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SOCIAL MEDIA FOR ENGLISH LANGUAGE LEARNING: GEN-NEXT PERSPECTIVES

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DEPARTMENT OF ENGLISH

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Nidadavole, W.G.Dt.

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Revolution of Social Media in Learning English

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Social media is one of the terms which has become popular in twenty first century. As there is much competition among Telecom companies, the internet has become much cheaper than the past. Even an ordinary man is able to use smartphone now a days. Almost of all the people started using social media. Everybody is using WhatsApp, Face book, Twitter, Instagram, LinkedIn, Ebo, Wiki's, You tube etc., under the platform of social media. Especially the younger generation got accustomed to social media.

What is social media?

Social media is an online technology which is used to share the information and personal opinions on various things, general discussions etc. We can share the text, images, audios and video files through social media. We can be in touch with people all over the world through social media. Students show much enthusiasm in spending much time on social media. According to Oberst 2010 Survey, 73% of students use social media websites. 45% of students agreed that they spend 6 to 8 hours per day in checking social media (Chen,w., Liang,Y., WanG.,2011).

According to Pew Research Centre, the United States of America, the youth in America use the Social media sites online or mobile.

You Tube:73%	Facebook:68%	Instagram:35%
Pinterest: 29%	Linkedin:25%	Twitter:24%

Majority of the students have connected to internet. Most of the students expect technology and social media to integrate in language learning (Windham,2005). One can communicate the idea easily through social media. It helps to find the updated information.

Benefits of social media to students:

Social media gives ample opportunities to communicate with people all over the world. It makes the learning interesting and engaging. It develops a new way of thinking. It adds value to the subject. It builds vocabulary and makes creative. It relates content purposely to their lives. It makes students understand and remember much better when they are exposed to a visual video. Using social media to watch videos encourages students to look for similar videos and become accustomed to using social media as an educational resource. It builds a greater skill of critical thinking, productivity and creativity. Students can develop a sense towards what they have seen. By engaging in social interaction, students perform better in class and learn more than the students who work individually. Many language learners have a positive impression on teachers who use social media and other up-to-date technology in the classroom. By using social media as a tool of learning, teachers should find online tools that make students have open ended and creative way of interaction.

So, this is the right opportunity for the teachers of English to make use of social media in English teaching and learning process. For that, the teachers must be aware of different strategies to make use of social media in language teaching. One should be aware of latest tools of social media. The teaching style has to be shifted from traditional to ICT.

How to Use Social Media to Improve Your English

- Join an English-language learning group.
- Create your own Facebook group.
- Follow organizations, companies, and teachers who share language advice.
- Use YouTube to learn pronunciation.
- Connect with native English speakers. ...
- Practice pronunciation with friends using Snapchat.

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English teaching and learning through WhatsApp:

The basic purpose of WhatsApp is to facilitate communication. The purpose of education is nothing but communication. WhatsApp can provide a channel through which teachers can achieve faster and more seamless communication with their students. It can also increase the level of communication between students and create another venue for learning.

Some Reasons Why Educators Should Use WhatsApp in the Classroom and Beyond:

- It allows free unlimited messaging
- It can be used directly over the Internet via WhatsApp Web.
- WhatsApp can be used on Wi-Fi without a data plan.
- Unlike some messaging solutions, WhatsApp can be used to send videos, audio messages, and pictures.
- WhatsApp is a cross platform solution.
- WhatsApp can be used to reach students via the technology they are most familiar with: their phones
- WhatsApp can be used to reach students and parents that do not utilize other communication methods, such as landline telephones and email
- WhatsApp is very cost effective

Education Strategies for WhatsApp

Here are some basic strategies that educators can utilize to take advantage of the core abilities of WhatsApp:

- Create a WhatsApp group particularly for your students.
- Use the Group Chats feature to create learning and study groups
- Create audio lessons that can be sent directly to students
- Stay in contact with students outside the classroom
- Send out problems or assignments to students even when they are not in class
- Stay in contact with parents
- Send videos to students
- Send graphics such as pictures or charts directly to students
- Send report cards directly to the parents' phones
- Facilitate real-time communication between students and teacher.
- Facilitate real-time communication between teachers and parents.
- Teachers can also maintain communication with students.

How to Practice Your English with Facebook

On Facebook, you can join conversations without worrying about how you say things. To actually learn from your experience, here are some tips that you can use:

- Make sure your language is set to English. Facebook is available in a few different languages. Your account might be in your native language now. If it isn't in English, change it to English. Seeing English all the time will help you practice reading it – and you're probably familiar enough with Facebook to know what all the words mean.
- Read the comments. The comments on Facebook posts don't always have the best grammar, but that's what makes them real. This is where you'll see how people really speak English. If you notice a word o phrase repeated more than a few times, find out what it means. It might be a good phrase to add to your vocabulary.
- Leave your own comments. Every time you read a post or an article that someone shared, add a comment. The person posting will appreciate your comment, but you'll also be using your English skills. Leaving a comment also means others might reply to you, and before you know it you'll be having a conversation in English.
- Write status updates. Practice your English by posting status updates to your own Facebook profile. The status update can be anything.
- Follow topics that interest you. You might already be connected with your friends and acquaintances (people you know but are not really friends with). If you haven't already, you might also want to follow pages and groups on topics that are interesting to you. Love horses? Find a community on Facebook that loves talking about horses. It's easier to talk to people when you have a shared interest.

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- Make English-speaking friends. Try to become friends on Facebook with native English speakers. The nice thing about Facebook is that you can ask anyone to be your "friend." You probably don't want to approach a complete stranger, but you might find a friend in someone who's in the same group as you, or who you share an interest with.
- Find online practice buddies. Aside from becoming friends with English speakers, you can also find a practice buddy on Facebook.

Teaching and learning English through YouTube

You tube is one of the best resources for improving one's English. We can find anything on You Tube. If we know how to find it out, we will be able to find English resources that fit our level. Most of the You Tube videos are freely available to the public. You Tube videos made for English learners tend to be totally available for free. Abundant information is available in You Tube for improving vocabulary, pronunciation, listening, reading and writing skills. Watching funny English videos on free time helps in improving English. Many You Tube channels are available for improving English language skills. Some of them are ESL basics, Idiom Land, Rachel's English, BBC learning English, YouGlish, Nationlal Geographic, StoryCorps, JacksGap, Joey Graceffa, Grace Helbig etc.

Tips to make students learn English through You Tube:

A teacher has to make the students watch the following things on You Tube in order to improve their English.

- Watch and listen to a story in English
- Watch English news, live or inserts about politics, money and finance etc.,
- Watch a documentary in English
- Watch a movie or television show in English
- Watch promotional videos
- Watch advertisements in English
- Watch the videos on English grammar, communication skills and soft skills
- Watch the motivational videos in English

Conclusion:

Most of the teachers think social media is destroying the career of the students. The advantage or disadvantage of social media depends on how we make use of it. So, a language teacher has to take initiation in motivating the students to make use of social media in a proper way to learn English.

References:

1) Oberst 2010 Survey
2) Chen,w.,Liang,Y., WanG.,2011
3) Whatsapp for education,2016
4) Educause Learning Initiative,2016
5) Misanchuk,Schwier&Boiling,1996

Organizational Development and its Impact on Employees in selected IT companies in Hyderabad, India.

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ABSTRACT

While the physical and mental abilities of men constitute human resources, the boundless human energy, intelligence, imagination, most importantly their indomitable spirit form the very fulcrum on which every facet of development is leveraged. Human resource management is related to the principles of management that are applied to bring about organizational success. Its functions include recruitment, appraisal, rewards and compensation, employee welfare etc. Human resource development, far from having dissimilar functions, works for accomplishing the very HR objective of improving the overall performance of the organization. HRM and HRD are two sides of the same coin working for the realization of the same goal. While HRM deals with the broader management spectrum, HRD constitute its most dynamic and powerful subsystems devoted to enhance and strengthen employee capabilities that are essential for the success of any organization. Modern business concerns are analogous to sports where players are expected to display their true qualities and practices. A true player never gives up, never thinks of defeat and never ceases to perform at the highest level.

Key words: HRM, HRD, Business, Organization Development and Qualities.

Introduction

Organizational Development

The role of organizational development is very pivotal as it is responsible for building the whole

culture of the organization and undertakes behavioral change and strives to improve the problem solving abilities of the staff.

Senior level managers and executives constitute the organizational development group that plans changes needed for the effective functioning of the organization. They identify problems and find solutions to address them. They make a thorough investigation of the problems by collecting feedback from employees and also information from various sources. The process involves interviewing the employees concern, analysis of the situation before they come up with preventive measures. The solution they find should be of long term in nature and sustainable. This group is also expected to anticipate challenges. Their basic function is to bring change in the organization in a planned way. One of the objectives of organization development is to improve problem solving abilities of the company.

Performance Appraisal

Performance appraisal is a vital component of human resource development strategies. As a tool of assessment its significance is priceless. But a biased assessment would be disastrous to the whole organization. Therefore, appraisal should be free from bias and favoritism.

It should be stress free. Promotions or rewards should be above board. Most importantly, the appraisal system should be designed in such a way that it encourages the participation employees.

A study (1992) on the role of performance appraisal in select companies emphasizes the need to change the attitude of the employees as per as appraisal system is concerned. The author thinks that employees should inculcate favorable attitude towards appraisal system and the process should be more participatory. He believes it should be a problem solving system and promotions have to be made on the basis of appraisal.

Career Development

Opportunities, individual goal setting, career growth, employee satisfaction and improved quality of his performance characterize career development. Its role as one of the crucial HRD strategies is irreplaceable.

The research work of Anupam gupta (2010) relates to the challenges human resource managers

are facing today as the market competition is growing more and more competitive. One of the serious problems especially the IT industry is facing the shortage of skilled man power. The study examines the role of human resource department in addressing this problem.

Executive Development

Competent management at the top is sure to provide competitive edge to any organization. Highly capable and skilled, knowledgeable, fair and broad minded, having proven abilities of negotiation and morally strong executives at the helm, are able to carry out the key strategies of the organization and make things to happen.

A study on training and development made on the HRD practices of Bharat Electrical Limited underscores the need to adopt new methods of training in which training needs are planned by an advisory committee .The paper also underscores the need to move from conventional methods of training to more scientific methods. The study recommends hr managers should adopt modern training methods as against traditional ones.

Potential Appraisal

It's a talent detecting HRD mechanism. It is an effective strategy applied to grooming and deployment of right men at the right job. However, the process of potential appraisal should be transparent and scientific. Since the identification of future managers is based on this process. In efficient and partial handling of this process will be harmful to the organization as the people slated to become the future executives fail to rise to the occasion. Bypassing really talented people will have disastrous consequences to the organization.

Goal setting

Nothing is more effective than goal setting in providing a sense of direction to the organization as well as the individual. A goal less organization fails and perishes. It can be described as the heart of HRD strategies because any achievement by the individual or organization is traceable to the

goal setting.

The study of Locke and Latham observe

1. Specific and difficult goals are needed to achieve better performance than vague and easy goals.

2. Short term goals facilitate long term goals.

3. Goals improve effort, persistence and motivation.

The study discusses the implications of goal setting for athletics and suggests the following.

- Setting goals for both practice and game situations.
- Setting goals for different elements of athletic skill, strength and stamina.
- Using goals to increase self-confidence.

The work of Kolker and Eli.Hathman examines the relationship between goal proximity and performance.

Objectives of the Study

- To study the socioeconomic profile of employees in the IT companies.
- To examine the human resource development Subsystems and their impact information technology companies.

Methodology of the Study

The primary data was collected through questionnaire survey. The respondents were asked to give their opinion relating to the crucial HRD practices. The part of the questionnaire comprises demographic factors with optional questions.

Another part consists of statements about the impact of HRD practices. Some optional questions are included along with the rating questions".

Scaling Technique in the Questionnaire

The questionnaire comprises both options and statements on Likert's 5 point scale. The

responses on these sections are obtained from the employees of IT companies on 5 point scale which range as follows:

5 – Strongly agree, 4 – Agree, 3 – Neutral, 2 – Disagree, 1 – Strongly Disagree.

Statistical Tools Used in the Study

There is a range of statistical tests that provide accurate methods for making quantitative decisions and conclusions on a particular sample. They mainly test the hypothesis that is made about the significance of an observed sample. They are directly correlated to statistical inference which involves tests of hypothesis.

On collecting data, it was processed by using R software 3.61 version. The statistical techniques adopted are: "Means and Standard Deviation, t test, F test, Analysis of Variation (ANOVA), Pearson's Correlation, Durbin Watson test, VIF (variance inflation factor), simple linear regression and multiple linear regression. For model assessment normal QQ plot and residual plots were used in this study

Secondary Data

The secondary data was collected from "journals, magazines, reports, books, dailies, periodicals, articles, research papers, websites, company publications, manuals and booklets".

Variable Analysis

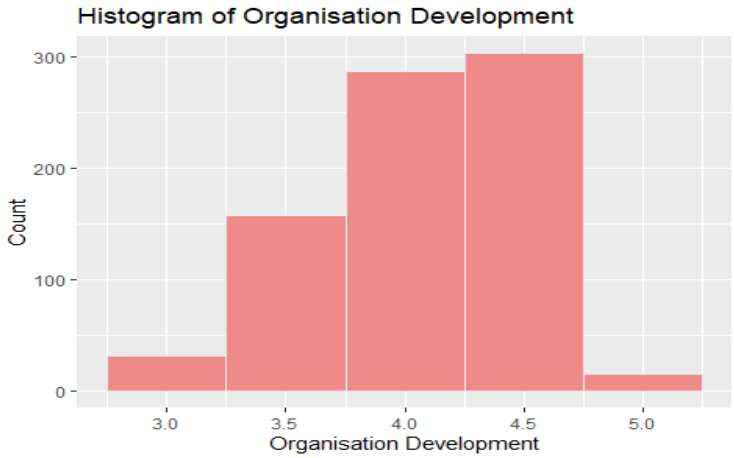
Organization Development

Table 1 indicates organization development variable descriptive statistics. Scale value from 1 to 5 points on likert scale, total number of respondents is 749, with mean of 4.05, standard deviation 0.42 respondents. It is having minimum value 3 and maximum value 5 on likert scale. Figure 1 show histogram of the variable with left skewness and validate by the value of -0.76 skewness values.

Table 1: Descriptive statistics of Organization Development

N	*mean*	*Sd*	*Median*	*min*	*Max*	*range*	*skew*	*kurtosis*	*se*
794	4.053	0.425	4.2	3	5	2	-0.76	-0.29	0.0151

Figure.1: **Histogram of Organization Development**



Hypothesis 1

H_0 *: There is no significant mean difference in organization development between male and female respondents*

H_1: *There is significant mean difference in organization development between male and female respondents*

Table 2: Two sample t test for Gender category in Organization Development

Df	T	Confidence Interval		P value	Decision
		Low	Upper		
792	-0.8546	-0.08772	0.034503	0.393	Accepted

Figure 2: **Boxplot of Organization Development with Gender category**

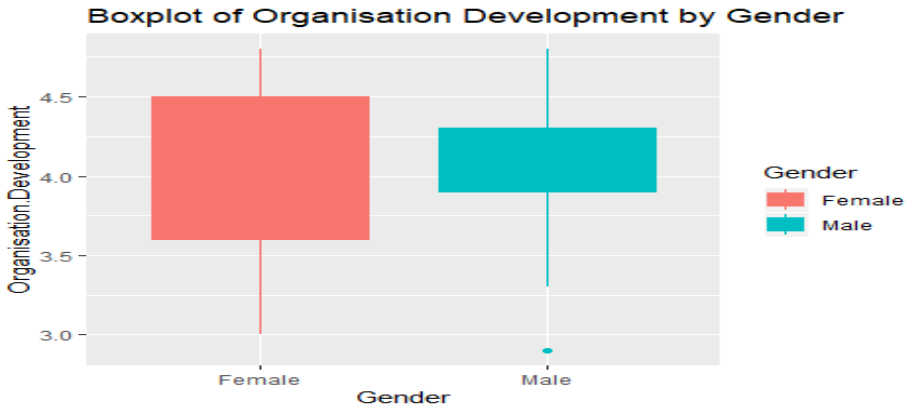


Table 2 indicates two sample t test result of gender mean difference in organization development. Test result indicates that, p value (0.39) is greater than the significant level (α=.05), researcher fail to reject alternative hypothesis and accepted null hypothesis for given df=792. Figure 4.2.2 display the mean differences between two group and it can be easy to understand very less differences between two groups.

Hypothesis 1 Conclusion: Two sample t test indicates that this study accepted null hypothesis and rejected alternative hypothesis (there is no mean differences in organization development between male and female category)

Hypothesis 2

H_0: There is no significant mean difference in organization development between age groups

H_1: There is significant mean difference in organization development between age groups

Table 3: ANOVA test for different age groups in organization development

Term	**Df**	**Sum.sq**	**Mean.sq**	**F value**	**p.value**	**Decision**
Age	3	26.38	8.7934	59.176	<2e-16	Rejected
Residuals	790	117.39	0.1486			

Table 3 indicates ANOVA test results of organization development variable mean difference in various age groups.

Hypothesis test results on one-way ANOVA revealed that there were significant differences in organization development among the four age groups of measurement, $F(3,790)=59.176$, $p<0.05$.

Table 4 Tukey Posthoc test of Organization Development with different age groups

Comparison	***Mean difference***	***conf.low***	***conf.high***	***adj.p.value***
>45 Years-<25 Years	0.0865591	-0.4910244	0.6641427	0.9804698
25-35 Years-<25 Years	-0.4019889	-0.4874842	-0.3164937	0.0000000
35-45 Years-<25 Years	-0.0841305	-0.2015443	0.0332832	0.2532018
25-35 Years->45 Years	-0.4885481	-1.0632842	0.0861881	0.1273025
35-45 Years->45 Years	-0.1706897	-0.7510328	0.4096535	0.8735744
35-45 Years-25-35 Years	0.3178584	0.2153652	0.4203517	0.0000000

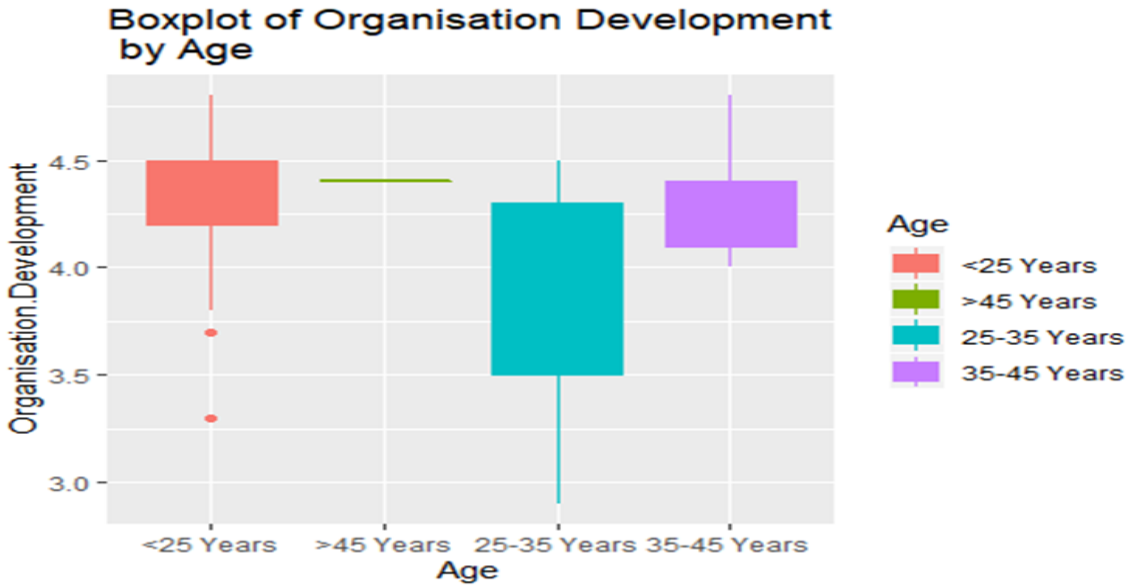
Table 4 indicates TukeyPosthock test results, which can test the significant mean differences among various age groups. Among all the age groups only 25-35 Years-<25 Years and 35-45 Years-25-35 Years age groups are having significant mean differences, remaining age groups means differences are not significant.

Table 5 Levene's test for Age groups in Organization Development

Term	*df*	*Statistic*	*p.value*
group	3	46.95194	<2e-16

Table 5 indicates levene's test results for verifying significant variance differences more than two groups. Results indicates that there is no significant variance difference among the groups in organization development ($p<0.05$).

Figure 3: Boxplot of Mean Group Difference Among Ages In Organization Development



Hypothesis 2 Conclusion: One way ANOVA test indicates that this study reject null hypothesis and accepted the alternative hypothesis (there is mean differences in organization development among age groups)

Hypothesis 3

H_0: There is no significant mean difference in organization development between managerial levels measurement

H_1: There is significant mean difference in organization development between managerial levels measurement

Table 6: ANOVA test for different managerial levels in organization development

Term	***df***	***Sum.sq***	***Mean.sq***	***F value***	***p.value***	***Decision***
Managerial Level	2	8.311717	4.1558583	24.26	<2e-16	Rejected
Residuals	791	135.461180	0.1712531			

Table 6 indicates ANOVA test results of organization development variable mean difference in three different managerial levels. Hypothesis test results on one-way ANOVA revealed that there were significant differences in organization development among the three managerial levels of measurement, F (2,791) =24.26, p<0.05.

Table 7TukeyPosthoc test of Organization Development with different managerial levels

comparison	**estimate**	**conf.low**	**conf.high**	**adj.p.value**
Middle Level-Junior Level	-0.1317194	-0.2082624	-0.0551763	0.0001727
Senior Level-Junior Level	0.1706002	0.0545545	0.2866459	0.0016956
Senior Level-Middle Level	0.3023196	0.1934109	0.4112282	0.0000000

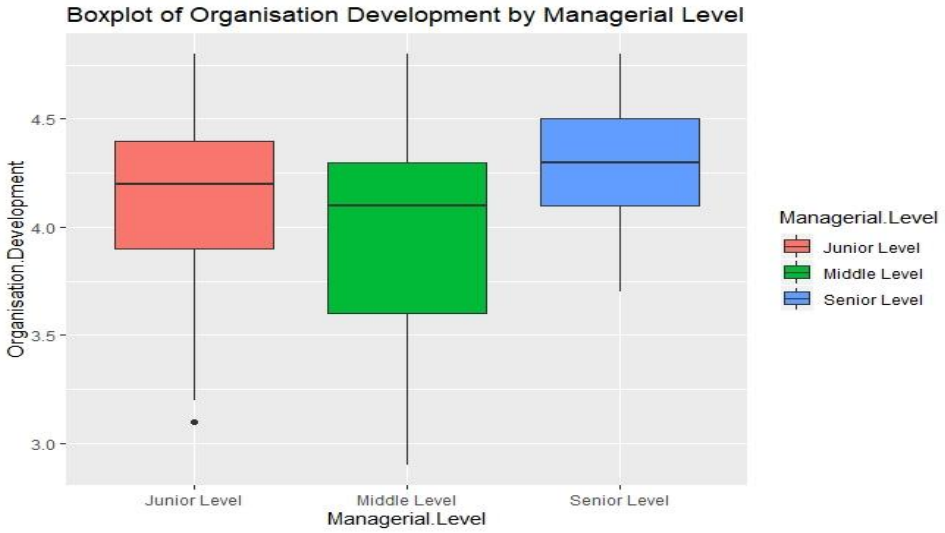
Table 7 indicates Tukeyposthock test results, which can test the significant mean differences among various managerial levels. Test results indicate all three groups have significant differences among them.

Table 8 Levene's test for Managerial levels in Organization Development

Term	df	statistic	p.value
group	2	15.48582	3e-07

Table 8 leven test results for verifying significant variance differences more than two groups. Results indicates that there is significant variance difference among the managerial levels in organization development ($p<0.05$).

Figure 4: Boxplot of Mean Group Difference Among Managerial Levels In Organization Development



Hypothesis 3 Conclusion: One way ANOVA test indicates that this study reject null hypothesis and accepted the alternative hypothesis (there is mean differences in organization development among managerial levels)

Hypothesis 4

H_0: There is no significant mean difference in organization development between experience levels measurement

H_1: There is significant mean difference in organization development between experience levels measurement

Table 9: ANOVA test for different Experience levels in Organization Development

Term	df	Sum.sq	Mean.sq	F value	p.value	Decision
Experience	2	6.46542	3.2327098	18.62	<2e-16	Reject
Residuals	791	137.30748	0.1735872			

Table 9 indicates ANOVA test results of organization development variable mean difference in three different experience levels. Hypothesis test results on one-way ANOVA revealed that there were significant differences in organization development among the three experience levels of measurement, $F(2,791) = 18.62$, $p<0.05$.

Table 10: TukeyPosthoc test of Organization Development with different experience levels

Comparison	Estimate	Conf.Low	Conf.High	Adj.P.Value
>20 Years-<10 Years	0.4496044	0.1213278	0.7778809	0.0038642
10-20 Years-<10 Years	0.2270818	0.1268688	0.3272948	0.0000004
10-20 Years->20 Years	-0.2225225	-0.5615919	0.1165469	0.2723280

Table 10 indicates Tukeyposthock test results, which can test the significant mean differences among various experience levels in organization development.

Test results indicates 10-20 Years->20 Years' experience groups have no significant differences and other groups are having significant mean difference between them.

Table 11: Levene's test for Experience levels in Organization Development

Term	df	Statistic	p.value
group	2	8.233765	0.000289

Table 11 levene's test results for verifying significant variance differences more than two groups. Results indicates that there is significant variance difference among the experience level groups ($p<0.05$).

Hypothesis 5 Conclusion: One way ANOVA test indicates that this study reject null hypothesis and accepted the alternative hypothesis (there is mean differences in organization development among income levels)

Simple Linear Regression Model

Hypothesis 5

$H_{0:}$ There is no significant prediction of HRD Outcome by organization development (OD)

$H_{1:}$ There is significant prediction of HRD Outcome by organization development (OD)

Table 12 Regression Summary (HRD Outcome ~OD)

R square	Adjusted R square	Standard Error
0.3263	0.3255	0.3627

Table 13 ANOVA for Regression (HRD Outcome ~OD)

Term	df	Sum.sq	Mean.sq	F test	p.value	Decision
OD	1	50.45294	50.4529436	383.60	0	Rejected
Residuals	792	104.16611	0.1315229			

Table 14 Regression Coefficients (HRD Outcome ~OD)

Term	estimate	std.error	T test	p.value
(Intercept)	1.5359296	0.1232864	12.45823	0
OD	0.5923859	0.0302456	19.58586	0

A linear regression established that organization development could statistically significantly predict HRD Outcome, F (1, 792) = 383.60, p = .0000 and organization development accounted for 32.63% of the explained variability in HRD Outcome

Regression equation

HRD Outcome=1.5359296+0.5923859 X (Organization Development)

Figure 5 Correlation between OD and HRD Outcome

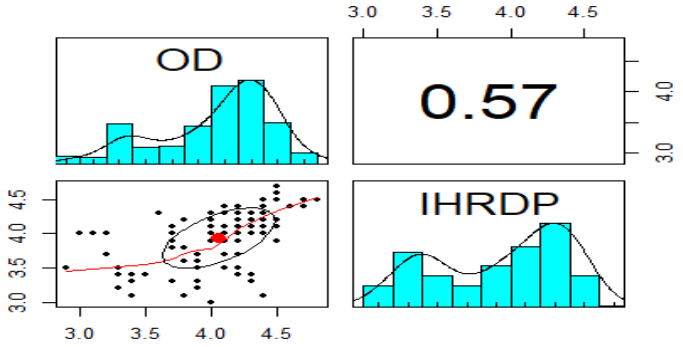
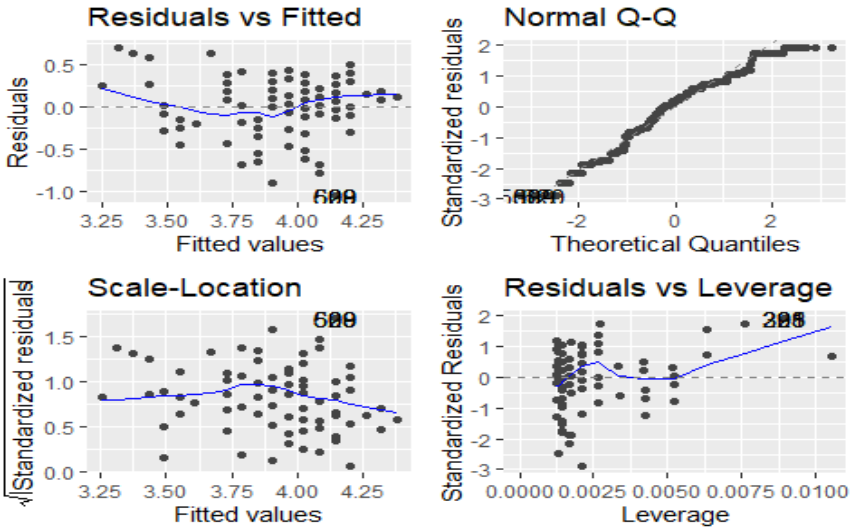


Figure 5 indicates correlation between organization development and HRD Outcome, Pearson correlation coefficient between two variable is 0.57, indicates positive correlation. Scatter plot indicates a liner relationship between two variables.

Model Validation: Model can be validate by fallowing assumption

Figure 6 Model Diagnostic Plots (HRD Outcome ~ OD)



Linearity

In figure 6 residual (error) vs fitted (predicted values) scatter plot indicates linearity of the model. It is clearly understandable that there is no nonlinear relationship and fallows linearity.

Normal Distribution

In figure 6 Normal Q-Q (quintile-quintile) plot indicates normal distribution of the dependent variable. In this picture dependent variable shows normal distribution character across all the quintiles.

Homo scedasticity

In figure 6 scale vs location plot indicates the homo scedasticity (equal variance distribution) is there or hetero scedasticity is there. It is clearly visible that all residuals are equally distributed, there is no hetero scedasticity in the model.

Potential Outliers

In figure 6 residual vs leverage plot indicates is there any potential outliers presented in the model or not. In this plot we can identified 298 data point is potentially influencing the model power. This outlier data point need to be converted into normal point by using cooks distance method

Hypothesis 5 Conclusion

This study concludes that test result are less than p value ($0<0.05$) which indicates to reject the null hypothesis and accept alternative hypothesis where there is significant prediction of HRD Outcome (HRD Outcome) by organization development (OD). This model is valid since its following all assumptions.

Conclusion

Doubtless majority of the respondents believe that human resource development practices are absolutely critical to business outcomes especially for a pre-eminently skill based industry like information technology. As an indispensable facet of any business concern, HRD is leveraged to achieve the requisite skill accomplishment through its multiple processes and decisive operations.

Recognizing the growing need for effective HR mechanisms and strategies, IT companies should increase their focus as well as their funds on developing the management of human resources. In terms of enhancing productivity, nurturing talent for present and future, advancing the careers of staff with development opportunities, building relations and collaboration, creating conducive work environment, the role of HRD is undeniably irreplaceable. There can't be a better investment than that of the measures to improve and standardize the quality of HRD functioning.

The study finds that there is a strong need for the involvement of the staff in both discussion and policy implementation. If an employee feels that his views are counted and he is part of decision making, it will not only boost his confidence but also make him committed to the organization. Such measures will certainly create a radically different work culture in which staff succeed to deliver their best. Development opportunities will also motivate the work force to give its best.

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ORIGINAL ARTICLE

Neuroprotective effects of *Abelmoschus moschatus* seed extract on fluoride-induced myelin degeneration in developing brain of rats

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Abstract

Aim: Fluoride at higher concentrations affects various soft tissues, including brain, heart, kidney, and other tissues in addition to dental and skeletal systems. Particularly, in brain it induces various complications such as oxidative stress, alters in the levels of neurotransmitters, and histological changes. The aim of the present study is to report the protective effects of *Abelmoschus moschatus* seed extract against sodium fluoride-induced neurohistological changes with particular emphasis on myelin degeneration, cell shape, size, and Gamma-aminobutyric acid (GABA) as well as aspartate alterations. In addition, antioxidants (glutathione peroxidase [GSH-Px] and superoxide dismutase [SOD]), spatial navigation, and learning ability were observed. **Materials and Methods:** The pregnancy confirmed Wistar rats were segregated into six groups, five subjects for each and doses started from 1st day of pregnancy. Control group received normal tap water, fluoride group fed on 20 ppm fluoridated water, 3rd group treated with NaF (20 ppm) + *A. moschatus* aqueous extract (AMAE) (300 mg/kg b. wt.), 4th group received NaF (20 ppm) + *A. moschatus* ethanolic extract (AMEE) (300 mg/kg b. wt.), and 5th and 6th groups treated with AMAE and AMEE alone. Treatment continued for 51 days (21 gestational and 30 postnatal days [PND]).On PND 1, 7, 14, 21, and 30 rat pups were sacrificed, dissected out the brain and used to assess antioxidants, GABA, aspartate and also used for histological studies. Days 21 and 30, rats were used to behavioral studies before they sacrificed. **Results and Discussion:** The decreased learning ability is observed in NaF exposed rats compared to control and protective groups of rats. GSH-Px activity is increased and SOD activity is decreased in fluoride received rats. Moreover, GABA and aspartate levels are increased ($P < 0.001$). The GABA, aspartate, and myelin have a crucial role in the maturation of brain. Decreased neural connections, networks, dendritic branches, and degenerating myelin sheath are observed in NaF intoxicated rats through H and E stain and luxol fast blue stain. These all are reverted on the administration of AMAE and AMEE toward NaF toxicity. AMEE showed good results over AMAE. **Conclusion:** It is concluded that the seed extract of *A. moschatus* possesses neuroprotective effects against fluoride toxicity.

Key words: *Abelmoschus*, aspartate, fluoride, Gamma-aminobutyric acid, histology, myelin

INTRODUCTION

Fluoride is widely distributed in nature, readily available in various sources and enters into the body through drinking water, food, toothpaste, mouth rinses, and other dental products such as drugs. In addition, fluoride dust and fumes from industries using fluoride containing salt and hydrofluoric acid also are sources for fluoride. Fluorosis is caused in human beings predominantly through fluoride in drinking water and also burning coal, drinking tea, and supplementing food with additives such as calcium monohydrogen phosphate containing high levels of fluoride contribute to fluorosis.[1] High levels of fluoride consumption are known to cause structural changes, altered activities of enzymes, and metabolic lesions in the brain and influence the metabolism of lipids.[2]

The fluoride-induced alterations in the central nervous system (CNS) include morphological and functional

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changes. Dong *et al.*[3] reported the decreased nAChRs' expression in fluoride-exposed rats which received fluoride chronically; thus, they are resulted in reduced learning and memory ability. Fluoride produces excess free radicals which act as an excitotoxin, stimulates overexcitation of aspartate and Gamma-aminobutyric acid (GABA) receptors which, in turn, leads to the production of free radicals and consequently damage CNS. Thus, fluoride exposure induces oxidative stress which has an immense effect on superoxide dismutase (SOD) and Glutathione peroxidase (GSH-Px) enzymes activity, alters neurotransmitters levels and morphological changes in the cerebral cortex and as well as hippocampal regions.[3] Exposure to chronic fluorosis also induced alterations in behavioral changes, depression, deterioration of short-term spatial memory[4] and neural damage in rodents as well as in humans.[3] Inhibited SOD, glutathione reductase, catalase, GSH-Px activity, and glutathione content were reported in fluoride-exposed rats by Blaylock.[5]

High levels of fluoride exposure during gestational periods have an adverse effect on the levels of fetal neurotransmitters.[6] GABA is principal excitatory neurotransmitter in developing brain (in contrast to the mature brain in which it is inhibitory NT),[7] influences the processes of cell proliferation, migration, and differentiation,[8] regulate the development of excitatory synapses at early stages of cortical circuit formation.[9]Altered NTs levels and their abnormal functioning on NaF administration is resulted in decreased learning and memory ability.[10] Increased free radicals from fluoride initiate oxidative stress pathway which leads to damage in the neuronal cell membranes, destruct them and in turn leads to the release and subsequent extracellular accumulation of glutamate, contributing to excitotoxicity[11] and further promoting reactive oxygen species (ROS) generation.[12] In our earlier report, increased glutamate levels were observed in NaF treated rats[13] and thus, the altered levels of GABA, glutamate, and aspartate leads to the excitotoxic mechanism and alter the brain maturation process.

Myelin sheath is a plasma membrane of neural cells enriched with phospholipids. It is formed by oligodendrocytes in CNS and by Schwann cells in PNS and acts as an insulator and increase the speed of propagation in conducting action potentials. Myelin sheath, in addition to rapid signal conduction, is important for axon maintenance and function.[14] Myelin degeneration is associated with many CNS pathological conditions such as congenital, autoimmune, and metabolic disorders.[15] Structural perturbations also result in axonal degeneration and it occurs due to disruption in axo-oligodendrocytic signaling. Reddy *et al.*[16] reported that the destruction of the myelin sheath in fluoride (20 ppm) exposed rats.

Most recent researchers are now looking at natural antioxidants as persuasive therapeutic agents against several neurological disorders, as they have the proficiency to combat by neutralizing free radicals. The primary source of antioxidants is our diet. However, the medicinal herbs are catching attention to be a commercial source of antioxidants at present. In earlier studies, researchers attempted to treat a variety of diseases with antioxidants, which acts through scavenging free radicals. In previous reports, for example, *Ginkgo biloba* extract,[17] quercetin,[18] resveratrol,[19] Vitamin E,[20] Vitamin C,[17] curcumin,[21] tamarind fruit pulp,[22,23] and silymarin[24] were used to scavenge free radicals. All these observations suggesting that the involvement of ROS in the pathogenesis of several diseases including neurodegenerative disorders and a possibility of the therapeutic use of free radical scavengers and antioxidants in the prevention of free radical-mediated neurological disorders. Many research studies evidenced that free radical scavenging substances inhibit the toxic effect of β-amyloid or hydrogen superoxide on cell cultures and organotypic hippocampal cultures.[25,26] Three free radical scavenging drugs used for therapeutic purposes in different fields were also scrutinized in clinical studies of AD and produced beneficial results: Vitamin E (α-tocopherol), selegiline (also a monoamine oxidase B inhibitor), and *G. biloba* extract EGb 761[26].

The earlier studied natural compounds provided positive results against fluoride toxicity, but, no compound is suitable for treating fluorosis completely. In view of this, the present study focused on *Abelmoschus moschatus* plant, which belongs to Malvaceae family and possesses a number of pharmacologically important chemicals. Lai *et al.*[27] isolated and identified a number of flavonoids, namely myricetin, myricetin 3-*O*-beta–*D*-glucopyranoside, and quercetin from the plant *Abelmoschus manihot*. Lai *et al.*[28] isolated a glucuronide from the flowers of *A. manihot* along with traces of hibifolin. Jain and Bari[29] isolated of Stigmasterol and γ-Sitosterol from the petroleum ether extract of the woody stem of *A. manihot*.[30] The various parts of the plant, *A. moschatus* (seeds, leaves, flowers, and some extent roots) is used in Bangladesh by traditional healers;[31] used in the tribal and traditional medicine of India;[32] for stomach pain and disorder in Trinidad and Tobago.[33] From the seeds of Ambrette, there are four natural polyphenolic compounds, namely 1-(6-ethyl-3-hydroxypyridin-2-yl) ethanone, 1-(3-hydroxy-5,6-dimethylpyridin-2-yl) ethanone, 1-(3-hydroxy-6-methylpyridin-2-yl) ethanone, and 1-(3-hydroxy-5-methylpyridin-2-yl) ethanone were isolated by Du *et al.*[34] In our earlier reports, Okra seed extract showed the protective results toward NaF toxicity by reducing ROS production,[35,36] maintaining NT system,[13] and reversed altered pain and alterations in cell shape, size, Nissl granules, and amyloid plaque formation.[37]

Based on these observations, the present study reports the protective role of *A. moschatus* seed extract against fluoride induced neuronal disturbances in terms of GABA, aspartate alterations, myelin destruction, and learning abilities.

MATERIALS AND METHODS

Wistar rats during developmental periods both pre- and post-natal were used for experimentation, and they were maintained

in laboratory conditions as per the guidelines of the CPCSEA (CPCSEA No: 383/01/a/CPCSEA) and Institutional Animal Ethical Committee approval was taken for experimentation. Animals were acclimatized for 7 days to light from 6:00 AM to 6:00 PM alternating with 12 h dark and after that doses were started. The animals are housed in stainless steel cages and which were maintained in an air-conditioned room with a temperature at 25 ± 2°C. Rats were allowed to feed on standard chow diet and water *ad libitum* throughout the experiment. Female and male rats of the same strain are categorized in 2:1 ratio into separate cages for breeding and after confirmed the pregnancy, females were randomized into six groups five subjects for each, and they were treated as:

1. Group I – Control rats (untreated) received normal tap water
2. Group II – Sodium fluoride (NaF) received (20 ppm) rats in their drinking water
3. Group III – NaF (20 ppm) + *A. moschatus* aqueous seed extract (AMAE) at the rate of 300 mg/kg body weight/rat/day
4. Group IV – NaF (20 ppm) + *A. moschatus* ethanolic seed extract (AMEE) at the rate of 300 mg/kg body weight/rat/day
5. Group V – AMAE at the rate of 300 mg/kg body weight/rat/day
6. Group VI – AMEE at the rate of 300 mg/kg body weight/rat/day.

The treatment continued for 51 days (prenatal or gestational – 21 days and postnatal 30 days), and the pups from all experimental groups were sacrificed at different age groups such as postnatal day (PND) 1, 7, 14, 21, and 30 and used the brain for all experiments.

Methods

Behavioral parameter

Maze learning test was performed on rats' pups with age 21 and 30 days. PND 21 and day 30 young rats from all experimental groups were used to perform the maze task.

Maze learning

The maze test was conducted according to the method of Bromley-Brits *et al.*[38] Maze apparatus (60" × 30" × 15") is used to study the ability of spatial navigation of animal, in which rats explore novel situations and make decisions based on reward (food) that produce desirable outcome. During the training period, all rats were under starvation for a period of 8–12 h and trials were conducted around 10 A.M.–2 P.M. At the beginning of each trial, animals were placed at the start point of the maze and allowed to explore the maze for 10 min. The training was given to rats for 3 days. On the day of experimentation, rats were allowed into maze task to locate the food which present at the end of the set up and noted the latency time to reach the goal. The data were exposed to statistical analysis and results (i.e., goal reaching time) were expressed in minutes.

Antioxidant markers

PND 1, 7, 14, 21, and 30 rats from all experimental groups were used for assess oxidative stress markers.

GSH-Px

Glutathione peroxidase was estimated by the method of Rotruck *et al.*[39]

SOD

SOD assay was carried out by the method of Marklund and Marklund.[40] This method is based on the ability of the enzyme to inhibit oxygen dependent auto-oxidation of pyrogallol. The rate of auto-oxidation is measured by noting the increase in absorbance at 420 nm.

Neurotransmitters

Neurotransmitters are assessed from PND 1, 7, 14, 21, and 30 rats of all experimental groups.

Aspartate

Aspartate was assessed by the modified method of Murai *et al.*[41]

GABA

GABA was assessed by the modified method of Ippolito and Piwnica.[42]

Histological studies

Histological studies were carried out from PND 1, 7, 14, 21, and 30 rats of all experimental groups.

H and E stain

H and E staining was performed by the method of Leeson *et al.*[43] and observed under Lawrence digital microscope.

Luxol fast blue (LFB) stain

The LFB stain is preferably used for staining myelin sheath and Nissl substance and observed under Lawrence digital microscope.[44]

Statistical Analysis

One-way analysis of variance (one-way ANOVA) to compare the means between the groups and *t*-test was used to determine the statistical differences between groups. Results were represented as the mean ± standard error of the mean. Significant of the data is $P < 0.001$.

RESULTS

Maze Learning

The increased latency time was observed in the maze in fluoride-treated group with respect to control and protective

compound-treated rats [Figure 1]. The percent of change in time latencies in NaF treated rats as compared to control rats is 39.70% and 34.74% after 21 and 30 days. The time latencies reduced in NaF+AMAE about 24.05% and 16.40% after 21 and 30, respectively, and in NaF+AMEE about 22.38% and 14.28% in after 21 and 30 days, respectively. The percent of change in AMAE and AMEE from control is 7.13% and 5.14% in PND 21 and −3.28% and 4.05% in PND 30 ($P < 0.01$), respectively.

GSH-Px

The GSH-Px activity in NaF treated rats was increased progressively with age, and its percent of change from control was about 23.28%, 23.28%, 26.92%, 24.05%, and 30.12% in PND 1, 7, 14, 21, and 30, respectively. GSH-Px activity significantly ($P < 0.001$) reversed in NaF+AMAE and NaF+AMEE treated groups and it was about 4.22% and 7.04% in PND 1, 8.21% and 6.84% in PND 7, 6.41% and 5.12% in PND 14, 7.59% and 6.32% in PND 21, and 4.81% and 3.61% in PND 30 rats. AMAE and AMEE treated rats showed the normal enzyme activity as compared to the control group [Figure 2].

SOD

In NaF intoxicated rats, the decreased activity of SOD was found with respect to control rats. The percentage of decrease in its activity in NaF is about −30.50%, −20.27%, −23.80%, −21.73%, and −19.04% from PND 1–30, respectively. Its activity was reverted in AMAE and AMEE administered rats toward fluoride received rats. The reverted activity of SOD in NaF+AMAE and NaF+AMEE from day 1 to day 30 by −11.86% and −15.25%, −12.16% and −13.51%, −7.14% and −9.52%, −5.43% and −7.60%, and −9.52% and −10.47% correspondingly with compared to control. The results showed that the enzyme activity was more prominently decreased in PND 1, 7, and 14 [Figure 3].

Aspartate

Aspartate levels were increased [Figure 4] in the brain tissue of NaF intoxicated rats, and it was about −42.85% in day 1, −37.50% in day 7, −44.44% in day 14, −45.45% in day 21, and −41.66% in day 30 when compared to respective age control rats. On administration of AMAE and AMEE against NaF toxicity, its levels were reversed. The percent of reversal observed in NaF+AMAE treated rats is about −28.57%, −12.50%, −11.11%, −18.18%, and −16.16% in PND 1, 7, 14, 21, and 30, respectively, and in NaF+AMEE treated rats is by −28.57%, −12.50%, −11.11%, −18.18%, and −16.66% in PND 1, 7, 14, 21, and 30 correspondingly. Ethanolic extract of seeds provides better results over aqueous extract.

GABA

γ-aminobutyric acid levels were increased [Figure 5] in the brain tissue of NaF intoxicated rats compared to the control group. The percent of the increase in GABA levels is 53.84%, 43.47%, 22.58%, 18.42%, and 12.24% from PND 1 to PND 30 correspondingly. *A. moschatus* extract treatment along with NaF reverted the GABA levels. In NaF+AMAE received rats, it was about 15.38%, 12.90%, 8.16%, 10.00%, and 7.89% from PND 1 to 30, respectively. NaF+AMEE treated rats showed that the percent of reversal is about 10.00%, 10.52%, 7.69%, 9.67%, and 6.12% from day 1 to day 30, respectively. AMEE showed more protection than AMAE.

H and E stain

The cells of control rats' brain tissue are with round regular shape and size and are represented by the yellow color arrow

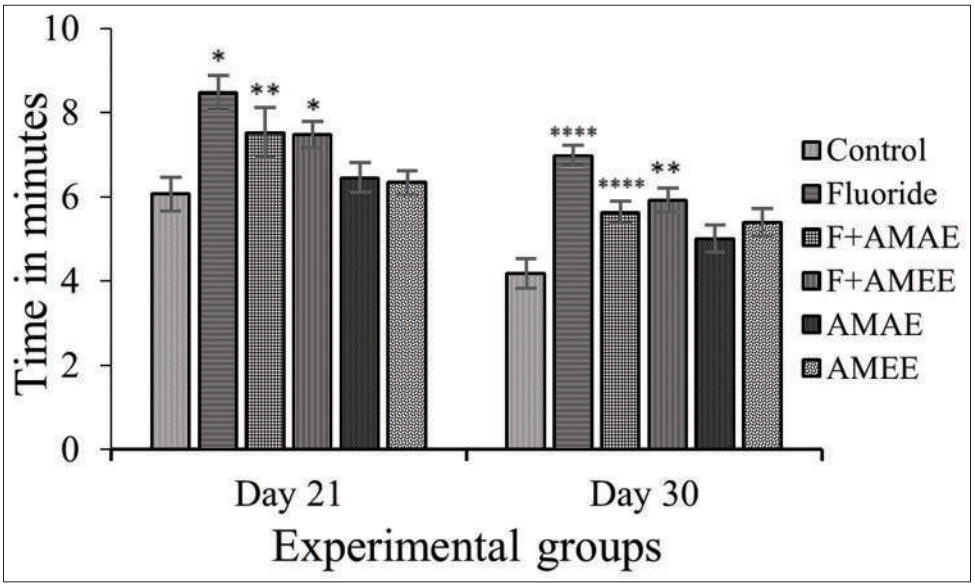

Figure 1: Latency time of maze test shown in rats exposed to fluoride and treated with *Abelmoschus moschatus* extract. Results were presented as the mean ± standard error of the mean ($n = 5$). *For $P < 0.01$; **for $P < 0.05$, ****for $P < 0.005$

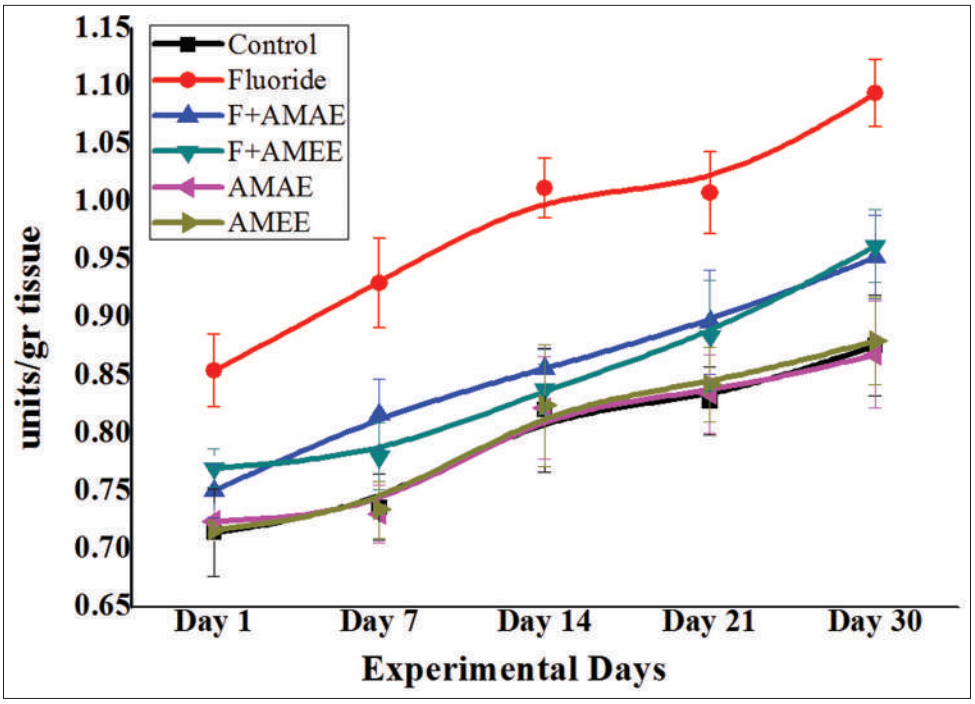

Figure 2: Protective effects of *Abelmoschus moschatus* extract on glutathione peroxidase activity in brain tissue of rats exposed to NaF. Results were presented as the mean ± standard error of the mean (n = 5). Significant of the data is P < 0.001.Units: Glutathione peroxidase activity was expressed as µg/mg protein

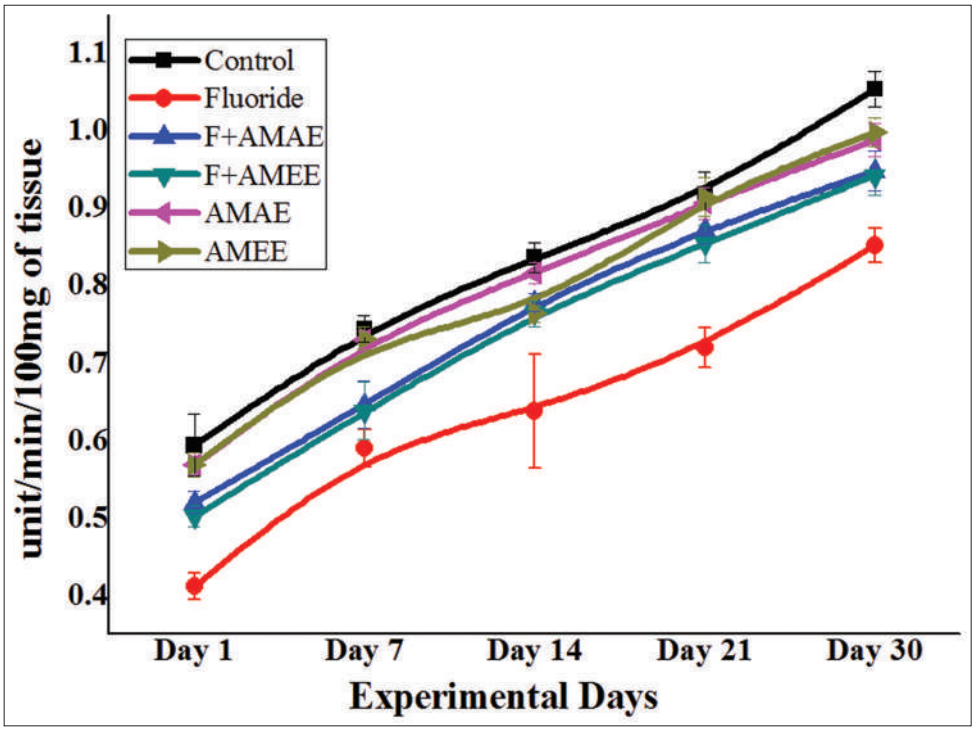

Figure 3: Protective effects of *Abelmoschus moschatus* extract on superoxide dismutase activity in brain tissue of rats exposed to NaF. Results were represented as the mean ± standard error of the mean (n = 5). Significant of the data is P < 0.001. Units: Superoxide dismutase activity is expressed as units/mg protein

mark. In NaF alone fed rats, the cell with irregular shape and size was observed and they were represented by black color arrow mark. In NaF+AMAE and NaF+AMEE treated some of the cells with irregular shape and size. AMAE and AMEE treated groups showed the normal cells comparable to control. PND 14–30 day rats treated with NaF showed obvious alterations in their shape and size than PND 1 and PND 7 rats of fluoride exposed [Figure 6].

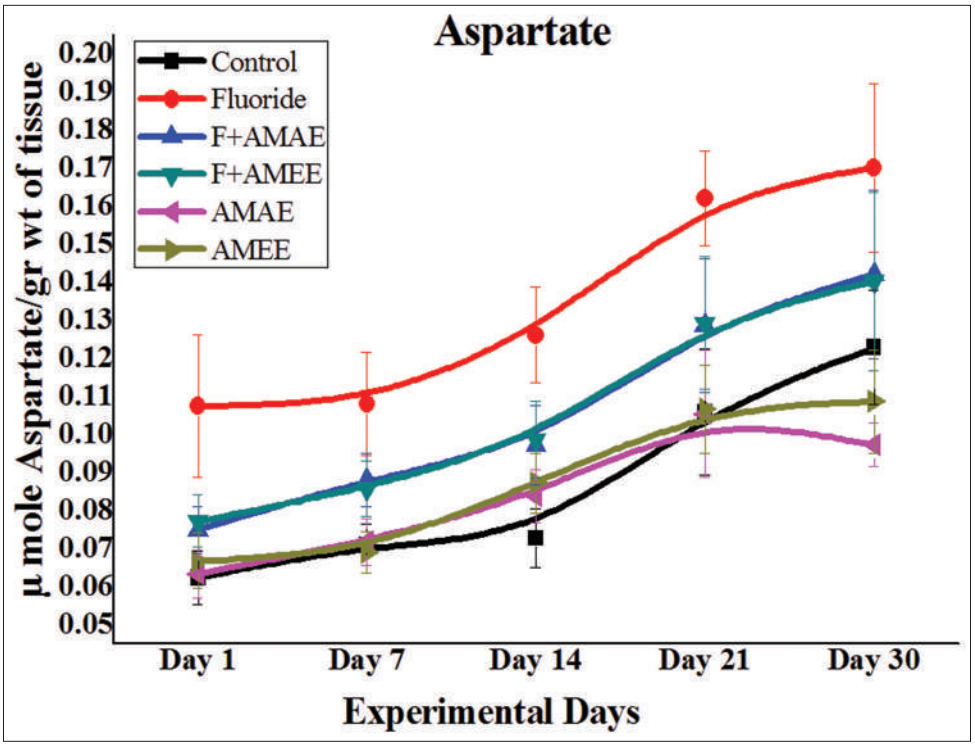

Figure 4: Protective effects of *Abelmoschus moschatus* extract on aspartate levels in brain tissue of rats exposed to NaF. Results were presented as the mean ± standard error of the mean (n = 5). Significant of the data is $P < 0.001$. Units: Aspartate levels were expressed as µ mole of aspartate/g weight of tissue

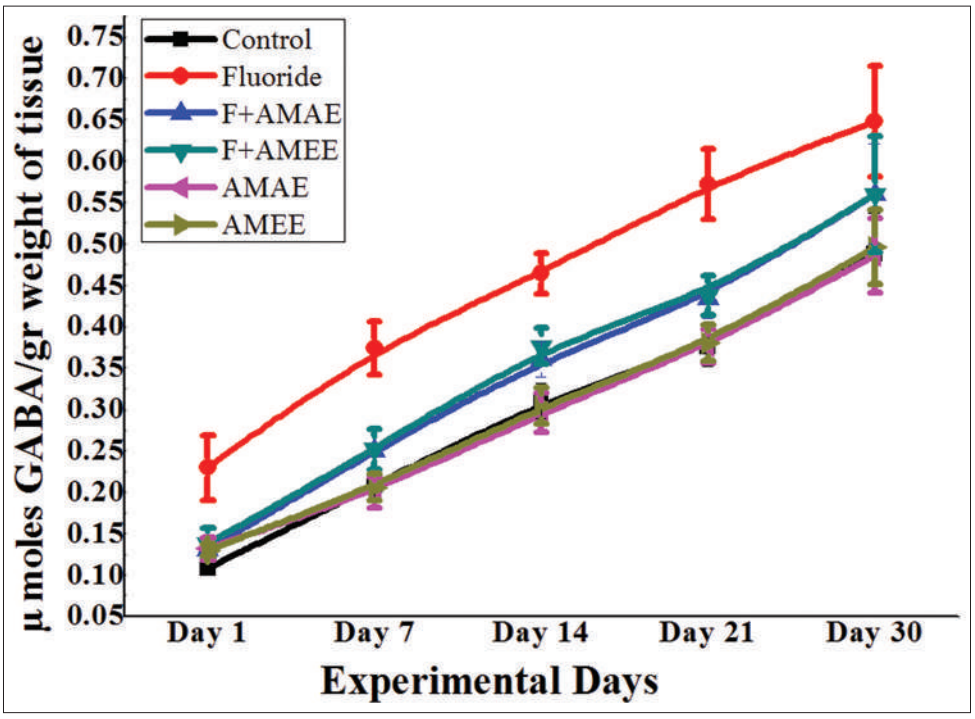

Figure 5: Protective effects of *Abelmoschus moschatus* extract on Gamma-aminobutyric acid (GABA) levels in brain tissue of rats exposed to NaF. Results were presented as the mean ± standard error of the mean (n = 5). Significant of the data is $P < 0.001$. Units: GABA levels were expressed as µ mole/g weight of tissue

LFB Stain

Rats exposed to NaF during pre- and early post-natal periods showed the destructing myelin sheath and cells undergoing apoptosis. The NaF+AMAE, NaF+AMEE treated rats showed the reverted myelin degeneration, and only AMAE and AMEE exposed rats displayed normal myelin sheath as compared with control rats. The myelin sheath degeneration

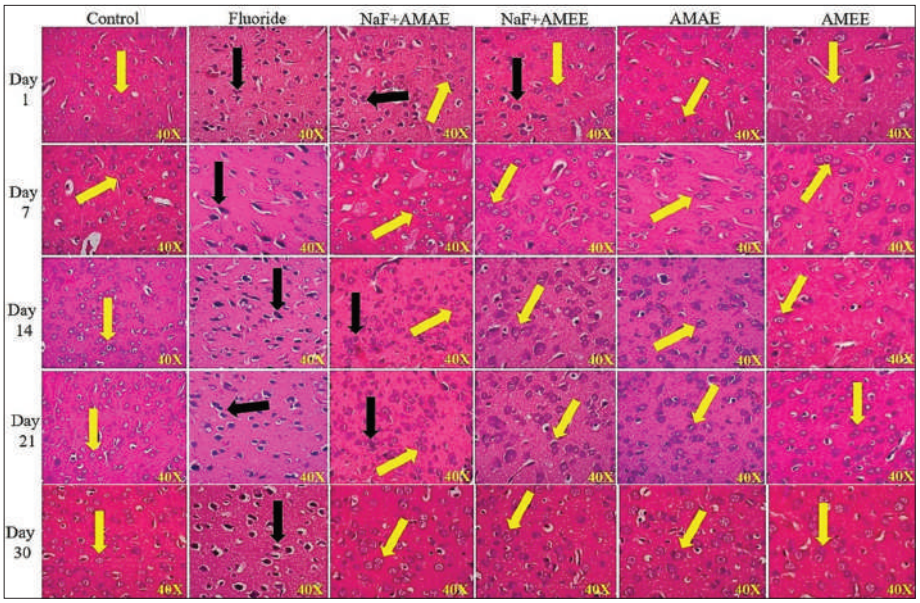

Figure 6: Cerebral cortex region of rat brain stained with H and E stain. Protective effect of *Abelmoschus moschatus* seed extract on rat brain exposed to NaF. Normal cells with regular round shape and size were found in control rat brain and which are represented by the yellow color arrow mark. Black color arrow mark showing the cells which were with altered shape and size, swelling and undergoing necrosis were seen in NaF received a group of rats. NaF+AMAE and F+AMEE treated rat brain sections were found with normal cells (×40, Lawrence digital microscope)

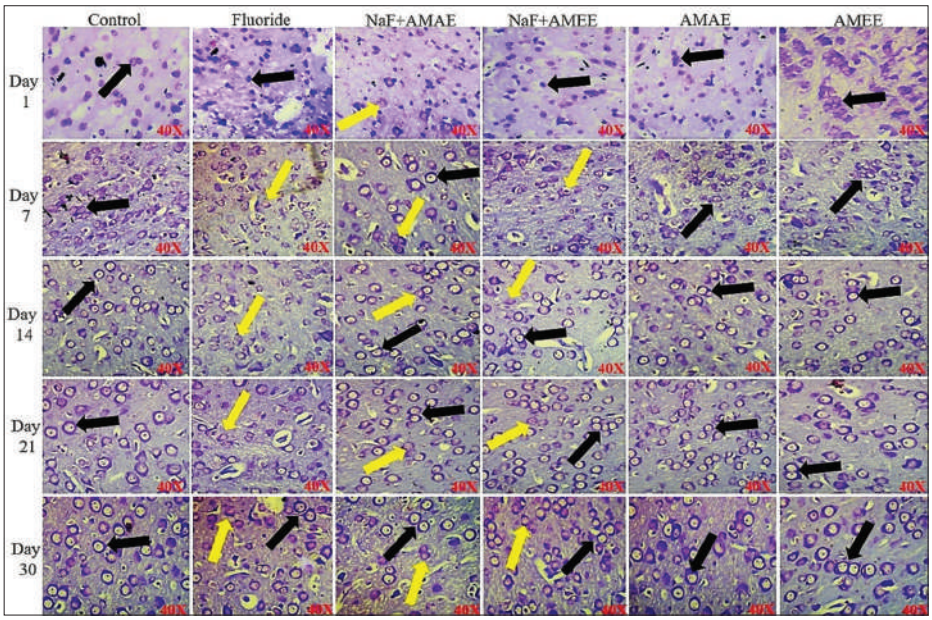

Figure 7: Cerebral cortex region of rat brain stained with Luxol fast blue stain. Protective effect of *A. moschatus* seed extract on rat brain exposed to NaF. Cells with normal myelin sheath were found in control rat brain and which are represented by the black color arrow mark. Yellow color arrow mark showing the cells with destructing myelin sheath and are observed in NaF received a group of rats. NaF+ *Abelmoschus moschatus* aqueous extract and F+ *A. moschatus* ethanolic extract treated rat brain sections were found with normal myelin sheath (×40, Lawrence digital microscope)

was clearly seen in PND 14–30 rats. The reason for this may be a long duration of exposure to fluoride [Figure 7] .

DISCUSSION

The present study is undertaken to evaluate the consequences of high levels of fluoride exposure during pregnancy and lactation on neurodegeneration in young rats' developing brain whose mothers exposed to fluoride (20 ppm) during pregnancy and on different PNDs (lactation periods) and simultaneous protective treatment of *A. moschatus* seed extract. The fetus is with poorly formed protective mechanisms including blood-brain barrier against xenobiotics that circulate in the maternal blood and the placenta also does not block the entry of numerous environmental toxicants

from the maternal circulation to fetal circulation.[45] Mullenix *et al.*[46] observed that the various behavioral alterations and which were common to weanling and adult exposure and were different from those after prenatal exposures. In the present study, the NaF fed rats showed decreased learning ability and spatial navigation compared to control rats. The similar results were observed by Gao *et al.*,[47] they found the decreased capacity of learning and memory of rats which exposed to high fluoride levels. AMAE and AMEE treated rats showed increased learning ability than fluoride alone treated rats.

The fluoride-exposed rats resulted in reduced activity of SOD when compared to control and NaF+AMAE and NaF+AMEE treated groups. Fluoride has been reported as one of the well-known inhibitors of SOD activity.[48] Fluoride exposure during prenatal and early postpartum periods in rats showed significant decrease in SOD activity in their neural tissues with respect to the control group and the similar results were observed by Nabavi *et al.,*[24] in which they exposed the rats to 600 ppm of fluoride for a week through their drinking water. The decreased SOD activity in sodium fluoride administered rats result in an extra superoxide onion accumulation in rat's neural tissue. SOD activity was reversed in NaF+AMAE and NaF+AMEE treated rats when compared to fluoride-exposed rats. Present results reported that the increased GSH-Px activity in 20 ppm fluoride received rats when compared to control group of rats. AMAE and AMEE treated rats along with sodium fluoride showed the reverted GSH-Px activity. AMAE and AMEE alone treated rats do not showed any significant differences in the activity of GSH-Px, and results were similar to control rats.

Increased free radicals from fluoride initiate oxidative stress pathway which leads to damage in the neuronal cell membranes, destruct them and in turn leads to the release and subsequent extracellular accumulation of glutamate, contributing to excitotoxicity[11] and further promoting ROS generation.[12] These effects of oxidative stress on amino acid accumulation may be due to membrane lipid peroxidation, which may impair the GABA transporter, leading to a decrease of GABA accumulation,[49] and/or it may increase the release and extracellular accumulation of aspartate and glutamate.[49] Other mechanisms that could be involved in the inhibition of glutamate uptake by ROS may be the direct oxidation of the transporter sulfhydryl groups or the impairment of Na^+-K^+-ATPase activity.[49] In agreement with these results, the present data showed increased levels of aspartate in NaF treated rats with compared to control rats, and its levels were reverted on the administration of AMAE and AMEE toward fluoride toxicity. In contrary to the Duarte *et al.,*[49] GABA levels were increased in NaF treated rats, and it was reverted on AMAE and AMEE treatment. Glutamate, aspartate is excitatory amino acid NTs and GABA also acts as an excitatory NT in developing the brain. In our earlier report, NaF received rats showed the increased levels of glutamate[13] and in this report, the increased levels of GABA and aspartate were observed in NaF treated rats. These three NTs distributed throughout the CNS and play a very crucial role in cognition, synaptogenesis, memory, etc. Free radicals from fluoride lead to excitotoxicity which, in turn, triggered the release of glutamate, GABA, and aspartate from presynaptic terminals into extracellular space with consequent overstimulation their respective receptors. As a consequence, disturbance in GABAergic, aspartatergic and glutamatergic systems may lead to many psychological and neurodegenerative diseases.

The myelin sheath is a specialized multilayered structure and surrounds selected axons in CNS. Biochemically, myelin is formed of roughly 70–85% lipid, with a high content of cholesterol and only 15–30% of protein, especially with myelin-specific proteins.[50] Myelin degeneration occurs in CNS on chemical toxicity, traumatic brain injury, and demyelinating diseases.[51] Demyelination may induce undesirable inflammation[52] and cell death.[53] Myelin-associated proteins are released after the destruction of the intact myelin sheath.[54] After destruction of the intact myelin sheath, myelin basic protein (MBP) also disassociates from the plasma membrane and acts in a free, membrane-unbound manner in the extracellular matrix.[55]

In the present study, the NaF treated rats showed myelin destruction as compared to control rats. In NaF+AMAE and NaF+AMEE rats, the normal myelin sheath was found. Histological studies indicate myelin destruction, which is correlated with changes in MBP secondary to membrane damage and axonal degeneration on the exposure of fluoride.[56] The histopathological investigations in rat exposure to fluoride seemed thickening and disappearance of dendrites, swelling of mitochondria, dilation of the endoplasmic reticulum in neurons,[57] and diminished hippocampal synaptic interface structure[58] and the changes in the structure of synaptic interface could necessarily affect the neuronal transmission. These findings indicate that high consumption of fluoride resulted in structural and functional damages of the CNS and is associated with CNS dysfunction.

In summary, developing brain is more prone to fluoride toxicity due to poorly formed protective mechanisms such as blood-brain barrier and antioxidant defense. F mediates the generation of superoxide anion (O_2^-) and the supplementary production of hydrogen peroxide, peroxynitrite, and hydroxyl radicals. Exposure to NaF during pregnancy and lactation has resulted in a wide range of changes, including histopathological changes. This resulted in alterations in the levels of neurotransmitters and as consequence of behavioral alterations. *A. moschatus* treatment resulted in a reversal of the alterations resulted in fluoride exposure.

CONCLUSION

Fluoride produces excess free radicals which alter the antioxidant status of the brain. These free radicals oxidize

membrane lipids and thus destruct the myelin sheath of neural cells. These changes lead to neuronal loss, alters in the levels of neurotransmitters, and finally, behavioral alterations. *A. moschatus* possess antioxidants principally quercetin, rutin, catechin, epicatechin, and procyanidin and quercetin derivatives which quench free radicals and maintained lipid membranes of the cell. Thus, the normal myelin sheath was maintained in AMAE and AMEE treated rats against fluoride. The ethanol extract has shown better efficacy than aqueous extract. Yet, further studies are needed to know the exact mechanism of components neuroprotective effects of *A. moschatus* seed extract.

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8. Global synchronized slowdown.
9. Japan and South Korea trade relations become sour now.

DOMESTIC REASONS:

Important contributors to the current economic slowdown include

- Demonetization
- Stressed banking sector
- NPAs
- GST Implementation and problems in Agriculture sector
- High rates of GST
- Liquidity crisis in NBFCs
- Twin balance sheet problem
- Inertia in Economy
- Service led growth
- Low growth in agriculture
- Subdued rural demand
- Rising unemployment & wage problem
- Revised GDP calculations didn't allow the problem to come surface
- **Global oil price rise in 2018 :** Increase CAD, rupee depreciation & consumption slowdown
- **Crisis in financial sector :** IOL & FC crisis Rs. 90,000 fallout.
- Shift in the behavioural pattern of the workforce due to the entry of young people has discouraged savings.
- A decade of high fiscal deficit & public sector borrowings requirement.
- Low private investment
- Seriously distorted framework of Agri marketing – in efficient pricing - procurement.
- Relatively weak and inefficient infrastructure
- Significantly overvalued rupee exchange rate
- Reduced government spending

CONCLUSION

Recession can be short – lived if corrective actions are taken immediately, failure of which can have a prolonged effect on the health of an economy. Amidst the news of slowdown rise in FDI inflows from $12.7bn (FY19) to $16.3 bn(Q1 FY20) brought respite for the government. In a welcoming move, government revised GST for the automobile sector, opened up FDI in contract manufacturing sector and even announced the recapitalization of the banking sector. Together with these, it should also focus on optimum utilization of funds granted by RBI and direct them to boost investment in the economy both infrastructural and research investment. Rationalization of GST rates is the need of the hour. Further, structural shifts over the long run can be achieved through tapping into the health and education sectors that long for quality improvements. Only such long-lasting structural changes can improve the growth potential of the Indian economy and deter the possibility of three slowdowns within the short span of a decade.

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- Recent RBI annual report.

Indian economy at the cross roads

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ABSTRACT

India has to consistently achieve a minimum of 9%+ growth rate for next five years to reach to the level of $5 trillion economy. The latest annual report of the RBI for the fiscal year 2018-19 (or FY19) confirmed that the Indian economy has indeed hit a rough patch. The GDP growth of India has gone down to almost 5% in Q1 of financial year 2019-20 and 4.5% Q2 of 2019-20. This GDP growth of Indian Economy has touched the six-year low in the first financial quarter of April – June 2019-20, although in nominal terms India's GDP grew by 7.99% which is also lowest since December 2002. This is an indication of tougher times ahead. The latest Annual report of RBI confirms it. Be it the recent collapse of the automobile sector or the rising number of non – performing assets (NPAs), sluggish consumer demand or failing, manufacturing sector; all have a hand in this declaration of growth rate. In the context of growing leadership role of India in global arena Indian Economy is at the cross roads due to recent economic slowdown.

Keywords : PFCE, GFCE, GDP, continued slow down.

INTRODUCTION

India has to consistently achieve a minimum of 9%+ growth rate for next five years to reach to the level of $5 trillion economy. This GDP growth of Indian Economy has touched the six-year low in the first financial quarter of April – June 2019-20, although in nominal terms India's GDP grew by 7.99% which is also lowest since December 2002. This is an indication of tougher times ahead. The latest Annual report of RBI confirms it. The spurt in instances of job losses from automobile manufacturers to biscuit makers has led to the general acceptance of the downturn. This is the third instance of an economic slowdown for India in the past decade after the ones that began in June 2008 and Mach 2011. A recession is defined in economics as three consecutive quarters of contraction in GDP. The last instance of negative growth for India was in 1979. In the context of growing leadership role of India in global arena Indian Economy is at the cross roads due to recent economic slowdown. On the one hand US – China trade war, Britan's exit EU Indo – China trade war on the other hand recent economic slowdown in India made Indian economy stands at the cross roads.

Recent Sharp fall in PFCE:

The growth of the Indian economy had been predominated by consumption inclusive of both – Private Final Consumption Expenditure (PFCE) as well as the Government Final Consumption Expenditure (GFCE). Over the last five years, the total consumption expenditure by Indian households had accelerated with an average growth rate of 7.8 per cent compared to an average of 6.1 per cent in 2011-14. But the recent sharp fall in PFCE in the June's quarter to 3.1 per cent compared to 7.2 per cent in the March quarter has significantly contributed to the recent slowdown.

Any fall in consumption expenditure, as and when it would happen, would escalate the crisis even more. If consumption spending falls, then output and employment levels also fall since consumption expenditure directly impacts the other two. As a consequence, the

economy would stagnate, and prices deflate. Lower prices, if unable to recover the costs, would halt the operations of any firm and would initiate the layoff process. This, in turn, reduces earnings further. Hence this vicious cycle keeps on repeating itself until the economy slips into a deeper state of shock.

About India's GDP:

Another major component of India's GDP is investment, induced by both – private and government sectors. It has been a key driver of growth since the liberalization of 1991. Though gross fixed capital formation (GFCF), the main constituent of investment in the economy, increased, yet its contribution to growth fell by 6.2 percentage points in 2014-19 than in 2011-14. The slackening of investment lowers the level of infrastructure development, causes hesitation in creating small businesses, stop entrepreneurs from investing in research and development, and thus stagnates technological development. Capital investments are long-term gains that generate profitability for many years by improving operational efficiency and boosting innovation. It goes without saying that for holistic growth of the economy and to gain competitive edge over others, the economy must innovate.

A Growth Recession:

Economists call the continued slowdown quarter after quarter a growth recession. This is as damaging as recession. Here the economy continues to grow but people continue to lose employment, and hence income leading to decline in consumption spiralling into reduction in investment triggering further loss of employment and the economy is trapped in vicious cycle. The situation is like a perfect storm where a way out cannot be seen. The only option left to those trapped in such storm to wait ensuring minimum damage is done, and hope the storm dissipates on its own.

Consumption had begun its slide from a high of almost 10 per cent in September 2018 quarter. It continued to decline till it reached an 18-quarter low of 3 per cent in April – June quarter 2019. Private consumption has improved to 5 per cent in September quarter. It is really a good news. But the damage has been done. Similarly, investment has gone from about 12 per cent growth to 1 per cent in quarter ending September 2019. It was 4 per cent in April – June period.

Many sectors that contribute to the Indian Economy's growth path, like Automobile, Real estate, Fast Moving Consumer Goods (FMCG), Manufacturing, Agriculture are bearing the brunt of economic slowdown and lagging behind in achieving desired growth rate and jobs in these sectors are not only going down but are also trimmed. Exports witnessed a negative growth of 0.4% in Q2 of 2019-20 first time after 2015 Q4. The $100 billion automobile industry that employs 370 lakh people and contributes 12% to the national GDP, is suffering from huge slow down. Around 3 lakhs jobs are lost, Sales have gone down and the automobile industry appears to be going in reverse gear.

According to CMIE:

The official data released by the National Statistics Office (NSO) confirm that. Weaker consumer demand and slowing private investments are the two key factors behind the Indian Economy Slow Down. Eight core sectors have registered negative growth of just 2.1% in July, compared to 7.3% in the corresponding month last year. According to the Centre for Monitoring Indian Economy (CMIE), the overall unemployment in India has now touched 8.2%, with a high urban figure of 9.4%. FPIs have pulled out a net amount of Rs.5,920 crore even after the government announced a rollback of enhanced surcharge on FPIs. All the sectors need huge investments and remedial measures to increase the