure that all girls and boys have access to quality early childhood development, care, and pre-primary education so that they are ready for primary education. The provision of at least one year of free and compulsory quality pre-primary education is encouraged to be delivered by well-trained educators, as well as that of early childhood development and care.

Centrally Sponsored /Central Sector Schemes: Umbrella ICDS (Anganwadi Services)

4.3 - Equal access to affordable, technical vocational and higher education: To ensure equal access for all women and men to affordable and quality technical, vocational, and tertiary education, including University. It is imperative to reduce barriers to skills development and Technical and Vocational Education and Training

(TVET), starting from the secondary level, as well as to tertiary education, including University, and to provide lifelong learning opportunities for youth and adults. The provision of tertiary education should be made progressively free, in line with existing international agreements.

Centrally Sponsored /Central Sector Schemes (CSS):

- Rashtriya Uchhatar Shiksha Abhiyan
- Scholarship for College and University Students
- Interest Subsidy and Contribution for Guarantee Funds
- Technical Education Quality Improvement Programme
- Post-matric scholarships for SC, OBC and other vulnerable community students
- Post-matric scholarships for ST students
- National Fellowship and Scholarship for Higher Education of ST Students
- Vocational Training Centres in Tribal Areas
- Post-matric scholarships for minorities students
- Merit-cum-means based scholarship for minorities students for professional and technical courses undergraduate and postgraduate
- Free Coaching & Allied Scheme for Minorities
- Support for minorities students clearing preliminary examinations conducted by UPSC, SSC, State PSCs, etc.
- Interest subsidy on education loans for overseas studies for minorities students
- Maulana Azad National Fellowship for minorities students
- Multi-Sectoral Development Programme for Minorities (MsDP)
- Umbrella Programme for Skill Development of Minorities:
 - i. Seekho aur Kamao – Skill Development Initiatives for minorities
 - ii. Upgrading Skills and Training in Traditional Arts/Crafts for Development (USTAAD) for minorities
 - iii. Nai Manzil- The Integrated educational and Livelihood initiatives
- Pradhan Mantri Kaushal Vikas Yojana:
 - i. Development of Skills (Umbrella Scheme)
 - ii. Development of Entrepreneurship (Umbrella Scheme)
 - iii. National Board for Skill Certification
 - iv. National Skill Development Agency
 - v. Model ITIs/Multi Skill Training Institutes
 - vi. Apprenticeship and Training (Umbrella Scheme)
 - vii. Scheme of Polytechnics

4.4 - Increase the number of people with relevant skills for financial success: Substantially increases the number of youth and adults who have relevant skills, including technical and vocational skills, for employment and entrepreneurship.

(i) Access: Equitable access to TVET needs to be expanded while quality is ensured. Learning opportunities should be increased and diversified, using a wide range of education and training modalities, so that all youth and adults, especially girls and women, can acquire relevant knowledge, skills and competencies for decent work and life.

(ii) Skills acquisition: Beyond work-specific skills, emphasis must be placed on developing high-level cognitive and non-cognitive/transferable skills, such as problem solving, critical thinking, creativity, teamwork, communication skills and conflict resolution, which can be used across a range of occupational fields.

Centrally Sponsored /Central Sector Schemes (CSS):

- Pradhan Mantri Kaushal Vikas Yojana:

i. Development of Skills (Umbrella Scheme)

ii. Development of Entrepreneurship (Umbrella Scheme)

iii. National Board for Skill Certification

iv. National Skill Development Agency

v. Model ITIs/Multi Skill Training Institutes

vi. Apprenticeship and Training (Umbrella Scheme)

vii. Scheme of Polytechnics

- Vocational Training Centres in Tribal Areas

- Umbrella Programme for Skill Development of Minorities:

i. Seekho aur Kamao – Skill Development Initiatives for minorities

ii. Upgrading Skills and Training in Traditional Arts/Crafts for Development (USTAAD) for minorities

iii. Nai Manzil- The Integrated educational and Livelihood initiatives

4.5 - Elimination of all discrimination in education: To eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples, and children in vulnerable situations.

(i) Inclusion and Equity: All people, irrespective of sex, age, race, color, ethnicity, language, religion, political or other opinion, national or social origin, property, or birth, as well as persons with disabilities, migrants, indigenous peoples, and children and youth, especially those in vulnerable situations or other status, should have access to inclusive, equitable quality education and lifelong learning opportunities. Vulnerable groups that require particular attention and targeted strategies include persons with disabilities, indigenous peoples, ethnic minorities, and the poor.

(ii) Gender Equality: All girls and boys, women, and men, should have equal opportunity to enjoy education of high quality, achieve at equal levels and enjoy equal benefits from education. Adolescent girls and young women, who may be subject to gender-based violence, child marriage, early pregnancy, and a heavy load of household chores, as well as those living in poor and remote rural areas, require special attention. In contexts in which boys are disadvantaged, targeted action should be taken for them. Policies aimed at overcoming gender inequality are more effective when they are part of an overall package that also promotes health, justice, good governance, and freedom from child labor.

Centrally Sponsored /Central Sector Schemes (CSS):

- National Scheme for Incentive to Girl Child for Secondary Education (NSIGSE)
- Prime Minister's Girls' Hostel
- Assistance to Disabled Persons for purchase of Fitting Devices (ADIP)
- Deendayal Disabled Rehabilitation Scheme (DDRS) Scholarships for students with disabilities
- Support to Establishment/ Modernization/ Capacity augmentation of Braille Presses
- Establishment of Colleges for Deaf
- National Program for Persons with Disabilities
- National Fellowship for Persons with Disabilities (PwD)
- Pre-and post-matric Scholarship to students with disabilities
- National Overseas Scholarship for Students with Disabilities
- Free Coaching for SC and OBC Students
- Boys and Girls Hostels

- SIPDA (Schemes for the Implementation of the Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995

- Pradhan Mantri Kaushal Vikas Yojana:

i. Development of Skills (Umbrella Scheme)

ii. Development of Entrepreneurship (Umbrella Scheme)

iii. National Board for Skill Certification

iv. National Skill Development Agency

v. Model ITIs/Multi Skill Training Institutes

vi. Apprenticeship and Training (Umbrella Scheme)

vii. Scheme of Polytechnics

4.6 - Universal literacy and numeracy: To ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy.

The principles, strategies and actions for this target are underpinned by the contemporary understanding of literacy as a continuum of proficiency levels in each context. It goes beyond the understanding of a simple dichotomy of 'literate' versus 'illiterate.' Therefore, action for this target aims at ensuring that by 2030, all young people and adults across the world should have achieved relevant and recognized proficiency levels in functional literacy and numeracy skills that are equivalent to levels achieved at successful completion of basic education.

Centrally Sponsored /Central Sector Schemes (CSS):

- Saakshar Bharat
- Vanbandhu Kalyan Yojana - Development of Particularly Vulnerable Tribal Groups (PVTGs)
- National Service Scheme (NSS)
- Schemes for Youth development & Education (Nehru Yuva Kendra Sangathan, National Programme for Youth and Adolescent Development, etc.)

4.7 - Sustainable Development and Global Citizenship: To ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and nonviolence, global citizenship, and appreciation of cultural diversity and of culture's contribution to sustainable development.

It is vital to give a central place to strengthening education's contribution to the fulfilment of human rights, peace, and responsible citizenship from local to global levels, gender equality, sustainable development, and health. The content of such education must be relevant, with a focus on both cognitive and non-cognitive aspects of learning. The knowledge, skills, values, and attitudes required by citizens to lead productive lives, make informed decisions, and assume active roles locally and globally in facing and resolving global challenges can be acquired through education for sustainable development (ESD) and global citizenship education (GCED), which includes peace and human rights education, as well as intercultural education and education for international understanding.

Centrally Sponsored /Central Sector Schemes (CSS):

- Saakshar Bharat
- Vanbandhu Kalyan Yojana - Development of Particularly Vulnerable Tribal Groups (PVTGs)
- National Service Scheme (NSS)
- Schemes for Youth development & Education (Nehru Yuva Kendra Sangathan, National Programme for Youth and Adolescent Development, etc.)
- Kala Sanskriti Vikas Yojana
- Pradhan Mantri Kaushal Vikas Yojana:

i. Development of Skills (Umbrella Scheme)

- ii. Development of Entrepreneurship (Umbrella Scheme)
- iii. National Board for Skill Certification
- iv. National Skill Development Agency
- v. Model ITIs/Multi Skill Training Institutes
- vi. Apprenticeship and Training (Umbrella Scheme)
- vii. Scheme of Polytechnics

4.8 – Build and upgrade inclusive and safe schools: Build and upgrade education facilities that are child, disability, and gender sensitive and provide safe, non-violent, inclusive, and effective learning environments for all.

This target addresses the need for adequate physical infrastructure and safe, inclusive environments that nurture learning for all, regardless of background or disability status.

Centrally Sponsored /Central Sector Schemes (CSS):

- Sarva Shiksha Abhiyan
- Umbrella Programme for Education of SC, ST, OBC and minorities students
- Umbrella ICDS
- Umbrella Programme for Education of SC, OBC and vulnerable group students
- Umbrella Programme for Education of ST students
- Umbrella Programme for Education of minorities students

4.9 –Expand higher education scholarships for developing countries: Scholarship programmes can play a vital role in providing opportunities for young people and adults who would otherwise not be able to afford to continue their education. Where developed countries offer scholarships to students from developing countries, these should be structured to build the capability of the developing country. While the importance of scholarships is recognized, donor countries are encouraged to increase other forms of support to education. In line with the SDG4- Education 2030 focus on equity, inclusion and quality, scholarships should be transparently targeted at young people from disadvantaged backgrounds.

4.10 - Increase the supply of qualified teachers in developing countries: To substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing States. Teachers are the key to achieving all the SDG 4 targets. It requires urgent attention, with a more immediate deadline, because the equity gap in education is exacerbated by the shortage and uneven distribution of professionally trained teachers, especially in disadvantaged areas. As teachers are a fundamental condition for guaranteeing quality education, teachers and educators should be empowered, adequately recruited, and remunerated, motivated, professionally qualified, and supported within well-resourced, efficient, and effectively governed systems.

Centrally Sponsored /Central Sector Schemes (CSS): Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching

Concerned Ministries/Departments for the above programmes include HRD (School Education & Literacy), Social Justice & Empowerment, Tribal Affairs, Minority Affairs, Labor and Employment, Women and Child Development, Skill Development & Entrepreneurship, Youth Affairs & Sports, Higher Education, External Affairs, Culture, Social Justice & Empowerment,

Challenges and proposed solutions for providing education for all:

- **Gaps in allocation of funds:** To achieve all the targets of Goal-4; the total financial requirement for India is of the order of Rs. 142 lakh Crores (USD 2,258 billion). While there is no financial gap identified in case of primary and secondary schooling due to provisions and finance allocations under Right to Education Act, there are significant gaps in case of early childhood development and tertiary and higher education. There is a gap of Rs. 27 lakh Crores (USD 429 billion) out of the total of Rs. 35 lakh Crores (USD 555 billion) required for ensuring access to quality early childhood development, care, and pre-primary education. Further, India will require an additional Rs. 19 lakh crores (USD 301 billion) for ensuring quality technical, vocational, and tertiary education. To enhance the standards of Indian higher education to match world standards, additional finance may be required over and above what is estimated here.

- **Budget erosion due to willful defaulters and NPAs in Public sector banks:** Economic Survey of India 2020 discusses about the shortage of funds in education due to high level of Non-Performing Assets (NPAs) in Public Sector Banks. It states that “had the money siphoned away by willful defaulters stayed in the economy, the budget allocation would have increased by Rs 138 Cr towards health, education and social protection.”
- **Low literacy rate:** While, the National Literacy Mission Authority has taken proactive initiative for alignment of Saakshar Bharat with Sansaad Adarsh Gram Yojana in achieving 100% literacy. Current Literacy rate of India is 77.7%. One of the main factors contributing to this relatively low literacy rate is availability of schools in vicinity in rural areas. There is a shortage of classrooms to accommodate all the students along with the concern of not having proper sanitation and drinking water facilities in most schools.
- **High drop-out rates:** Though drop-out rates have been declining from year to year, it remains a major challenge. With the increased number of schools, improved facilities in schools and enrolment, the annual dropout rate at primary level for all categories of students has lowered down over last few years; however, the same has increased at upper primary and secondary level for all categories. Besides infrastructure, lack of qualified teachers, pupil teacher ratio, crimes against children like, child labor, child marriage and child trafficking are the main reasons that causes school drop outs.
- **Quality Education:** Though India has made substantial progress in enrolments across level of education, there is enough scope to strengthen quality parameters. Given the fact that, quality is difficult to define, measure and monitor, education should be inclusive in all dimensions of children’s holistic development which includes skills, knowledge, values, and attitudes, besides access to health and nutrition. Evidences have shown that adequate investments in quality related inputs like textbooks and teacher training lead to better outcomes.
- **Focus on employability and entrepreneurship:** The aim of education should be to increase employability and develop entrepreneur skills. Measures to increase the literacy levels rapidly through the institution of more schools and colleges will spur entrepreneurship and consequently local wealth creation.
- **Need for collective efforts in decentralized framework:** Decentralization of school management through the School Level Improvement Plans (SLIP) can create a positive impact in overall improvement. Parents, teachers, school management committees and local communities need to work collectively to improve the quality of learning for children. Empowering teachers is required to strengthen their professional motivation thereby enhance their sense ownership of the school. In the decentralization framework, the SLIP activities can strengthen the participation of teachers, school management committees, parents, and community involvement in the schools. Purchase of cleaning materials, books, bookshelves, musical instruments, clearing of the school playground, small scale repairs to school benches, toilets etc. can add to the enabling environment for enhanced learning. To support planning at local level, training to government officials at districts school management committee members and head teachers may be provided. Further, to improve the quality of education, focus should be on in-service teacher training wherein teachers are trained in interactive teaching approaches and receive subject based training.
- **Monitoring of implementation:** To measure and quantify the Sustainable Development Goal-four effectively, standardization and periodicity of data related to education is required. These indicators can be compared across all states as well as across districts to measure the achievements. This exercise will also help in understanding where the states lag so that targeted policies and interventions can be directed to achieve desired education outcomes. India has already identified the nodal ministries and departments to achieve sustainable development goals. Education is a crosscutting issue and a goal which requires inter-sectoral initiatives to be strictly implemented, reviewed, and monitored on a regular basis along with the allocation of adequate resources to finance education needs.

CONCLUSION

Various initiatives have been taken by the Government of India, State Governments, and educational institutions to achieve the goal of providing quality education to all children by 2030 as part of Sustainable Development Goals of United Nations, to which India is a signatory. These efforts include increasing literacy levels with a wider scope of literacy, primary, secondary, higher education with focus on skillset development, employability, and technology adoption. The ongoing journey is facing challenges in terms of gaps in allocation of funds, high drop-out rate, gaps in quality education, gaps in skillsets and inadequate implementation and monitoring of schemes. Some of the solutions to resolve these issues are training and development of officials

who frame and monitor policies, teachers, and other staff, creating infrastructure, focus on digital literacy and skillset development. Decentralization can also prove to be useful for empowering local communities and teachers to take initiatives and decisions leading to higher involvement and accountability.

REFERENCES

Makol, R. & Makol, L. (2019). Environmental Education, New Delhi: Gupta Offset

Ahlawat, A. (2019). Sustainable Development Goals: Directive Principles for Sustainable India by 2030: Notion Press

Ossewaarde, M. J. (2018). Introduction to Sustainable Development, New Delhi: Sage Publications India Pvt. Ltd.

Kumar, C., Kaur, A., Rani, K. & Lata, S. (2018). Historical & Sociological Foundations of Education, New Delhi: Twentyfirst Century Publications

- <https://sustainabledevelopment.un.org/>
- <https://sdg4education2030.org/the-goal>
- <https://www.niti.gov.in/>
- <https://sdgs.un.org/>
- <https://www.indiabudget.gov.in/economicsurvey/>
- <https://en.unesco.org/themes/education-sustainable-development>
- <https://www.ris.org.in/>
- https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

MANUSCRIPT SUBMISSION

GUIDELINES FOR CONTRIBUTORS

1. Manuscripts should be submitted preferably through email and the research article / paper should preferably not exceed 8 – 10 pages in all.
2. Book review must contain the name of the author and the book reviewed, the place of publication and publisher, date of publication, number of pages and price.
3. Manuscripts should be typed in 12 font-size, Times New Roman, single spaced with 1" margin on a standard A4 size paper. Manuscripts should be organized in the following order: title, name(s) of author(s) and his/her (their) complete affiliation(s) including zip code(s), Abstract (not exceeding 350 words), Introduction, Main body of paper, Conclusion and References.
4. The title of the paper should be in capital letters, bold, size 16" and centered at the top of the first page. The author(s) and affiliations(s) should be centered, bold, size 14" and single-spaced, beginning from the second line below the title.

First Author Name₁, Second Author Name₂, Third Author Name₃

1 Author Designation, Department, Organization, City, email id

2 Author Designation, Department, Organization, City, email id

3 Author Designation, Department, Organization, City, email id

5. The abstract should summarize the context, content and conclusions of the paper in less than 350 words in 12 points italic Times New Roman. The abstract should have about five key words in alphabetical order separated by comma of 12 points italic Times New Roman.
6. Figures and tables should be centered, separately numbered, self explained. Please note that table titles must be above the table and sources of data should be mentioned below the table. The authors should ensure that tables and figures are referred to from the main text.

EXAMPLES OF REFERENCES

All references must be arranged first alphabetically and then it may be further sorted chronologically also.

• Single author journal article:

Fox, S. (1984). Empowerment as a catalyst for change: an example for the food industry. *Supply Chain Management*, 2(3), 29–33.

Bateson, C. D., (2006), 'Doing Business after the Fall: The Virtue of Moral Hypocrisy', *Journal of Business Ethics*, 66: 321 – 335

• Multiple author journal article:

Khan, M. R., Islam, A. F. M. M., & Das, D. (1986). A Factor Analytic Study on the Validity of a Union Commitment Scale. *Journal of Applied Psychology*, 12(1), 129-136.

Liu, W.B, Wongcha A, & Peng, K.C. (2012), "Adopting Super-Efficiency And Tobit Model On Analyzing the Efficiency of Teacher's Colleges In Thailand", *International Journal on New Trends In Education and Their Implications*, Vol.3.3, 108 – 114.

- **Text Book:**

Simchi-Levi, D., Kaminsky, P., & Simchi-Levi, E. (2007). *Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies* (3rd ed.). New York: McGraw-Hill.

S. Neelamegham," Marketing in India, Cases and Reading, Vikas Publishing House Pvt. Ltd, III Edition, 2000.

- **Edited book having one editor:**

Raine, A. (Ed.). (2006). *Crime and schizophrenia: Causes and cures*. New York: Nova Science.

- **Edited book having more than one editor:**

Greenspan, E. L., & Rosenberg, M. (Eds.). (2009). *Martin's annual criminal code: Student edition 2010*. Aurora, ON: Canada Law Book.

- **Chapter in edited book having one editor:**

Bessley, M., & Wilson, P. (1984). Public policy and small firms in Britain. In Levicki, C. (Ed.), *Small Business Theory and Policy* (pp. 111–126). London: Croom Helm.

- **Chapter in edited book having more than one editor:**

Young, M. E., & Wasserman, E. A. (2005). Theories of learning. In K. Lamberts, & R. L. Goldstone (Eds.), *Handbook of cognition* (pp. 161-182). Thousand Oaks, CA: Sage.

- **Electronic sources should include the URL of the website at which they may be found, as shown:**

Sillick, T. J., & Schutte, N. S. (2006). Emotional intelligence and self-esteem mediate between perceived early parental love and adult happiness. *E-Journal of Applied Psychology*, 2(2), 38-48. Retrieved from <http://ojs.lib.swin.edu.au/index.php/ejap>

- **Unpublished dissertation/ paper:**

Uddin, K. (2000). A Study of Corporate Governance in a Developing Country: A Case of Bangladesh (Unpublished Dissertation). Lingnan University, Hong Kong.

- **Article in newspaper:**

Yunus, M. (2005, March 23). Micro Credit and Poverty Alleviation in Bangladesh. *The Bangladesh Observer*, p. 9.

- **Article in magazine:**

Holloway, M. (2005, August 6). When extinct isn't. *Scientific American*, 293, 22-23.

- **Website of any institution:**

Central Bank of India (2005). *Income Recognition Norms Definition of NPA*. Retrieved August 10, 2005, from <http://www.centralbankofindia.co.in/home/index1.htm>, viewed on

7. The submission implies that the work has not been published earlier elsewhere and is not under consideration to be published anywhere else if selected for publication in the journal of Indian Academicians and Researchers Association.

8. Decision of the Editorial Board regarding selection/rejection of the articles will be final.



INDIAN ACADEMICIANS & RESEARCHERS ASSOCIATION

Major Objectives

- To encourage scholarly work in research
- To provide a forum for discussion of problems related to educational research
- To conduct workshops, seminars, conferences etc. on educational research
- To provide financial assistance to the research scholars
- To encourage Researcher to become involved in systematic research activities
- To foster the exchange of ideas and knowledge across the globe

Services Offered

- Free Membership with certificate
- Publication of Conference Proceeding
- Organize Joint Conference / FDP
- Outsource Survey for Research Project
- Outsource Journal Publication for Institute
- Information on job vacancies

Indian Academicians and Researchers Association

Shanti Path ,Opp. Darwin Campus II, Zoo Road Tiniali, Guwahati, Assam

Mobile : +919999817591, email : info@iaraedu.com www.iaraedu.com



EMPYREAL PUBLISHING HOUSE


- Assistant in Synopsis & Thesis writing
- Assistant in Research paper writing
- Publish Thesis into Book with ISBN
- Publish Edited Book with ISBN
- Outsource Journal Publication with ISSN for Institute and private universities.
- Publish Conference Proceeding with ISBN
- Booking of ISBN
- Outsource Survey for Research Project

Publish Your Thesis into Book with ISBN “Become An Author”

EMPYREAL PUBLISHING HOUSE

Zoo Road Tiniali, Guwahati, Assam

Mobile : +919999817591, email : info@editedbook.in, www.editedbook.in



Empyreal Institute of Higher Education
Guwahati
www.empyreal.co.in